

Enhancing Roof Deck Performance with PVC Waterproof Membranes



PVC membranes were specified for roof decks at a Baltimore-area town house development. Bond Street Townes, Fells Point, Maryland. Architect: Architecture Collaborative, Inc.

How to create safe, attractive outdoor spaces and durable, walkable surfaces

Provided by Duradek

Roof decks offer inexpensive living space geared to relaxation and socializing and, especially in urban environments, often afford views over a glittering cityscape. Yet because these outdoor rooms can quickly become unsightly and even unsafe if they are not built of the proper materials, they can be particularly challenging for architects. Roofing products are not intended for pedestrian traffic. Protective carpet or wood can be placed

over the roofing, but are susceptible to damage from the elements. Applied coatings and fiberglass have been used with limited success due to the inherent deficiencies in the materials themselves. With walkable, waterproof decks being so problematic, many architects and building officials have shied away from them.

However, walkable decks finished with heavy-duty polyvinyl chloride (PVC) thermoplastic waterproofing membranes are one way to ensure that outdoor spaces remain livable for years to come. The surface has its origins in the 1960s when it was used in small boats to provide an attractive, slip-resistant flooring that would clean easily and stand up to the abuses to which a fishing or water ski boat may be subjected. PVC membranes were adapted and introduced as a waterproofing roofing material in Canada, and have been growing in popularity in the U.S. market ever since.

Typically applied with heat-welded seams, and formulated for long-term, direct exposure to the elements, PVC membranes have distinct advantages over traditional waterproofing methods. This article will detail the differences between the traditional and the PVC approach to waterproofing and provide an overview of design and installation considerations, as well as introduce the basics involved in specification of PVC-based membranes.

Typically applied with heat-welded seams, and formulated for long-term, direct exposure to the elements, PVC membranes have distinct advantages over traditional waterproofing methods.

CONTINUING EDUCATION

Use the learning objectives below to focus your study as you read **Enhancing Roof Deck Performance with PVC Waterproof Membranes**. To earn one AIA/CES Learning Unit, including one hour of health, safety, welfare credit, answer the questions on page 324, then follow the reporting instructions on page 352 or go to the Continuing Education section on archrecord.construction.com and follow the reporting instructions.

LEARNING OBJECTIVES

After reading this article, you should be able to:

- Examine the types of walkable roof decks, waterproofing options, and common problems
- Analyze the characteristics, advantages and applications of walkable roof deck, and outdoor flooring systems
- Explore design and installation considerations for walkable roof decks, balconies, and outdoor flooring systems
- Understand key issues in specifying waterproof PVC-based roof deck and flooring membranes



Photo credit: Jaime Kotanko

Roof decks offer additional space to town house dwellers.
Project: Canton Mills, Canton, Maryland. Architecture Collaborative, Inc.

The ABCs of Pedestrian Roof Decks

Pedestrian roof decks are surfaces that are subjected to pedestrian traffic. They can be constructed with a wood or concrete substrate, and can be waterproofed using a variety of materials. Waterproofing systems for wood or concrete decks are typically classified as protected membrane assemblies or as exposed membrane assemblies. In protected assemblies, the waterproofed membranes are protected by another surface, such as concrete pavers, tiles or wood deck boards. In exposed assemblies, the waterproof membrane, which is either a liquid-applied coating or a PVC membrane, is exposed to the elements.

Traditional waterproofing methods in protected assemblies can result in a number of common problems. Wood can rot. Coatings can delaminate. Concrete deteriorates. Over time, costly maintenance and expensive repairs are required to correct these problems.

Liquid coatings can also be problematic. Because concrete substrates tend to shift in response to daily temperature fluctuations, unattractive and potential dangerous cracks can occur. This kind of constant movement can put enormous stress on epoxy, urethane, and acrylic liquid-applied coatings. As a result, pinholes, blisters or surface cracks often occur, allowing moisture to penetrate the membrane and cause further deterioration of the concrete. In addition, incorrect or inadequate surface preparation is a huge reason for failure of liquid coatings.

While outdoor carpet may be an attractive option, installed on its own, it is not waterproof. When it does get wet, carpet tends to hold water and dry very slowly. If the carpet is laid without a waterproof membrane underneath, it will allow water to permeate the concrete or wood substrate below, causing it to rot and deteriorate. Furthermore, carpet holds the water close to the deck and doesn't allow it to dry, therefore increasing the potential damage. Beyond that, outdoor carpet fibers tend to deteriorate rapidly through exposure to the sun. Frequently, frayed and unsightly outdoor carpets need to be replaced.

Wood decks have a unique aesthetic appeal. But even treated wood will deteriorate when exposed to the elements. Over time, exposure to moisture will cause wood decking to split, warp, twist, shrink, splinter, crack, and rot. Wood decks, which are also highly combustible and can be slippery when wet, require constant maintenance, regular repainting, and re-staining.

There are difficulties with paver overlays, too. To begin with, the structure has to be designed to accept the additional weight and clearance requirements of the paver system. In addition, drainage is critical to the waterproof membrane underneath the paver system, which is difficult to get at should maintenance, repair or replacement become necessary. Even PVC membranes are not problem-free. While normal traffic will not damage the vinyl, removing snow, moving furniture, dropping sharp objects, skidding a bicycle tire, a roller blade or the edge of a running shoe across the vinyl creates friction, and the extreme heat and abrasion may possibly remove the print. Consequently, solid-color membranes are advisable for high traffic areas.

PVC membranes may also be affected by the sun. "All products designed for exterior use will eventually be affected by Mother Nature," says John Ogilvie, President, Duradek, Ltd. "PVC is the best attempt at prolonging the life cycle of various building products and performs an admirable job in delaying the inevitable."

The Benefits of PVC Membranes

The optimum walkable PVC membrane can have significant advantages over other types of waterproofed flooring materials. PVC membranes are extremely durable—even when exposed to heavy traffic and severe weather conditions. They won't peel, chip, delaminate or crack, and will outlast painted surfaces by years. PVC membranes offer varying degrees of slip resistance as required for the particular project and consequently are considered "safer" than wood or concrete surfaces that become slippery when wet. They also excel in terms of ease of installation. In contrast to coated systems that require frequent recoating and maintenance, PVC membranes need only regular cleaning. "The main considerations we look at when selecting a product like this are durability and affordability. We need something that will be reliable and lasting," says Dave Robbins, RA, president, Architecture Collaborative, Inc., Ellicott City, Maryland, who has used PVC membranes on many projects. "We also need it to be relatively easy to install, and PVC membranes are much easier to install and less expensive than most walking surfaces. And since the entire surface is



PVC membranes come in a wide variety of patterns, textures, and colors.

Consideration should also be paid to sequencing of building components—failure to do so can lead to severe moisture intrusion.

walkable, access is not limited as it is in paver-type roofs.” Waterproof outdoor roof deck and flooring systems consist of pre-manufactured PVC sheet membranes that are applied to wood or concrete deck surfaces. Because they’re pre-manufactured, they can be fabric-reinforced to provide added stability and multi-directional strength.

While waterproofing is the most important attribute of a PVC membrane and appearance is a secondary consideration, membranes come in a wide variety of patterns, colors, and textures geared to diverse needs and budgets. (Figure 3) Because roof deck and flooring

membranes are manufactured in an array of contemporary colors, textures, and patterns, they offer the potential to create complimentary or contrasting borders, and even custom design work. Says Robbins, “The availability of finish colors provides a design opportunity not found in other roofing products.”

If a walkable membrane is to be specified for a project, there are several determining characteristics to look for in order to ensure high quality, durability, and long-term performance. The membrane should be fabric reinforced. It should also have slip-resistant texture. An effective PVC membrane will also have UV and heat stabilizers. “Warnings against the effects of UV rays on the skin are common,” says Ogilvie. “After a period of years these same rays will affect outdoor products too. To minimize this, manufacturers add UV screens and stabilizers to prolong the life of PVC materials. These screens are designed to resist the potential of cracking, embrittlement, and discoloration of the vinyl.” In addition, the membrane should incorporate mildew inhibitors, be fire-retardant, resistant to chemicals, and meet all building code standards.

Design Considerations—the Six Ds

For illustrative purposes, consider a project to waterproof, such as a walkable roof deck. Key design considerations can be thought of as the six Ds—deflection, drainage, drying, durability, detailing, and deconstruction. Each plays an important role in the performance of both the deck and the waterproofing system.

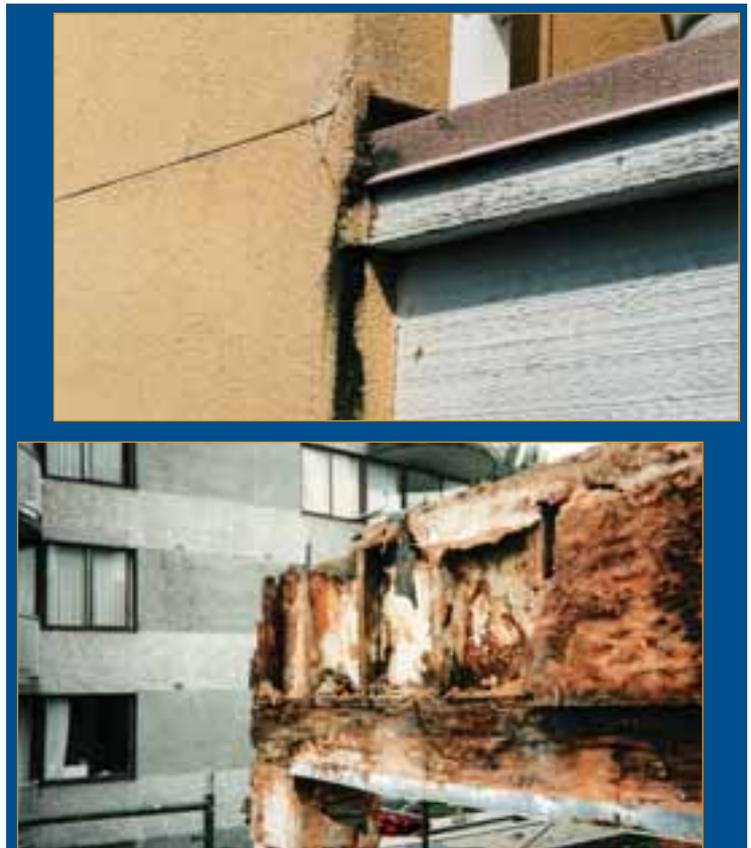
Deflection refers to a deck’s ability to control surface water and is affected by several factors, including slope, drip edges, and diverters. For the best product performance and customer enjoyment of the deck surface, the structure should be sloped to eliminate ponding water, while accounting for building shrinkage or settlement. If the deck is designed with the correct slope, water will flow away from the building into a gutter system or over a drip edge away from the exterior wall system. Slope is vitally important. On new construction, wood frame buildings can shrink as much as 1/2 inch per floor, which can result in the balcony sloping in the wrong direction—a situation that can have adverse consequences for controlling surface water. Furthermore, building settling can make things worse if enough slope hasn’t been built in. But given the proper slope—approximately two percent or 1/4 inch in 12 inches—a simple drip edge detail is usually the most expedient way of removing surface water from the deck surface; false fascia detailing can be used to hide the gutter, fascia, railing mounts, and deck slope. Severe structural damage can occur if the waterproofing detail is not correctly done. “If most of the water is diverted away from critical areas, it’s less likely that problems will occur,” says Ogilvie. (Figure 4) To address this situation, simple pre-manufactured diverters can be installed and waterproofed to steer water away from adjoining walls and other critical junctions.

Drainage refers to the ability of the building assembly to redirect any liquid water that enters the system and allow it to drain to the outside. Drainage is dependent on

two factors: flashing and proper sequencing of moisture barriers and detailing of wall openings. Flashings are metal components that are placed at strategic spots to either direct water to an appropriate location or to keep it out of a structure. A wall flashing, for example, is attached to the outside wall several inches above the deck surface, and overlapped by tar paper which, in turn, sheds the water onto the PVC roof membrane. In this case, the PVC membrane would tuck up under the flashing so that no water—from snow, splashback, wind-driven rain or from hosing off the deck—can get into the wall system.

Special attention to flashing is important, as incorrect detailing of flashing elements will invariably lead to leaks and water damage. For example, curbs or knee walls higher than three inches or higher than a wall opening will result in a “trapped” deck system that requires special drainage. Should a trapped deck occur, the top plate of the curb or knee wall must slope back toward the deck surface. In addition, the PVC membrane should extend to the line of the outside drip edge, which, in turn, should extend well out from the building wall surface.

Consideration should also be paid to sequencing of building components; failure to do so can lead to severe moisture intrusion. Proper sequencing of moisture barriers is critical, and installing the PVC membrane after the wall assembly has been completed will almost always lead to failure. In the first step, the vinyl is installed on the floor and extended up the wall a minimum of six inches (the actual height is dictated by the local building code). Vertical surfaces are then covered by a tar paper which overlaps the vinyl by at least two inches; some builders use two layers of tar paper for added waterproofing protection. Horizontal surfaces such as the top of stub walls or solid railings should be covered with a peel-and-stick membrane. Special attention should always be paid to the “saddle,” where horizontal and vertical surfaces meet.



Severe structural damage can occur when water is not properly diverted.

Many decks have posts and columns that require proper construction and sequencing of moisture barriers to prevent water from seeping under the PVC membrane. Water may find an entry point in the post itself and get in behind the waterproof membrane. As wood posts or columns will crack and allow water to get into the subsurface, they should be covered with a moisture barrier and then finished with siding. Where the dramatic effect of a rough-hewn wood post is required, special consideration must be made for post attachment. When fastening metal rails or posts to the deck surface, all pilot holes should be filled with a sealant before screws are inserted. Curbs, knee walls, posts, and wall openings must be constructed and detailed properly to ensure the performance of the membrane. In constructing or modifying door openings, door sills should be sloped toward the deck surface for optimum drainage. In addition, the waterproof membrane should continue into and waterproof the rough door opening saddle in order to deflect any moisture intrusion.

Building authorities may require overflow drains or scupper boxes on trapped decks to provide a path for water to drain from the deck. Drains and scuppers should be sloped toward the outside, and scuppers should be inserted into the deck surface so as to prevent ponding. In general, scuppers are very difficult to detail in such a way as to make them truly impervious to wind, rain, snow, and structural deflection. ABS-shower drains are only approved for showers and are not suitable for any roof deck or multi-family building applications. Drains should be approved roof drains. PVC-coated drains or drains with a positive clamping system are suitable to allow water to drain into the building's storm water system. With PVC-coated overflow devices, the PVC decking membrane can be welded directly to the PVC-coated surface, with no caulking required.

Drying refers to any features of the building assembly that speed the drying of materials that have been exposed to moisture. Drying can be aided by the use of a rain screen wall assembly or by the venting of trapped air spaces. Proper ventilation is critical and insufficient ventilation of the deck space can lead to mold, mildew, and rot. Venting of the air space underneath decks, balconies, and walkways with a closed soffit or ceiling is especially important for adequate drying. If the underside of a roof deck, balcony or walkway has a closed soffit or ceiling, venting is required in order to reduce moisture buildup. To be effective, the vent area should be a minimum of 1/150th of the insulated ceiling area. If equal venting can't be provided at both ends of the joist runs, then purlins should be installed above the joists in order to allow for cross ventilation.

To facilitate ventilation, some manufacturers offer deck ventilation systems that allow for venting of the roof space joists in new and retrofit construction. "These deck ventilation systems work by allowing air from the roof space to circulate up and through a type of snorkel vent which includes a perforated mesh bug screen," says Ogilvie. "And they can be installed without altering the elevation of the deck, door openings, railings or through-wall flashing details."

Durability refers to assemblies and materials that stand up to foot traffic, moisture, mildew, chemicals, and environmental conditions. The durability of the assembly will be affected by the quality of the waterproofing membrane, and by its overall maintenance. While two waterproofing membranes may have a similar appearance, the quality of their ingredients can give the product a price differential of up to 25 percent, and a difference in life expectancy of as much as 75 percent. Model building codes that dictate the requirements for roof and walking deck membranes should be consulted. Roof membranes, for example, are tested in accordance with nationally recognized standards, such as the American Society of Testing and Materials (ASTM) E-108 (International Codes),

Well before the product hits the deck, a thorough examination of the space that will be covered is in order. The better the surface, the better the finished floor.

ULC-S107 (NBC), for Class "A", "B" or "C" Fire Endurance Rating. PVC roof and walking deck membranes must conform to the same material standards as PVC Roofing and Waterproofing Membranes.

Any alternative material, type or method of construction can be accepted as long as it demonstrates compliance with the performance features of the applicable code. In the United States, the International Code Council Evaluation Service (ICC-ES) evaluates Roof and Walking Deck Membranes in accordance with the ICC-ES interim Criteria for Walking decks (AC39), dated March 2000.

In addition, waterproofing membrane products must be manufactured under an approved quality-control program with inspections by an inspection agency accredited by the International Accreditation Service (IAS).

Also key to the durability of a PVC membrane is to ensure that all components of the waterproofing system are compatible and will not adversely affect performance. This includes the membrane, along with any tapes, sealants, adhesives, drains, scupper boxes, flashings, or perimeter fastening devices.

Waterproof PVC roof deck and flooring systems are highly durable and maintainable with periodic washing to remove surface dirt. Rougher membranes may require washing with a scrub brush and mild detergent or pressure washing. Regular inspection of caulking and immediate attention to any loose seaming will ensure that the PVC membrane lasts for years to come.

Detailing refers to the workmanship involved in installing materials and assemblies such that they are watertight and aesthetically appealing. Permanent secure waterproofing depends upon proper detailing at perimeters and penetrations. "A good or bad detail can often mean the difference between a good and a bad installation," says Ogilvie, noting that use of pre-manufactured flashing details for outside corners, posts, and railing attachments can help ensure a neat and waterproof detail. Good workmanship and proper detailing are critical to the long-term performance of a waterproof outdoor flooring system, and should always be installed by manufacturer-approved and/or trained technicians. PVC membranes can be hot-air welded to provide a completely waterproof seam, making them well-suited to fine detailing. Poor workmanship and improper detailing will compromise deck aesthetics, and will result in poor deck performance. "The manufacturer provides a lot of good details to ensure a watertight installation as well as providing the required fasteners and accessories," says Robbins.

Deconstruction refers to the use of waterproofing solutions that offer long-term life expectancy as well as ease of replacement. Deconstruction is a relatively new concern that has become increasingly important for "green" construction. In terms of durability, with proper care and cleaning, today's waterproof PVC membranes can be expected to last for 10 to 15 years or more—and 20-25 years is not unusual. Demountable flashing systems are one way to reduce the amount of deconstruction required to repair or replace a waterproofing membrane. These systems are easy to remove, and allow the PVC membrane to be repaired or replaced quickly and easily with minimum destruction. Membrane and trim panels can be replaced without disrupting the existing wall system and doors, which means that to replace the waterproofing membrane, one doesn't have to take off the siding or stucco or compromise the second waterproofing job.

Installation Considerations

Like all products, the PVC membrane will function more effectively with proper installation. Well before the product hits the deck, a thorough examination of the space that will be

covered is in order. The better the surface, the better the finished floor. In a typical installation, the vinyl is installed over the top of the structural plywood flooring. Code requires 5/8 inch plywood, but 3/4 inch provides a stronger surface with less bounce and less warping. If the plywood is of poor quality, pressure-treated or it is oriented strand board, it must be overlaid with a plywood or cement board skin. Since 1/4 or 3/8 inch plywood usually warps, an overlay of no less than 1/2 inch is recommended.

Sanded plywood or cement board will give the best-finished surface possible. As a rule, 1/4 inch or 3/8 inch plywood will warp due to absorption of moisture from the atmosphere. For the flattest possible surface, it's recommended to overlay with minimum 5/8 inch and preferably 3/4 inch plywood. In any case, the deck must be secure, well supported, clean, smooth, free of depressions, waves and projections, properly sloped to drains, valleys, or eaves. ■

CLICK FOR ADDITIONAL REQUIRED READING

The article continues online at <http://archrecord.construction.com/resources/conteduc/archives/0512duradek-1.asp>.

To receive AIA/CES credit, you are required to read this additional text. For a faxed copy of the material, call Jennifer Ogilvie toll free at 877-387-2724.

**AIA/ARCHITECTURAL RECORD
CONTINUING EDUCATION Series**

LEARNING OBJECTIVES

After reading this article, you should be able to:

- Examine the types of walkable roof decks, waterproofing options, and common problems.
- Analyze the characteristics, advantages and applications of walkable roof deck, and outdoor flooring systems.
- Explore design and installation considerations for walkable roof decks, balconies, and outdoor flooring systems.
- Understand key issues in specifying waterproof PVC-based roof deck and flooring membranes.

INSTRUCTIONS

Refer to the learning objectives above. Complete the questions below. Go to the self report form on page 352. Follow the reporting instructions, answer the test questions and submit the form. Or use the Continuing Education self report form on *Record's* web site—archrecord.construction.com—to receive one AIA/CES Learning Unit including one hour of health safety welfare credit.

QUESTIONS

1. PVC membranes are superior to traditional waterproofing materials in that:
 - a. They will never be affected by the elements
 - b. They are able to move with the subsurface
 - c. They do not require cleaning
 - d. They do not require professional installers
2. Deflection is affected by:
 - a. Slope
 - b. Diverters
 - c. Drip edges
 - d. All of the above
3. Drainage is dependent on:
 - a. Drip edges
 - b. Flashing
 - c. Ventilation
 - d. Sealants
4. Installing the PVC membrane after the wall assembly has been completed:
 - a. Is critical to ensuring a watertight floor
 - b. Will almost always lead to failure
 - c. Is an advantage over traditional waterproofing mechanisms
 - d. Should be done only if the deck has posts
5. Drying can be aided by:
 - a. Slope of the deck surface
 - b. Scuppers
 - c. Venting of trapped air spaces
 - d. A closed soffit
6. Neat and waterproof details can be assured by:
 - a. A hot-welded PVC membrane
 - b. Periodic maintenance
 - c. Pre-manufactured flashing
 - d. Overlapping two layers of building paper
7. When installing a PVC membrane over an existing system that has failed, it is necessary to:
 - a. Inspect for spalling concrete
 - b. Sand plywood or cement board
 - c. Use a heavier PVC membrane
 - d. Fill in joints
8. The most critical element of a PVC waterproofing system is:
 - a. Detailing
 - b. Ventilation
 - c. Preparing the substrate
 - d. Seaming
9. In "fully wrapped" roof deck membrane installation:
 - a. A metal "L" trim can be used to secure the PVC membrane to the bottom of the fascia
 - b. The PVC membrane is heat-welded to a PVC-coated flashing that provides a drip edge
 - c. Galvanized flashing with a PVC clip holds the PVC membrane in place
 - d. The PVC membrane is heat-welded to a PVC-coated scupper box, which provides drainage
10. Typically, a membrane manufacturer will not supply:
 - a. Overflow drains
 - b. Roof drains
 - c. Flashing
 - d. Perimeter fasteners



Duradek is a multinational company that has installed over 100 Million Square Feet of 100% waterproof, vinyl membranes since 1974. This decking system was developed in the Pacific Northwest, a place that relies on superior waterproofing products for its harsh climates. Not only does Duradek perform well in all kinds of weather, it also comes in over 20 colors and patterns to enhance the exterior of any home. It is a non-slip, mildew resistant, outdoor flooring, with a life span of approximately 20 years. Besides being an exceptional decking membrane, Duradek Ultra products may be used over living space to provide a dry, watertight area below. It is ICC approved for use over habitable areas and also carries Class A and C fire ratings.

**CIRCLE 101 ON READER SERVICE CARD OR GO
TO ARCHRECORD.CONSTRUCTION.COM/PRODUCTS/**

Surfaces and site conditions must be ready to receive the PVC membrane, and they must conform both to the membrane manufacturer's requirements and the local building code standards. If problems are seen, the installation consultant must be notified of all conditions that would prevent satisfactory completion of work. All unsatisfactory conditions must be corrected before proceeding. Further inspection is necessary in cases where a waterproof PVC membrane is being installed over an existing system that has failed. The deck must be thoroughly inspected for rot, weakness of plywood, delamination of plywood, loose panels, or spalling concrete that may be hidden under the existing waterproofing membrane.

Once the deck surface is given the green light, the surface must be prepared. For wood decks, this means filling in joints, knot holes, voids, and low areas with filler and sanding until a smooth surface is achieved. For Class "A" fire-rating-approved application, a plywood deck must be covered with a cementitious board that meets all requirements. For concrete decks, surface imperfections and variations must be filled with leveling compounds. It's also important to test for and remove surface contamination.

To ensure adequate adhesion, installers should glue a small test patch of the PVC membrane (about two square feet) to the existing surface. After 24 hours, the adhesion should be checked. If there are any concerns about the ability of the membrane to bond to the existing surface, the coating must be removed and the deck resurfaced with a suitable underlay.

Roof Deck Membrane Installation

The PVC membrane should be installed in accordance with the manufacturer's instructions and any appropriate PVC roof membrane application codes (for example, the CGSB -37-GP-55M). Seaming, the process of fusing two sheets of PVC membrane together, is the most critical element of a PVC waterproofing system. The vinyl sheets should be overlapped and heat fused. The membrane should be affixed to the substrate with the minimum number of seams possible. However, all seams should be extremely strong—and they should be visible. Offering invisible butt seams, as has been done in the past, was found to compromise the waterproofing, the prime function of the system.

To allow for a strong hot-air welded seam, adjacent membranes should overlap by a minimum of 3/4 inch. It is important to remember that proper fusing cannot take place if the back of the overlapping piece of PVC has been glued. Seam strength and integrity should be checked every few feet. If the seam comes apart, the welding is incomplete and must be redone. Extreme care must be used when welding a PVC membrane where the seam runs into a 90-degree corner and vertically up a wall or over an edge. All wall and corner seaming must be carefully inspected for pinholes. A strip of PVC may be welded on top of any critical junctions for added security.

On projects where the deck is to be used as a staging area for other trades, protective panels should be applied over the finished membrane.

Installation of a PVC membrane involves detailing that should be carefully followed. Below are installation scenarios featuring PVC and metal elements; PVC and coated metal elements; "L" trim and fully wrapped around the fascia.

For a roof deck installation with PVC and metal elements, the inside back corner and outside front corner of the PVC membrane are folded and welded, not cut. Galvanized flashing with a PVC clip holds the PVC membrane in place. A roof-quality drain with clamping ring holds the PVC membrane in place and provides drainage. Colored metal flashing installed over the PVC membrane completes the waterproofing of the deck curb. This trim metal actually holds the PVC membrane in place and prevents it from curling or shrinking.



The PVC membrane adheres to the substrate.

For a roof deck membrane installation featuring PVC and coated metal elements, the PVC membrane is heat-welded to a PVC-coated flashing that provides a drip edge at the outside perimeter of the deck surface. The PVC membrane is heat-welded to a PVC-coated scupper box, which provides drainage, and to a PVC-coated overflow drain that also provides drainage for trapped or curbed decks.

In roof deck membrane installations using "L" trim, a metal "L" trim is used to secure the PVC membrane to both the outside and inside edges of the deck, balcony or walkway surface, and extended up the wall by a minimum of six inches to meet some building codes. In order to ensure a waterproof installation, the PVC membrane is overlapped by the building paper and exterior finish.

In "fully wrapped" roof deck membrane installations, the PVC membrane is fully wrapped over the fascia at the exterior edge of the deck surface, and secured to the inside edge with an inverted "L" trim and gumstop sealant. To provide an extra measure of strength and a secondary sealant, butyl tape is applied at the inside edge. Alternatively, a metal "L" trim can also be used to secure the PVC membrane to the bottom of the fascia.

Specifying Roof Deck Systems

Planning goes a long way to achieve superior results and roof deck systems that are attractive and watertight. The manufacturer of the PVC membrane should have 25 years experience with the product to be used; installers should be trained and approved by manufacturer. For best results, installation and seaming plans showing joints, termination details, and material interfaces should be prepared, along with two labeled samples (8-1/2 by 11 inches) of the specified PVC membrane showing finish, pattern, color, and backing. At least one week prior to the start of installation, a pre-installation meeting should be held involving the client's representative, manufacturer's representative, contractor, and installer to discuss pedestrian deck waterproofing practices, as well as any precautions applicable to the specific project.

When it comes to the actual PVC product used for the roof deck system, there are several factors to keep in mind. It is important to specify a polyester-reinforced PVC membrane

PVC membranes are extremely durable—even when exposed to heavy traffic and severe weather conditions. They won't peel, chip, delaminate or crack, and will outlast painted surfaces by years.

with ultra-violet resistance for fully-adhered installation with heat-welded seams and perimeter attachment. Always specify overall sheet thickness, as well as width and color.

With the exception of cap flashings, which are typically manufactured and installed by other parties, all perimeter fasteners and PVC-coated metal scuppers, overflow drains, roof drains, and trim should be provided by the membrane manufacturer. Whenever possible, the color of the perimeter fasteners should be coordinated with the membrane. Prior to installation, PVC membranes should be stored in a sheltered place without direct contact to the ground.

Model building codes are designed to ensure that buildings are structurally sound, safe from fire, free from health hazards, and accessible. In the U.S. and Canada, walkable roof deck membrane building requirements include:

- Provide class A, B or C fire protection classification. Conform to ASTM E-108 (United States); Conform to ULC-S107 (Canada)
- Conform to CAN/CGSB – 37.54 polyvinyl chloride roofing and waterproofing membrane
- Suitability of product as a walkable roof membrane. ICC evaluation services (United States); CCMC (Canada)
- Product listed by accredited quality-control provider

Execution

Prior to installation, an examination should be conducted to verify that the existing deck is secure and solid in accordance with local code structural requirements, and that the surface is clean and smooth, free of depressions, waves, and projections, and properly sloped to drains, valleys, and eaves. Any joints, voids or low areas of a wood deck should be filled and sanded smooth. Any surface imperfections or variations on a concrete deck should be filled with leveling compound and the surface cleaned of any contaminants. Waterproof PVC membranes should not be installed when temperatures are below 25 degrees Fahrenheit, above 98 degrees Fahrenheit, or when winds are gusting over 30 mph, and should be installed with the minimum number of seams possible. All seams should overlap by 3/4 inch and be heat-welded.

PVC Membranes—A Option for Outdoor Spaces

Factory engineered to be resistant to fire, UV rays, and mold and mildew, PVC membranes are easy to maintain and available in a variety of colors and textures. Today, they represent a valuable option for an aesthetic means of waterproofing all types of walkable surfaces, including sun decks, patios, balconies, pool surrounds, stairs, porches, balconies, sun decks, and walkways—or any outdoor area requiring a cleanable, waterproof surface. Generally speaking, for roof decks or surfaces requiring maximum protection, heavy-duty sheet flooring is ideal. Lighter weight vinyls, on the other hand, offer cost-conscious solutions for deck and balcony surfaces not exposed to heavy traffic or extreme conditions. Smoother textures offer easy-to-care-for surfaces that are better suited to indoor pool decks, hot tub areas, and even garage floors. Because they can be installed quickly and easily in any weather, even over existing coatings, PVC membranes result in fewer disruptions and lengthy closing of buildings or areas of buildings being covered.

When executed properly, waterproof PVC membranes make a significant contribution to creating outdoor spaces that are livable, attractive, and durable. “The flexibility and simplicity of PVC membranes are great,” maintains Robbins. “They offer us peace of mind when specifying this critical type of item.”

When executed properly, waterproof PVC membranes make a significant contribution to creating outdoor spaces that are livable, attractive, and durable. “The flexibility and simplicity of PVC membranes are great,” maintains Robbins. “They offer us peace of mind when specifying this critical type of item.”