

ROOF MEMBRANE: Single Ply - PVC

Design & Technology Series #17



Fig. 1: PVC membrane being detailed with hot air welder (Used with permission by Sika).

What is PVC Roof Membrane?

Polyvinyl Chloride (PVC) roof membrane is a type of single-ply roofing material commonly used in industrial, commercial and institutional buildings. It is made from a durable plastic material called polyvinyl chloride, which is known for its flexibility, strength, and resistance to weathering.

PVC roof membranes come in various thicknesses and can be reinforced with different materials to enhance their strength and durability. Various typical thicknesses and reinforcement options are available.

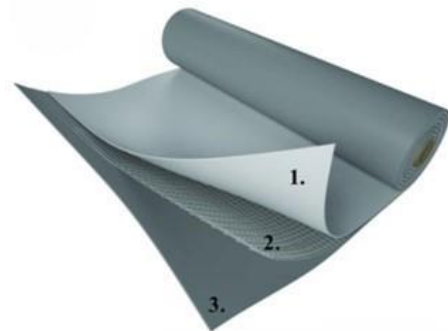
Thicknesses:

- 40 mils (1.02 mm): This is the thinnest option available and is often used in applications with lower performance demands or where budget constraints are a primary consideration.
- 50 mils (1.27 mm): This thickness is a commonly chosen option as it offers a balanced combination of durability and cost-effectiveness.
- 60 mils (1.52 mm): A widely used thickness, 60 mils provides enhanced durability and performance compared to thinner options. It is the standard thickness for membrane detailing on Alberta Infrastructure (AI) buildings.
- 80 mils (2.03 mm): The thickest membrane option,

80 mils is typically used in demanding environments where additional protection is necessary. Due to its superior strength and resilience, this thickness is the minimum requirement for the field roof area of AI buildings.

Reinforcements:

- **Polyester Scrim:** The most common reinforcement, this woven fabric layer adds tensile strength and puncture resistance to the membrane.
- **Fiberglass Scrim:** Used for specific applications, such as adhered systems, this reinforcement offers dimensional stability and fire resistance.
- **Non-reinforced (Homogeneous) PVC:** While less common, some PVC membranes are available without reinforcement. These are typically used in special applications where flexibility and conformability are needed, but they lack the tensile strength of reinforced membranes.



- Fig. 2: Reinforced PVC membrane. 1. Upper PVC layer, 2. Reinforcing scrim layer, 3. Base layer (Used with permission by Researchgate).

Other Considerations:

- **Fleece-backed PVC Membranes:** These have a layer of fleece on the underside, which can improve adhesion in some installation methods and provide additional cushioning against the substrate.

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- KEE (Ketone Ethylene Ester) Additives: Some PVC membranes include KEE, a plasticizer that enhances flexibility and longevity, particularly in harsh environments.

The choice of thickness and reinforcement depends on the specific requirements of the roofing project, including factors like climate, building movement, and expected foot traffic.

Advantages of PVC Roof Membrane

Durability and Longevity

PVC membranes are highly resistant to harsh weather conditions, including UV radiation and wind. When installed over an insulation cover board, they are very resistant to punctures and tears, which is crucial for long-lasting performance.

Energy Efficiency

PVC roofing is known for its high reflectivity, which helps to reduce the amount of heat absorbed by the building, thereby lowering cooling costs. Many PVC membranes are Energy Star-rated due to their reflective properties, contributing to overall energy savings.

Waterproofing

PVC membranes are typically heat-welded at the seams, creating a strong, watertight bond that is more reliable than glued or taped seams. This watertight bond offers superior protection against leaks.

Chemical and Fire Resistance

PVC membrane is resistant to many chemicals, including oils and greases, which can be beneficial in industrial or commercial settings. PVC membranes are self-extinguishing and have a high fire rating, which adds to the safety of the building.

Ease of Installation and Maintenance

PVC is relatively lightweight, which makes it easier and faster to install than other roofing systems. The flexibility of PVC ensures it is easy to mold around roof penetrations; this is especially important when dealing with difficult details. Once installed, PVC roofs require minimal maintenance, and any necessary repairs are typically easy to carry out.

Environmental Benefits

PVC membranes can be recycled at the end of their life, reducing waste and environmental impact. Its reflective properties help mitigate the urban heat island effect, contributing to a cooler environment. While heat island effect is less pronounced in northern climates, within major centers it should still be considered.

Things to Consider

Using a PVC roof membrane can potentially help lower insurance costs for several reasons. High fire rating, severe weather resistance, longevity, efficiency and compliance are just a few considerations. Several school boards have started to use flameless roofing systems exclusively due to insurance requirements, making heat welded membranes a viable option.

Because Alberta is in a northern climate with extreme temperature swings, thermal movement (expansion and contraction) of building components occurs regularly. The flexibility of PVC does well at withstanding this movement.

Installation time frames, seasonally, can be limited for PVC membranes. Single ply systems rely heavily on adhesives, especially when it comes to detailing. Low-VOC adhesives and primers contain more water than standard bonding adhesives and primers and can be adversely affected by outside temperatures. Heated storage of materials and a maximum cold weather temperature of -10°C limits the installation window.

PVC membranes can become slippery when wet or when a buildup of snow or ice is present. This can create safety hazards, difficulty in maintenance, and can restrict access during rain or snow events. There are steps to mitigate this slippery condition. Heat weldable PVC textured membranes can be used to create pathways to mechanical units and in high traffic areas. Walkways pads are another option.

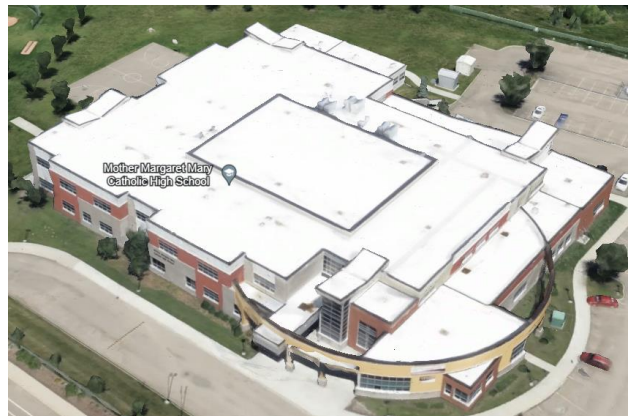


Fig. 3: PVC roof on Mother Margaret Mary Catholic High School, Edmonton AB (Image sourced from Google Earth)

Information/Images Sourced From:

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