Minimizing SBS blistering

by **Mark S. Graham**

Last month, this column focused on NRCA's investigation of blistering associated with SBS-modified bitumen sheet products applied in hot asphalt. Following is additional information about the investigation and NRCA's recommendations for minimizing the potential for blistering.

Research review

Previous technical research provides useful information about mop-applied SBS-modified bitumen sheet products. "Cooling of Bitumen During Construction of Built-Up Roofing Systems—A Mathematical Model," published in 1981 by the National Bureau of Standards (currently the National Institute of Standards and Technology), reveals that mop-applied asphalt cools relatively quickly.

For example, during ambient conditions of 70 F (21 C) and 10-mph (4.5-m/sec) winds, asphalt applied over an insulated substrate cools from 500 F (260 C) to 400 F (204 C) in six seconds and 500 F (260 C) to 300 F (149 C) in 16 seconds. This illustrates the importance of an SBS-modified bitumen sheet contacting hot asphalt as soon as possible after application to a substrate.

Also, a technical bulletin published by the Canadian Modified Bitumen Manufacturers in 1994 provides specific recommendations for installing mop-applied SBS-modified bitumen sheet products in cold weather (i.e., 40 F [4 C] or colder). The bulletin suggests applying "heat simultaneously to the underside of the sheet and the asphalt while unrolling using a torch with a rapid sweep motion." The bulletin also recommends a maximum 36-inch (914-mm) mop lead during cold-weather applications.

Laboratory analysis

Several samples obtained during NRCA's field investigation were submitted to the National Research Council Canada Institute for Research in Construction for detailed laboratory analysis.

The analysis revealed that physical properties of blistered membrane samples did not differ significantly from samples obtained from nonblistered areas. Gas samples obtained from within membrane blisters contained air and water vapor with negligible amounts of volatile inorganic compounds. Also, there appeared to be no physical or chemical incompatibility among SBS-modified bitumen sheets and mopping asphalt samples obtained during the field investigation.

To determine the relative softening points of bitumen on the bottom sides of SBS-modified bitumen sheet products, NRCA had 10 samples of new SBS-modified bitumen sheet products analyzed. The softening points of the bitumen on the bottom sides of the sheet products ranged from 233 F (112 C) to 256 F (124 C).

Recommendations

Based on the findings of NRCA's limited research, it appears blistering associated with mop-applied SBS-modified bitumen sheet products mostly is caused by inconsistent and sometimes inadequate adhesion between cap sheets and underlying base plies. Cap sheets that contact asphalt that is allowed to cool somewhat are a particular concern and likely cause of this type of inadequate adhesion.

NRCA recommends manufacturers provide more detailed instructions for SBS-modified bitumen sheet product installation. Instructions should include specific suggestions for asphalt heating and transportation; cap-sheet handling techniques; desired asphalt mopping temperature at application; a mop's handle length, head type and size; and mop lead for specific ambient application conditions.

Until manufacturers provide such detailed installation instructions, NRCA suggests the following:

- Materials should be kept dry, and surfaces covered with SBS-modified bitumen sheet products should be kept as free of debris as possible.
- Asphalt used to apply mop-applied SBS-modified bitumen sheet products should be heated as hot as possible but without damaging the asphalt or creating hazardous conditions.
- Asphalt should be applied with a maximum mop lead of about 8 feet (2.4 m), and an SBS-modified bitumen sheet should be placed in the asphalt as soon as possible. Consideration should be given to using mops with relatively short handles and lightweight head sizes; this will minimize the potential for over-extending mop lead.
- For applications in cold weather (i.e., ambient temperatures colder than 40 F [4 C]), manufacturers should be consulted for specific written installation instructions.

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