



Cold Adhesive Applied Modified Bitumen Membranes

Faced with the reluctance of insurers to provide coverage for roofing applications involving the use of open flame, there has been a renewed interest in cold applied roofing systems. Many manufacturers of modified bitumen membranes are now offering systems that allow for the application of their membranes using cold adhesives. Although the use of cold adhesives with modified bitumen membranes is not new, technical advances in their manufacture and formulation have renewed interest in their use as an alternative to the more traditional torch or hot asphalt methods of attachment. Testing by manufacturers indicate that the ultimate bond strength of membranes applied with adhesive is superior to that applied with hot asphalt.

As the cold applied modified bitumen technology is evolving, so are the installation techniques and methods. Currently there are no uniform installation specifications that can be applied to all applications. Manufacturers have their own set of requirements and procedures that must be followed to ensure satisfactory performance of their particular systems. However, contractors should be aware of some general application precautions and limitations that should be considered whenever these systems are applied.

Adhesive

The adhesive used in the application of modified bitumen is generally a solvent -based material, consisting of asphalt, solvent, modifiers, plus a mixture of fillers, fibres and stabilizers. There is no unique material standard for adhesives used to adhere modified bitumen membranes. The relevant Canadian Standard defining their technical requirements is CAN/CGSB-37.4-M.89, Fibrated, Cutback Asphalt Lap Cement for Asphalt Roofing which also applies to cutbacks used in cold-process b.u.r (built up roofing).

When applied, the solvents evaporate (flash off) resulting in a tacky compound that bonds the membrane to the substrate. The solvent content of adhesives used with modified bitumens tends to be less than that of the traditional asphalt cutbacks used in cold process b.u.r. Many of the blends used with Styrene Butadiene Styrene (S.B.S.) membranes are based on mineral spirits as these solvents are more compatible with the polymer than highly aromatic solvents such as xylene and toluene. In addition, these adhesives emit fewer odours. Depending on the solvent content, they may be formulated and marketed as low volatile organic compound (VOC) adhesives to comply with regional VOC regulations.

Adhesives differ in their formulation in both the type and quantity of solvent and other components depending on their intended use. It is critical to ensure that the adhesive is compatible with the membrane and other materials applied. Never attempt to mix and match adhesives and membranes. In addition, adhesives can only be used with talc or sand back coated membranes. They cannot be used with membranes backed with polyolefin film. An axiom of adhering components is that, in general, the thinner the glue lines the better the adhesion. Each adhesive has a critical thickness that is the optimal quantity applied to achieve the maximum bond strength. The critical thickness of the adhesive will be

affected by the porosity and /or smoothness of the surface to which the adhesive is being applied. Required adhesive quantities will vary depending on the properties of the substrate. By example, more adhesive may be required for application to a rough cement deck than between layers of membrane. Some manufacturers require a greater quantity of adhesive when applied over granulated areas of the membranes. Manufacturers' application rates must be strictly followed.

Too little or too much adhesive can have disastrous performance consequences.

There are different adhesives used for bonding the membrane onto horizontal surfaces (brush grade) than for bonding the membrane onto vertical surfaces and for flashings (trowel grade). The latter are formulated to be slump resistant and are generally applied using a trowel. They are sometimes used to join membrane laps on granulated surfaces. Both types should meet the requirements of CAN/CGSB 37.4-M89.

It should be remembered that adhesives have a limited shelf life, even when stored in their original unopened containers. The shelf life should be clearly marked on the label. Never attempt to use an adhesive that has passed the manufacturer's printed shelf life, or adhesive left over from previous jobs. The sealed containers should be stored in a cool dry place, away from excessive heat. Some adhesives may be adversely affected by exposure to prolonged high temperatures. Always keep the adhesive away from open flame, whether in storage or on the job site.

Tools

Use the right tools for applying the adhesive. Some manufacturers allow the use of a variety of application tools, including brushes, rollers, squeegees and mechanical spray or extrusion units, while others allow only a specific application tool. By example, one manufacturer insists that a notched neoprene squeegee be used while another specifies different depths of notches on the squeegee for differing rates of application. Regardless of the type of tool used, it must be properly maintained. Worn or dirty tools will result in improper coverage of adhesive. During application, the coverage rate should be confirmed by periodic measurements of the depth of adhesive.

Some manufacturers require that pressure be applied to the finished membrane. This may consist of a light brooming or the use of a heavy roller. In the case of laps, pressure applied by a hand roller or trowel may be required. Check with the manufacturer and use the proper recommended tools.

Temperature

Each manufacturer has application temperature limits for their specific products and systems. Most specify a temperature range of 5°C to 40°C as the application window. The specified application temperature is a combination of the outside air temperature, the wind chill effect, and the surface temperature of the substrate. During installation in cold weather (less than ±10°C), special precautions may be necessary. Deck temperature, wind chill, relative humidity, as well as ambient temperatures can influence adhesion and cure time.

Several manufacturers require that the adhesive be stored in a warm environment to maintain the adhesive at the ideal minimum application temperature of 18°C. In addition, the membrane rolls should be preconditioned by storing them in a warm and dry place prior to their installation. During warm

weather applications, shorter strips of the membrane may be required. Regardless of the installation conditions, the membrane must be unrolled and relaxed prior to installation to avoid wrinkling.

Cure Time

Depending on the ambient condition, roof configuration and orientation, the cure time will vary. In general, cure times range between 24 and 72 hours, but may be substantially longer depending on ambient conditions. The initial adhesive strength upon application, commonly referred to as its green strength, is not as strong as with either a torched or hot asphalt application. While the adhesive is curing, it is important to prevent any foot traffic over the completed membrane. The low initial green strength has prompted some manufacturers to require the seams to be welded using a propane torch or by hot air if open flame is prohibited.

Conclusion

Cold adhesive applied modified bitumen systems are being promoted as a viable alternative to the more traditional torch or asphalt adhered installations. Benefits of cold applied systems often cited include the elimination of the risks associated with open-flame, reduced emissions and odours, and, in the case of low VOC adhesives, compliance with increasingly strict air quality regulations. Although the use of adhesives in modified bitumen is not new, many contractors, designers and specifiers do not yet possess a great deal of experience with these applications. Currently, there are no widely accepted general installation practices. This bulletin attempts to inform the contractor of the general considerations and precautions necessary for a successful installation. Contractors should be aware, however, that these requirements may vary from product to product, and that the manufacturer's written instructions should be strictly followed.

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