



The Use of Waterborne Bonding Adhesives with Single Ply Roofing Membrane Systems

This paper is intended to address concerns that exist in the commercial roofing industry regarding the use of waterborne adhesives with single ply roofing systems. Its purpose is to provide general information, installation guidelines, and catalog common limitations associated with the usage of waterborne adhesives. This information is complementary to each manufacturer's specific requirements, and is not intended as a replacement.

Single ply roofing membrane systems have been used successfully to waterproof low sloped roofs worldwide for more than 40 years. These systems include thermoset (EPDM), thermoplastic (PVC, PVC/Elvaloy, TPO) and modified bituminous membranes. In order for the membrane to remain in place and provide a watertight covering, various methods of attachment are used. Attachment methods range from ballasting with smooth river stone or pavers, to mechanically fastening with screws and plates and/or metal bars, to applying various types of bonding adhesives.

In the early years of single-ply membrane use, adhered membrane systems accounted for a relatively small percentage of installed assemblies. However, adhesives have always played an important role in bonding the membrane to vertical surfaces in flashing applications such as parapet walls. In today's single ply roofing membrane market, adhering the membrane to the horizontal substrate surface has grown substantially.

Various adhesive types are currently used to adhere single ply membranes to approved substrates. The most common adhesives used today as bonding agents include solvent based, waterborne and 100% solids reactive products. These adhesives have unique characteristics, each having well defined application, storage, and usage specifications relating to ambient conditions and design consideration suitability.

The use of waterborne bonding adhesives began in earnest in the 1980's. As water may be classified as a universal vehicle for suspending polymers and molecules, its use in latex production presented an opportunity for designing adhesives that performed as specific bonding agents for single ply membranes. Formulating chemists focused on engineering waterborne adhesives to sufficiently bond EPDM, PVC and more recently TPO membranes to various substrates such as, but not limited to, roofing insulation, wood, concrete, lightweight insulating concrete and other types of surfaces.

Beginning with regulations in California in the late 1980's, requirements and guidelines have become more restrictive in the amounts of VOC's (volatile organic compounds) that can be released into the atmosphere. For example, the South Coast Air Quality Management District located in the Los Angeles basin area of California adopted Rule 1168 in 1989, which restricted the VOC content that can be present in bonding adhesives used with single ply membrane systems to less than 250 grams per liter. This regulation and others like it have accelerated the development and use of waterborne bonding adhesives in the single ply roofing market.

Waterborne bonding adhesives have been used successfully for over 20 years in the single ply roofing industry. As with solvent based adhesives, waterborne bonding adhesives have advantages as well as limitations. The following summarizes the limitations and advantages for using waterborne adhesives with single ply membrane roofing systems.

WATERBORNE BONDING ADHESIVES LIMITATIONS¹:

1. Protect from freezing during application, storage and shipping. Allowing the adhesive to freeze may destroy the protective layer surrounding the polymer in the water suspension, leading to coagulation of the system and destroying the adhesive's bonding performance and functionality.
2. Extended drying time of the adhesive (per manufacturer's recommendations) is necessary when installation occurs during times of increased relative humidity and moisture saturated air, which slows the evaporation rate of water.
3. Apply adhesive only when the temperature is at least 40°F to 50°F and rising (per manufacturer's recommendations). The ambient temperature must not go below 32°F at any time to prevent freezing during the complete adhesive drying period.
4. Store products at temperatures above 60°F, and preferably no greater than 90°F.
5. Shipping in northern climates in winter months requires heated vans to protect from freezing.
6. Recognize that reaching adequate green strength and ultimate cure may require longer time than solvent based adhesives when applied in a one sided "wet lay-in" method.
7. Handling, application methods, and installation specifications are manufacturer specific. It is therefore extremely important to carefully read and follow each manufacturer's exact guidelines.

WATERBORNE BONDING ADHESIVES ADVANTAGES:

1. Odor is typically extremely limited or non-existent, allowing for use on air sensitive projects.
2. Meets all VOC regulations issued and/or adopted in many areas of the US and worldwide.
3. Product versatility – can be used with smooth back or fleece-backed membranes in one sided, "wet lay-in" or two sided contact mode applications as per manufacturer's installation recommendations.
4. Excellent spreadability, which typically allows for extremely consistent and easy adhesive application. Additionally, most products are formulated for a high coverage rate in square feet per gallon.
5. No red diamond shipping label is required, allowing for less restrictive warehouse storage versus flammable solvent based adhesives which must have an explosion proof room.
6. "Wet lay-in" applications, when applicable, increases the speed of installation and allows membrane re-positioning.
7. Spray or roller applied techniques are available and optional.

As with any membrane adhesive, training applicators on proper waterborne adhesive installation recommendations and specifications is critical to its success. As regulations restricting the use of high VOC solvent based adhesives spread both domestically and internationally, the use and sale of waterborne bonding adhesive products will continue to grow in the single ply membrane market, building on their many years of successful use in the industry.

¹Many of the limitations listed are not merely specific to waterborne bonding adhesives, but rather may be found in other adhesives as well.