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CARLISLE COATINGS & WATERPROOFING

AIR & VAPOR BARRIER

Thick vs. Thin
Concrete Masonry Unit

Introduction

Fluid-applied membranes have been specified in commercial construction for many years as air barriers, vapor barriers and water-resistive barriers in wall assemblies. Unlike mechanically attached sheets, they provide improved air and water tightness, full adhesion to the substrate, monolithic installation, and sealing around brick ties and fasteners. Their manufacturers specify installation at many different mil thicknesses, which affect many properties of the installed system. Fluid-applied membranes are especially well suited for installation over concrete masonry unit (CMU) construction. However, the roughness and porosity of this substrate necessitates substantial coating thickness and attention to installation technique. Regardless of specified thickness and coverage rate, all membrane manufacturers agree that CMU must be coated sufficiently so that there are no pinholes or passages for air and water through the membrane.

Specifiers of roofing systems and traffic coatings would not classify systems of different thickness as equals. Yet fluid-applied membrane air barriers, whose specified mil thickness on CMU varies between 15 mils and 120 mils, are often placed in the same specification and classified as equal. In spite of the emergence of thin mil systems, the most common specified dry film thickness of fluid-applied membrane products is 40 mils. This matches the thickness of self-adhering roofing underlayments and self-adhering air/vapor barrier membranes, both of which have a very good track record of providing effective waterproofing in their respective applications.

The Comparison

Carlisle Coatings & Waterproofing Incorporated (CCW) made a side-by-side comparison of Coating A, a 40-mil dry (60 wet) system, versus Coating B, a 15- to 34-mil dry (20 to 46 wet) system. The objective was to observe the effects that mil thickness has on coverage and continuity when applied to concrete masonry unit (CMU). Coatings A and B were both one-part, air-drying, water-based coatings of high viscosity that can be sprayed or roller-applied.

Coating A

Coating B

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Testing

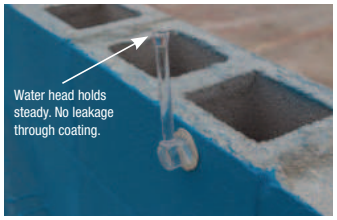
Coating A – The manufacturer specified a minimum coverage of 60 wet mils. The coating was sprayed on horizontally and vertically, easily achieving a wet mil coverage of 60–65, resulting in complete coverage of substrate, even around ties.

Coating B – The manufacturer specified a minimum coverage of two 10 wet mil coats for a total of 20 wet mils. The coating was sprayed in two successive coats at 12 wet mils each, building a total wet thickness of 24 mils. This coating failed to cover the CMU surface. On another bare surface, two successive 12 wet mil coats were spray-applied, this time with back-rolling of each coat. This coating also failed to cover the CMU surface.

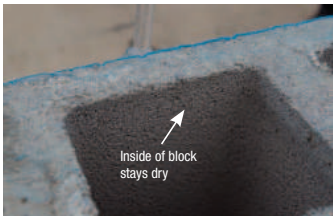
Conclusions

From this test, it was observed that even very small holes in the coating allow for easy passage of air and water. Complete coverage is essential, and is highly dependent upon coating thickness. The porous, rough substrate demanded every bit of the minimum 60 wet mil application of Coating A.

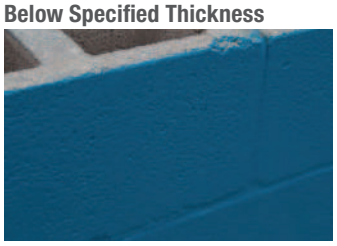
Coating A,
Minimum 60 Wet Mils



Coating A,
Inside View of Block



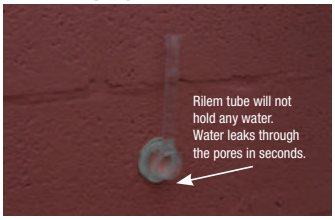
Coating A,
Below Specified Thickness



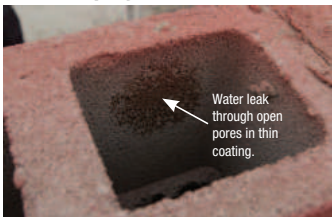
Coating A,
Inside View of Block

Thin application of either coating failed to provide an effective air and moisture barrier on the CMU substrate.

Coating B,
2 Coats Spray



Coating B,
2 Coats Spray



Coating B – Brick Tie Condition
Air Leakage (Bubbles) Through Pores

Coating A – Brick Tie Condition
No Air Leakage

Selling Points - Design Professional

Specifiy a nominal 40-mil dry film system:

- Barritech VP by CCW
- Perm-A-Barrier VP by WR Grace
- Air-Bloc 31 by Henry

Specifiy inspection of surfaces:

- Mockup: Bubble Gun (ASTM E1186) and Rilem Tube, acceptance criteria: no leaks
- Work: Provide a visual inspection for pinholes and voids

Specifiy submission of a "free film" sample of the membrane

Selling Points - Contractor

- All manufacturers specify a void and pinhole-free coating on CMU
- Spraying and back-rolling, which does not work, is required for increasing thin mil membrane coverage
- CCW's side-by-side comparison shows that 60 wet mils very effectively covers CMU, while 24 wet mils does not
- The owner can easily require inspection of CMU surfaces
- Bidding a job with a thin mil system will cost you dearly if the job is inspected for pinholes

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