Advisory Bulletin Equiviscuous Temperatures (EVT)

Since its introduction in late 1977, the concept of EVT has been widely accepted throughout the North American roofing industry as a means of providing an application temperature window and in-the- field quality control. Before the introduction on EVT, manufacturers' recommended application temperatures were based on empirically determined temperature limits intended to obtain the ad hoc standard interplay weight of mopping asphalt of 1.2 kg/m² (25 lbs./100 sq. ft.). Maximum heating temperatures addressed safety considerations and the prevention of fallback of the particular asphalt's softening point caused by overheating.

In the 1970's, research at NBS (NIST) demonstrated that the application of asphalt should be based on viscosity, the property of the asphalt which governs its flow. When asphalt is used to laminate reinforcing felts, it should be applied at temperatures at which it has attained a viscosity that will ensure that the quantity of interply asphalt will be at the recommended quantity of 1 kg/m²to 2 kg/m² (20 to 40 lbs/100 sq. ft.) regardless of the type of roofing asphalt used, provided that the proper application techniques are followed. Further research showed that the ideal viscosity of roofing asphalts for mop applications is 125cP (0.125 Pa.s), and 75cP (0.075 Pa.s) for mechanical spreader applications. Asphalts applied within the EVT application range should result in a homogeneous roof membrane assembly exhibiting the desired adhesion of the bitumen to the reinforcing ply sheets.

These EVT recommendations are now obtained in asphalt standards (ASTM, CSA), roofing specifications and manufacturers' literature. However, there are indications that the EVT concept has not been fully understood and is being misapplied.

The recommended viscosity of 125cP and 75cP applies only to the lamination of the reinforcing plies. These ranges should not be used for other applications, including the top pour (for gravel embedment), the securement of insulation, or the application of modified bitumen membranes.

Top Pour & Gravel

A flood coat of asphalt for gravel surfacing should be applied at ±3 kg/m². Applying asphalt at a viscosity of 75cP or 125cP would yield a top pour too thin to attain sufficient embedment of the gravel. If the top pour is too thin, premature gravel scouring due to wind and water erosion may result. Also, bare spots void of the protective surfacing may lead to accelerated weathering and aging of the roof in those locations.

Insulation Securement

Many manufacturers recommend greater quantities of asphalt for securement of insulation than that recommended for laminating reinforcing plies. For example, most manufacturers of polyisocyanurate insulation recommend a minimum quantity of 1.5 kg/m² for attaching the

insulation to the substrate. Applying the asphalt at the temperature recommended for interply moppings may result in insufficient quantities to satisfactorily adhere the insulation boards. This may be more problematic when the insulation is being applied to uneven surfaces (the asphalt flows into shallow areas), when the boards are rigid and stiff, or when boards susceptible to warping are used.

Modified Bitumens

The previous examples dealt with asphalt being applied at temperatures too hot (viscosity too low) to adhere to desired level of adhesion. In the case of modified bitumen, problems can occur as a result of the asphalt not being hot enough if applied at the EVT recommended for built-up roofing applications. Applied at these temperatures, the asphalt may not be sufficiently hot to melt the modified asphalt coatings. Difficulties in maintaining asphalt temperatures during installation, particularly in cold weather, have often been cited as a primary reason for the popularity of torching these membranes in lieu of mopping.

Conclusion

When asphalt is being used to laminate reinforcing felts in the construction of built- up roofs, the asphalt should be applied at the asphalt manufacturer's recommended EVT. However, these guidelines do not apply to other applications. When asphalt is used to secure insulation, it should be applied at temperatures 15°C to 20°C below the recommended EVT for interply hand mopping of that particular asphalt. For flood coats, the asphalt should generally be applied at temperatures 20°C to 35°C cooler. For mopping of modified bitumen, and thicker coated membranes, the asphalt should be applied at a minimum temperature of 205°C. Under winter conditions, the asphalt should be heated as hot as safely possible to compensate for the more rapid cooling of these thick membranes. In all cases, ambient conditions and roof surface temperatures should be taken into account. EVT is a useful tool for the interplay mopping of reinforcing felts in application of built-up roofing membranes. However, strict adherence to EVT for other applications may yield unsatisfactory performance.