This document defines the techniques currently available, their areas of application and limitations. The BWPDA recognises that no test is simple, fully conclusive and of universal application, but is satisfied that no test meeting all these criteria can be devised with present knowledge.

Details of any further developments in methodology will be published as they become available.

General Precaution

Location of Sampling Point

For reliable conclusions to be drawn from any test involving samples taken from the treated wall, the sample must be taken from the injected damp-proof course. This is not necessarily along the line of treatment holes, because:

(i) the damp-proofing chemicals may be carried up the wall by rising damp before their cure
(ii) the drill holes may be angled downwards, so that the effective level of injection is below the line of drilled holes.

Chemical Methods (on samples taken from the treated wall)

(i) Analysis for silicon of aluminium by inorganic analysis

A wall before treatment inevitably contains silicon and aluminium. Hence inorganic analysis techniques cannot be used to demonstrate the presence of a silicone or polyoxo aluminium stearate water-repellent.

(ii) Extraction of water repellent inorganic solvent, followed by analysis-silicone (including siliconates)

In curing, a silicone resin becomes chemically bonded to the substrate, and cross-links to itself. There are no known solvents for a fully cured silicone water repellent; hence it is not possible at this time to prepare a solution of the water repellent from samples of the treated substrate from a mature installation.

If the installation was sufficiently recent, it may be possible to extract sufficient water repellent for silicone to be detected in an instrumental technique such as infra-red spectroscopy. However, the extraction can only be partial, and the technique will only demonstrate the presence of the water repellent. As extraction is incomplete it is impossible to reach conclusions on the adequacy of treatment using this method.

(iii) Polyoxo aluminium stearate

In curing, polyoxo aluminium stearate becomes chemically bonded to the substrate. It is not possible to extract the water repellent in its original form from samples of the treated wall, but the stearate can be removed by acid or alkali, and the stearic acid subsequently extracted using a suitable solvent.

The stearic acid can be estimated

(a) by titration with standard alkali
(b) qualitatively by infra-red spectroscopy or
(c) qualitatively by gas-liquid chromatography.

(Commercially available polyoxo aluminium stearate may contain other fatty acids, in particular palmitic acid, but the above methods are equally suitable for these compounds.)

The correlation between results from method (a) and the known concentration of fluid in laboratory treated bricks is good. However, practical difficulties in sampling which will affect results and must be considered in any investigation are:

(a) bricks will differ in porosity, hence the standard of treatment will vary.
(b) when injection has been into the brick, the fluid may not be uniformly distributed but may be concentrated near the injection holes. To ensure a representative sample, the sampling point should be from the centre of the brick, between the injection holes.
(c) the original materials used in the wall may contain fatty acids, which will be extracted by this method. To investigate this possibility, a control sample should be taken several courses away from the injection line.

Physical Methods

An indication that a chemical DPC is present can be given by its effect on the water repellency or the water absorption of the substrate, but such indications should not be considered conclusive.

Method (i) is a non-destructive method that can be conducted in-situ.

Method (ii) can be conducted on site, or in the laboratory on drilled samples taken from site.

Method (iii) can be conducted in the laboratory on solid samples removed from site.

Note:

A. Methods (i) and (ii) are only suitable for chemical DPC’s based on water repellents. A chemical DPC operating on the pore-blocking principle will give negative results (and inconclusive results are likely from a mixed chemical DPC operating on both principles).

B. The water repellent properties of a silicone DPC are not developed immediately, and negative results in both these tests may be obtained until the full cure is complete. However, over the period, the treated substrate will have an alkaline reaction to phenol phthalein, and this reaction can be used as an indication of a recently installed silicone DPC.

C. Method (i) water repellency test in situ will not distinguish between an injected treatment and a surface application of water repellent.

(i) Water Repellency Test in situ

An area of 6000mm (along the DPC line under investigation) x 300mm (to cover the untreated area above and below) should be selected. A double layer of paper tissue, (e.g. Kinwipes) should be taped to this area. This should be saturated with an aqueous solution of a suitable dye (e.g. 1% Lissamine Blue 2BR), covered with polythene sheet to prevent evaporation and left in contact with the substrate for two hours. After this period, the tissue should be removed and the surface blotted. Any untreated area will remain coloured. An effective treatment (but see Note C above) will show a continuous horizontal band between coloured (untreated) areas. An inadequate treatment, where fluid has been injected, but saturation not achieved will have a series of uncoloured (treated) patches, centred on the injection holes, with coloured areas between them. An untreated wall will be uniformly coloured over the complete area.
(ii) Water Repellency Test on Drilled Samples
The drilled sample should be shaken with an aqueous solution of a suitable dye (e.g. 1% Lissamine Blue 2BR. The liquid should be decanted, and the sample placed on filter paper. If the sample has not been effectively treated it will retain its colour - if it has been effectively treated any colour will be soaked up into the filter paper, and the sample will revert to its original colour.

(iii) Water Absorption Test
A small piece of the substrate from the DPC line under investigation, and a control sample of the same material, taken some distance from the DPC line should be weighed, immersed in water for a minimum period of one hour and re-weighed. An effectively-treated sample has a water absorption markedly lower than the control, and in the region of 1%.

Methods Based on Moisture Content of Substrate
The methods available and their limitations are defined in PCA DP1. Provided adequate time is allowed for the wall to dry out, these methods can be useful in investigations, and are not influenced by the type of chemical used, nor by the sampling position (see 1 General Precaution).

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The information contained in this leaflet is given in good faith and believed to be correct. However, it must be stressed that of necessity it is of a general nature.
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