

TL-0012 — Impact of Substrate Roughness and Coating Thickness on Fluid Applied Air Barrier Performance Technical Letter

To achieve desired air barrier performance, the coating thickness of a fluid applied membrane must be continuous. Continuous membrane coverage requires that the coating thickness be sufficient to cover the high and low points of the substrate. Lack of continuity in the membrane results in voids that reduce overall system performance.

As the roughness of the substrate surface increases, the coating thickness required to achieve a continuous membrane also increases. To better understand the impact of substrate roughness on a fluid applied air barrier thickness requirements, tests were conducted at GCP Applied Technologies laboratories for both commercially available asphalt emulsion and PERM-A-BARRIER® Liquid products.

Two substrates were evaluated, a relatively smooth surface (DensGlass Gold® Exterior Guard) and a rougher, more irregular surface (commercially available concrete block). Fluid applied air barrier coatings were sprayed by an ABAA certified commercial contractor. Samples were then evaluated for membrane continuity by microscopic analysis and performance by ASTM E 1186 “Air Leakage Site Detection in Building Envelope and Air Retarder Systems”.

The results indicate that the coating thickness required to achieve acceptable performance increases with substrate roughness. A summary of findings is shown below:

DensGlass Gold® Exterior Guard

A carefully applied, consistent 40 mil dry film thickness can be adequate to pass ASTM E 1186.

- For discontinuities in the board system, such as panel joints and penetrations, additional coating thickness is required. Such discontinuities should be taped, treated with a 40 mil dry film thickness and then the entire assembly should be sprayed with an additional 40 mil dry film thickness.

Concrete Block (commercially available, medium density concrete masonry unit)

A carefully applied, consistent 60 mil dry film thickness can be adequate to pass ASTM E 1186.

- A 40 mil dry film thickness coating does not achieve a continuous membrane. (See Figures 1 & 2)
- GCP recommends that a minimum 60 mil dry film thickness coating be applied. While a 60 mil dry film thickness is generally sufficient, the contractor must carefully inspect each application for continuity and apply additional material for situations where excessive surface roughness exists. (See Figures 3 & 4)
- A 90 mil dry film thickness coating was also applied to concrete block. While possibly more than required, a 90 mil dry film thickness coating provided a continuous membrane with safety margin. The full laboratory report is available upon request.

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