

3M™ Extreme Sealing Tape 4412N Pressure Leak Testing on Kemlite® Roofing

TSR Test Report #IATD-5214; RGK 09-17A; May 11, 2009

Application Description:

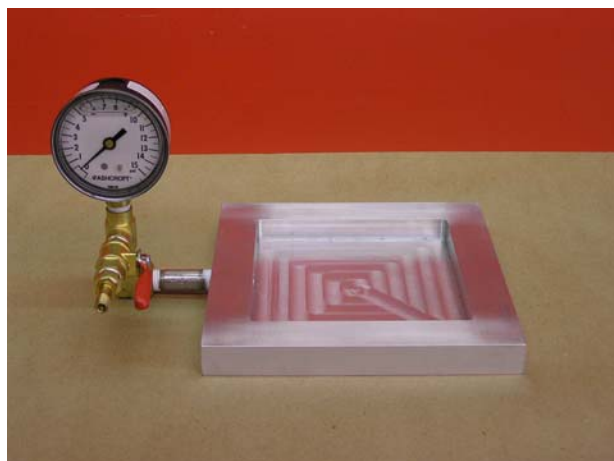
Roof sealing on truck bodies using 3M™ Extreme Sealing Tape 4412N

Purposes of Tests:

To examine sealing ability of 3M™ Extreme Sealing Tape 4412N to Kemlite® brand FRP roofing.

Test Procedure:

A custom air sealing test was developed to examine the “air pressure sealing ability” of 3M™ Extreme Sealing Tape 4412N to Kemlite® brand FRP roofing. This Kemlite® brand reefer roofing was white, nominally .060” thick, and was smooth on bottom underside but bumpy on top side exposed to the outside of the truck. Only sealing to the top, bumpy side was tested. This roofing was bonded to a “pressure chamber” as shown in the photos below. Various diameter holes were drilled in the center of the Kemlite® roofing. Prior to tape application, the Kemlite® roofing was cleaned with a 50:50 mixture of isopropyl alcohol. Then 3M Adhesion Promoter 111 was applied with a saturated, disposable facial tissue. The hole in the Kemlite® roofing was covered with a .830” diameter, die cut piece of 3M™ Extreme Sealing Tape 4412N. Tape application and test conditions were 68 degrees Fahrenheit and 27% relative humidity.



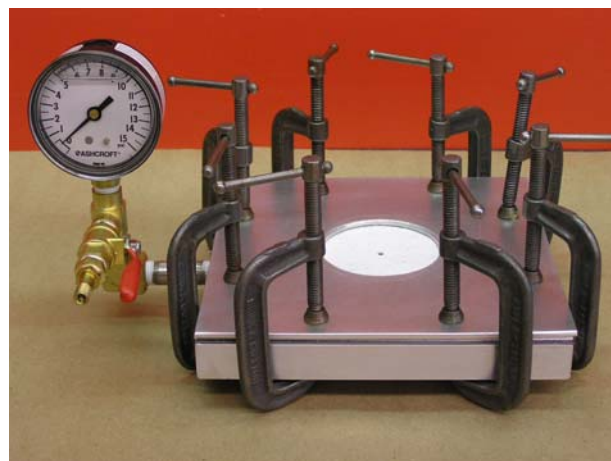
Aluminum pressure chamber without cover plate



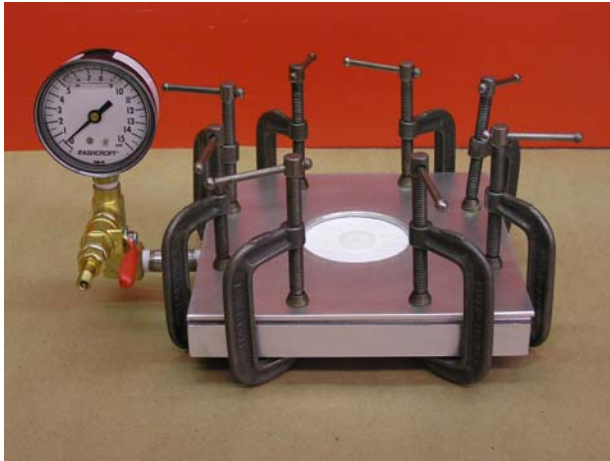
Pressure chamber with 3M™ VHB™ 5962 ready for cover plate



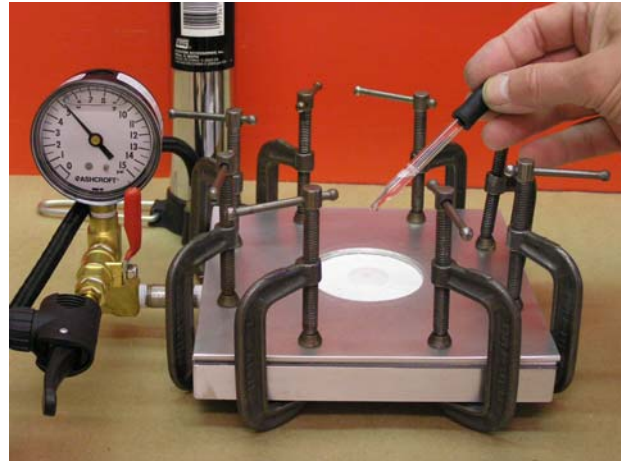
Pressure chamber with Kemlite FRP reefer roofing cover plate



Pressure chamber with safety plate clamped in position



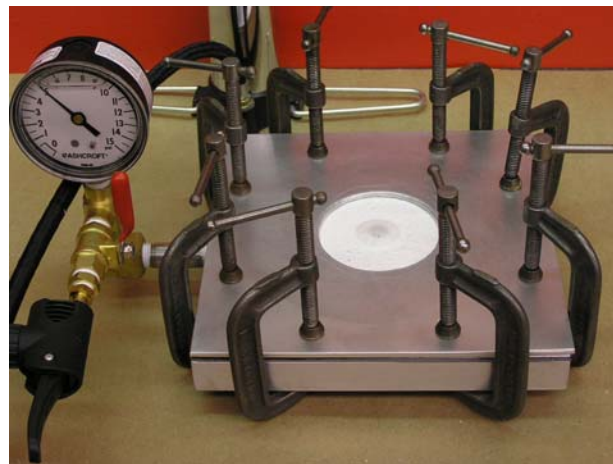
Kemlite roofing with .830" diameter EST 4412N tape over hole



Soapy water solution being applied to detect any leaks



Tire pump used to pressurize chamber



.830" diameter EST 4412N over 5/16" hole at 5 psi

Testing was done with 3M™ Extreme Sealing Tape 4412N over four different diameter holes as indicated in the table below:

3M Extreme Sealing Tape 4412N			
Air seal test to bumpy side of Kemlite roofing			
Tape diameter (inches)	Hole diameter (inches)	Hole area (sq. inches)	Annulus width (inches)
0.830	1/8	0.0123	0.353
0.830	3/16	0.0276	0.321
0.830	1/4	0.0491	0.290
0.830	5/16	0.0767	0.258

Test sequence for each of the four hole diameters:

- Apply EST 4412N tape over hole and wait 5 minute prior to air pressure application.
- Apply and hold 1 psig air pressure for 5 minutes.
- Apply and hold 2 psig air pressure for 5 minutes.
- Apply and hold 3 psig air pressure for 5 minutes.
- Apply and hold 4 psig air pressure for 5 minutes.
- Apply and hold 5 psig air pressure for 5 minutes. (5 psig = 139 inches water or 11.5 feet water)

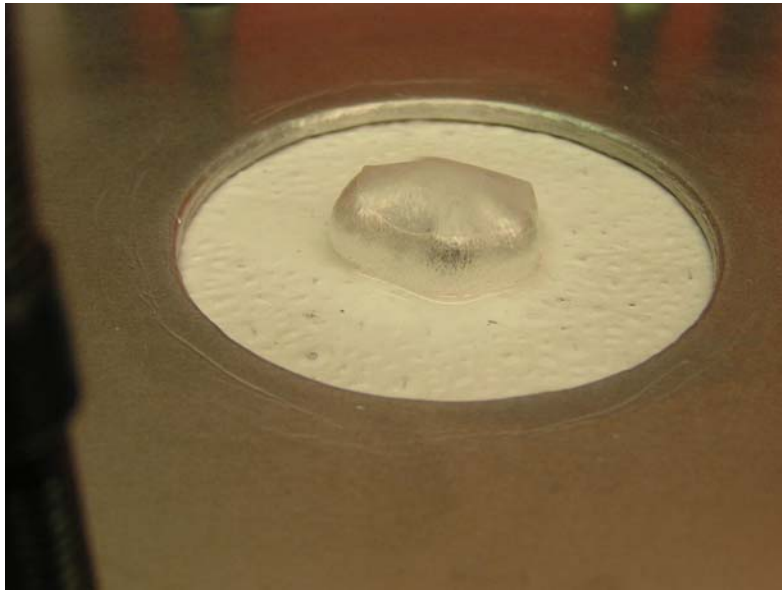
Test Results:

By observing the soapy water solution around the perimeter of the tape circle over the hole in the Kemplite roofing, there was no detection of any leakage with any of the four hole diameters with any of the applied pressures.

It should be noted that after the 5 minute hold at 5 psi on the 3/16" diameter hole, there was an additional 12 hour dwell with the full 5 psi. No leakage was detected even after the 12 hour dwell.

Also, after the 5 minute hold at 5 psi on the 5/16" diameter hold, there was an additional 9 hour dwell with no leakage detected up to the time of this writing. Original 5 psi pressure dropped to about 4 psi.

5-12-09 note: Still no leakage detected after a total of about 39 hours on covered 5/16" diameter hole. However, the 3M™ Extreme Sealing Tape 4412N was severely distorted and "ballooned" outward. Pressure chamber over that 39 hours dropped from starting 5 psig to just over 2 psig. Test was terminated and tape was removed.



.830" diameter 3M™ Extreme Sealing Tape over 5/16" diameter hole in Kemplite roofing after 39 hours; initial 5 psi dropped to 2 psi.

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