Vinyl Roofing Systems – High Performance Over A Long Life

Vinyl roofing membranes have permanently raised the bar in roofing specification and installation, offering a clean, quick, safe and affordable option to alternative roofing systems.

A single-ply technology employed worldwide for more than 40 years – with a track record of performing in every conceivable and extreme temperature condition – vinyl, or PVC, roofing membranes are a natural choice for specifiers looking for high performance roofing systems for their building envelope and unparalleled ease of installation.

Available in wide rolls or pre-fabricated panels, vinyl membranes are constructed of flexible, tear-resistant thermoplastic material reinforced with fiberglass non-woven mats or polyester woven scrims, giving them the strength and durability to withstand thermal cycles, wind loads, structural movement and temperature extremes.

Versatile, durable and safe application options

ASTM D-4434, "Specification for Poly (Vinyl Chloride) Sheet Roofing," establishes minimum standards for vinyl roof membranes. Under these test criteria, a vinyl sheet must show no evidence of cracking or crazing after 5,000 hours of exposure to a xenon arc light source, water spray and elevated temperatures – all factors that can degrade roofing membranes and lead to failures.

These stringent standards make it possible to use vinyl roofing material on everything from flat roofs with ponding water to vertical wall waterproofing applications. This kind of roofing also may be used in concealed applications such as the waterproofing layer in green, or planted, roofs and plaza deck applications.

Depending on the application requirements, vinyl roofing membranes can be installed on the roof deck or substrate in several ways: [1] mechanically attached with various fastening systems, [2] loose laid in planted roofs or plaza decks, where the weight of the overburden holds the membrane in place, or [3] adhered with either solvent- or water-based adhesives, or self adhered membranes.

The seams of vinyl roofing systems are welded together with hot air. These seams form a permanent, watertight bond – regardless of roof slope – that is stronger than the membrane itself. This is a major advantage of thermoplastic membranes over other types of roofing systems that rely on adhesives, tapes and caulks to seal the seams. No solvent wiping or solvent-based adhesives are necessary for seaming as with alternative roofing systems, nor are torches, open flames or kettles required.

Vinyl roofing adhesives are available that comply with all Air Pollution Control Districts in the State of California, SCAQMD Rule 1168 and the California Air Resources Board (CARB) model regulation.

A commitment to quality control

Vinyl roofing membranes are factory-manufactured to strict quality control requirements, minimizing the risk inherent in field-constructed built-up systems. Professional expertise is available every step of the way, from manufacturer-based technical advisers who consult on all aspects of a project from design concept to installation, to applicators specifically trained in vinyl roofing installation techniques.

A full complement of manufacturer-authorized adhesives, insulation, sealants, plates, fasteners, flashing components and other accessories are available to enhance the roofing system's prospects for a long service life, along with a wide array of product and installation warranties. Warranties can range from 10 to 25 years.

Energy efficiency a hallmark

White or light-colored vinyl roofing membranes achieve some of the highest solar reflectivity measures of which roofing materials are capable.

The U.S. Environmental Protection Agency recognizes all vinyl roofing manufacturers of the Chemical Fabrics and Film Association as ENERGY STAR® Partners for their commitment to continue to produce roofing products that exceed aggressive energy-efficiency criteria and to further the market's acceptance of these products.

For low-slope roofs, a roof product qualifying for the ENERGY STAR label must have an initial solar reflectivity of at least 65 percent, meaning that only 35 percent of solar heat is absorbed, and reflectivity of at least 50 percent after three years in service, in accordance with EPA testing procedures. The program's product list includes vinyl roof membranes with aged reflectivity as high as 86 percent. Non-reflective asphalt built-up roofs, by comparison, reflect between 6 percent and 26 percent solar heat.

Because it is lightweight, a vinyl membrane can often be installed over a dark built-up roof on an existing building (provided an appropriate separator is used), eliminating the need to dispose of discarded roofing materials.

Inherently fire resistant

The composition of the vinyl polymer gives vinyl roofing membranes an inherent fire resistance not found in alternative materials without the use of additives. A simple vertical fire test reveals how these membranes will self-extinguish when a flame source is removed. This is in stark contrast to other roofing materials that will continue to support combustion even after the flame source is no longer present. In the U.S., these systems are available with unlimited slope Underwriter Laboratories Class A fire ratings and Factory Mutual Class 1 approvals.

Design flexibility

Architects need not be limited in their thinking about materials by complex roof lines or multiple roof intersections that may be aesthetically critical to a project. All can be accommodated by vinyl's inherent flexibility, strength and welding characteristics. Watertight seals are easily formed at all details and penetrations.

Vinyl membranes can also be manufactured in a wide spectrum of color options to match a building's color palette; even logos can be incorporated. Extruded profiles can be welded to the membrane to replicate the appearance of standing seam or batten metal roofs, while providing the security of watertight hot-air welded seams.

Cost efficient over a long life cycle

Vinyl roofing systems can deliver reliable service for decades; it is not unusual for them to last more than 20 years. When damage occurs to vinyl roofing – such as a tear or cut – it can be repaired without recoating or resurfacing. The membrane need only be cleaned and then repaired with the same techniques used to weld the seams during installation. Although vinyl roofing systems require little maintenance, manufacturers recommend that they be inspected twice a year for plugged drains and weathered sealants, and after each heavy storm for possible damage.

Vinyl roofing membranes' long service life combined with the need for virtually no maintenance results in low life cycle costs. Life cycle analyses comparing vinyl building products to similar products made of alternative materials have shown them to perform favorably in terms of energy efficiency, maintenance costs, contribution to greenhouse gases and product durability.

In addition, vinyl membranes are recyclable at both the post-industrial and post-consumer phases. Although their long service life does not yet yield a large quantity of these membranes, there is an established vinyl roofing recycling program in Europe, and the industry is actively researching and investing in technologies to improve the availability of recycling alternatives in North America.

Numerous vinyl roofing membranes installed in the United States during the 1970s are still in place and performing well. With a life expectancy of decades, delivering secure, leaktight performance and building energy efficiency is the norm, not the exception, making vinyl roofing an investment that pays for itself many times over.

.