ASTM 滲水性試驗報告

NELSON TESTING LABORATORIES
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February 15, 2007

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REPORT OF TESTS

SUBJECT:	**Water Penetration Masonry Wall Testing**
PROJECT:	**KeimFarben** - Plant Research/Certification Program
TEST METHOD:	**ASTM E 514**, "Test Method for Water Penetration and Leakage Through Masonry."
PRODUCT IDENTIFICATION:	**Keim Royalan** - White
TEST SCOPE:	Three (3) concrete masonry walls were constructed in accordance with ASTM E 514 procedures. After the proper cure times, the three walls were tested according to ASTM E 514 procedures. After a sufficient drying period, the walls were coated with the Keim Royalan (White) coating. Shortly thereafter, the walls were retested according to ASTM E 514 procedures. The results reflect a comparison of the level of water penetration through uncoated concrete masonry walls compared to the level of water penetration through concrete masonry walls coated with the Keim Royalan (White) product.
TEST DATES:	Uncoated Walls – December 15, 2006 Coated Walls – December 22, 2006

TEST DATA

Materials

Mortar - All mortar properties were obtained in accordance with ASTM C 780. Air contents were determined using the pressure method (ASTM C231). Compressive strengths were determined on 3-inch diameter by 6-inch high cylinders (ASTM C 39).

Plastic Mortar	
Cone penetration, mm	50
Air content, %	4.8
Hardened Mortar	
Compressive strength, PSI	
7 days	2580
28 days	2920

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ASTM E 514 (continued)

TEST DATA (continued)

Concrete Masonry Units - Nominal 8" x 8" x 16", two core, normal weight concrete masonry units (CMU) were supplied by Northfield Block Company – Mundelein, Illinois. The following are the CMU physical properties. The results represent the average of three units tested in conformity with ASTM C 140.

Compressive Strength, net, psi	2960
Dimensions	
Length, in.	15.625
Height, in.	7.625
Width, in.	8.00
Thickness	
Face shell, minimum in.	1.34
Web, minimum in.	1.25
Absorption	
lbs./pcf	6.53
Percent	4.44
Moisture Content, percent	11.8
Unit weight, dry, lbs	37.8

Wall Fabrication

Three (3) walls for penetration testing were constructed according to ASTM E 514 requirements. The three walls were constructed using concrete masonry units (CMU). The walls were single-wythe wall panels, 3 block wide and 7 block high (48" wide x 56" high). The walls were built during a one-day period by an experienced lead mason. Workmanship was judged as to be average. Ambient temperature was maintained between 60 degrees F. and 75 degrees F. during the fabrication and subsequent curing period.

Each cmu wall was constructed by one mason and required approximately 1.5 hours to complete with the masonry work being done over a period of about 60 minutes. The walls were constructed on an inverted steel channel, and the bottom course was laid on a bed of mortar, which covered the face shells and webs but not the cavities. Full bedded mortar joints were used, and the walls were constructed one course at a time by applying mortar the full length of the bed joint (3 blocks), then buttering the ends of a block one at a time before setting on the bed joint. The joints were initially struck and tooled with a concave jointer after the top course was laid, and a final tooling was done approximately 30 to 60 minutes later.

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ASTM E 514 (continued)

TEST DATA (continued)

The walls were constructed in a random order to avoid potential systematic errors, which might have occurred if the walls had been built in a particular order. The walls were cured according to ASTM E 514, which requires curing for 7 days enclosed in plastic sheeting and for a minimum of 7 subsequent curing in laboratory air. The total curing time for the walls ranged from 14 to 21 days. Flashing was built into the wall to collect water that had passed completely through the wall. There was also a bottom trough which was built under the wall and which collected water that leaked into the interior cavities on the blocks, collected at the bottom of the cavities and leaked through mortar joints or blocks into that trough.

Test Procedures:

After the curing period, all three untreated walls were tested according to ASTM E 514 procedures for four hours and the results recorded. After 7 days the walls were coated with Keim's Royalan (White) coating in a two-coat application as recommended by Keim. The after 7 additional days the treated walls were retested according to ASTM E 514 procedures.

Ambient temperature was maintained between 60 degrees F. and 75 degrees F. during the testing and subsequent drying period. ASTM E 514 test procedures were followed throughout the test. ASTM E 514 test chambers were constructed of welded aluminum angle stock, and the observation face of the chambers was outfitted with Lexan sheet to allow full view into the chamber. All fixtures and appurtenances were in conformity with ASTM E 514, section 4. Each frame was outfitted with a monometer to measure interior pressure and a flow meter to monitor the amount of flow. During the testing, the frame was pressurized to 10 psf, and the water flow was adjusted to 40.8 gal/hour which is equal to 3.4 gal/sq.ft./hr. The units were held in place with clamps, and closed cell foam gasket materials.

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ASTM E 514 (continued)

TEST RESULTS

	Wall 1	Wall 2	Wall 3
First dampness on back of wall			
Control – Untreated	30 minutes	45 minutes	30 minutes
Keim Royalan (White)	210 minutes	210 minutes	195 minutes
First visible water through back of wall			
Control – Untreated	135 minutes	150 minutes	105 minutes
Keim Royalan (White)	no water	no water	no water
Percent dampness on back of wall @ 4 hours			
Control – Untreated	92%	86%	91%
Keim Royalan (White)	4%	4%	5%
Total leakage through back of wall			
Control – Untreated	0.38 gallons	0.30 gallons	0.28 gallons
Keim Royalan (White)	0 gallons	0 gallons	0 gallons
Total leakage rate through back of wall			
Control – Untreated	0.10 gal./hr.	0.08 gal./hr.	0.07 gal./hr.
Keim Royalan (White)	n/a	n/a	n/a

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ASTM E 514 (continued)

SUMMARY

All three of the walls coated with Keim's Royalan product illustrated very little water penetration through the walls during the 4-hour ASTM E 514 test procedures as compared to the control wall.

On average, the Keim Royalan coated walls showed dampness on the back of the wall after 205 minutes, while the untreated control walls showed dampness on average only after 35 minutes.

On average, the Keim Royalan coated walls allowed the back of the wall systems to show signs of dampness over only 4% of the area, while the untreated walls showed signs of dampness on average over 90% of the wall area.

Finally, the Keim Royalan coated walls did not allow any water to leak through the back of the walls, while the untreated walls allowed an average of 0.32 gallons to flow through the walls at a rate of 0.08 gallons/hour during the test.

Respectfully submitted

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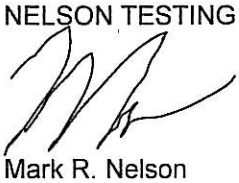

Mark R. Nelson
Principal

與對照組的牆面比較。這三道塗佈KEIM ROYALAN室外礦物塗料的牆面，在歷經四小時的ASTM E 514透水測試中，僅有極微少的水分滲透。

塗佈KEIM ROYALAN室外礦物塗料的牆面過了205分鐘後會開始在牆背顯露出潮濕痕跡，無處理的牆面在35分鐘後就會顯現出潮濕痕跡。

塗佈KEIM ROYALAN室外礦物塗料的牆面，僅有4%牆面面積顯現潮濕痕跡，無的牆面有高達90%的牆面面積顯現潮濕痕跡。

塗佈KEIM ROYALAN室外礦物塗料的牆面，無任何水自牆背面滲出，未經處理的牆面經過測試，有0.32加侖的水以滲透率平均每小時0.08加侖自牆背面滲出。