LABORATORY REPORT

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Water Vapour Permeability of Stormdry Treated Brick

The water vapour permeability (WVP) of a material is a measure of the rate at which water vapour can pass through. This is sometimes referred to as “breathability”.

The property is relevant in building materials as it can be useful to assess if a) a wet structure or part of a structure will dry as time proceeds and b) if the flow of moisture vapour can be reduced such that condensation can be inhibited or prevented.

Stormdry is a pore-lining rather than pore-blocking material and, in principle, this should allow water vapour to permeate after the cream has been applied and cured.

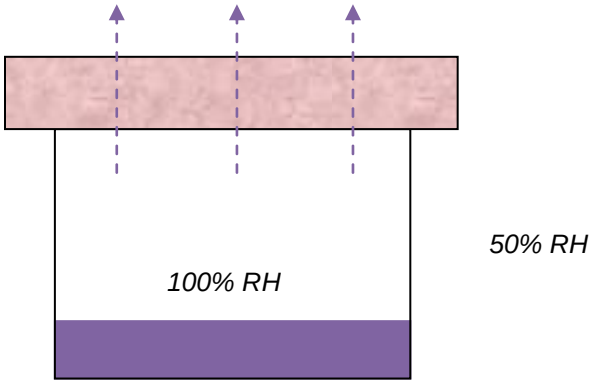
1. Test Method and First Results

A test method to determine WVP is described in BS EN ISO 12572:2001 – Determination of Water Vapour Transmission Properties. In this method a cup of water is sealed with the test film/coating. The rate of loss of water vapour through the test film is then measured by weighing the cup periodically. The conditions inside and outside of the cup can be modified by using salt solutions which provide different relative humidity (RH) values.

This method is designed for testing paint films but with some alteration it can be adapted to other materials.

Brick slips of 18 mm thickness were cut to a diameter of 43 mm size and used as the lids for the cups in the arrangement shown below.

Figure 1: Test set-up

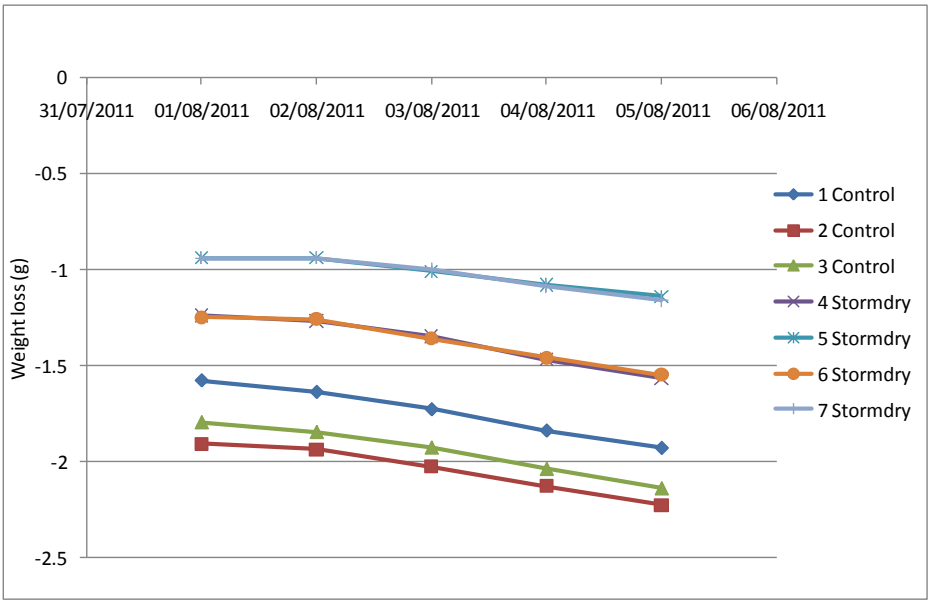


An example of the data obtained from the test is shown in Figure 2 for three untreated and four Stormdry treated samples. After stabilisation, in all cases there is a gradual drop in weight. There is reasonable reproducibility despite the variable nature of the brick slips.

The behaviour of the Stormdry treated brick (200 g/m^2 application) is roughly similar to the untreated control although the gradient of the line can be seen to be slightly lower.

Figure 2: The weight loss in grams of seven test specimens

Internal cup RH = 100%, External cup RH = 58%, Temperature = 26 C



Measurements at the test condition of; Internal cup RH = 100%, External cup RH = 58%, Temperature = 22 C gave the results in Table 1.

Table 1: Calculation of WVP

		kg/sec	area m2	Flow Rate kg/s/m2
Stormdry (50% RH)	0.083g/ 1 day	9.26E-10	0.00102	9.10E-07
Control (50% RH)	0.092g/ 1 day	1.06E-09	0.00102	1.05E-06

So the water vapour permeability of the untreated and treated bricks is 1.1 x 10^{-6} and 0.9 x 10^{-6} kg/s/m^2. Putting this into more accessible units, the flow rate through the untreated brick is 90 g water /m^2/day and through the treated brick is 81 g/m^2/day.

2. Results on different coatings

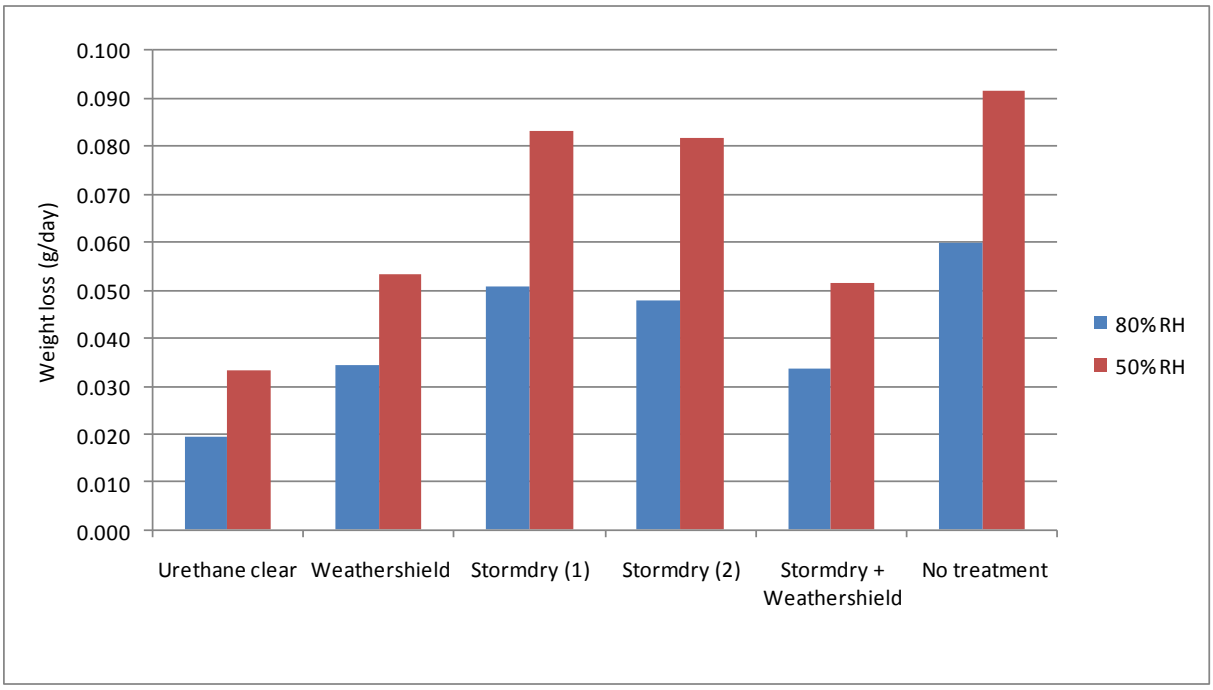
After this first round some further tests were done on other coatings as shown overleaf.

The coatings consisted of;

- A urethane clear coating with low WVP
- Weathershield white paint applied in two coats
- Weathershield applied to Stormdry
- Stormdry

The cups for this test were placed in an environment of either 50 or 80% RH and 23C

Figure 3: Average weight loss of different coatings at 50 and 80% RH external cup conditions



It can be seen that;

a) The external humidity condition is an important factor in controlling water vapour flow. There is approximately 50% more water vapour flow by reducing the external humidity from 80% to 50% RH.

b) The urethane sealer shows the most reduction in WVP. At the test condition of 100% internal/50% external, the relative vapour flow rates are:

Untreated 100% > Stormdry 90% > Weathershield 58% > Stormdry plus Weathershield 56% > Urethane clear 36%

Reference to the literature *(E.Schmid – Exterior Durability of Organic Coatings – 1988)* gives values for organic coatings not inconsistent with those found here, with acrylic polymer emulsions (Weathershield type) having WVP of 10-100 g/m^2/day and urethane alkyds at 30-50 g/m^2/day.

3. Conclusion

The measured values of the flow rate through the untreated and Stormdry treated bricks were 90 and 81 g/m^2/day respectively. Hence Stormdry gives a small reduction (10%) in water vapour permeability. There is greater reduction from using conventional paints and coatings.

The external humidity condition is a dominant factor in controlling vapour flow.

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