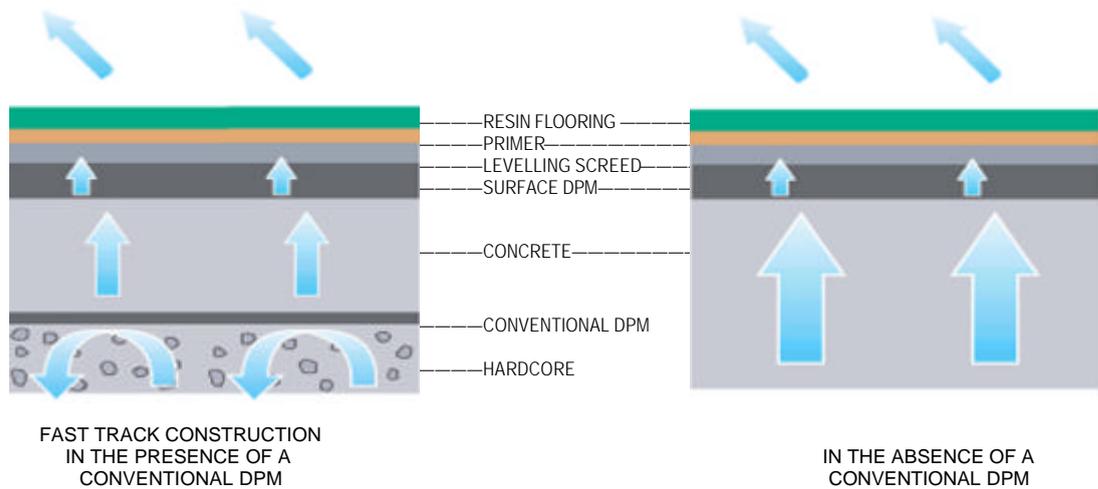


THE EFFECTIVE USE OF SURFACE DAMP PROOF MEMBRANES

**SURFACE DPM CONTROLS MOISTURE VAPOUR RELEASE FROM CONCRETE
TO PREVENT BLISTERING AND DEBONDING OF THE RESIN FLOORING**



FerFA Guidance Note: No. 5





Introduction

In a small number of instances it is found that floors in old buildings remain apparently unaffected by moisture, but as soon as resin flooring is installed the situation quickly deteriorates! Many of these old concrete floors may well have had 'sealers' applied, but because they were usually vapour permeable, the level or effects of moisture were not evident. The application of most types of resin flooring effectively creates a seal to the surface. Moisture already trapped in the concrete, or rising from below, can then lead to problems of blistering or detachment, although the onset of the problems might not occur immediately.

The difficulties of dealing with the refurbishment of old concrete floors or the installation of new floors where the programme does not allow sufficient time for the concrete base to dry out, have led to a requirement for the development of new technology resulting in the introduction of liquid applied surface damp proof membranes (DPMs).

What is a Surface Damp Proof Membrane

By definition it is a liquid system applied evenly to the surface of a concrete base, that adheres strongly to it even if the base contains a high level of moisture, and then sets to form a layer of controlled permeability to moisture vapour (normally less than 4g/sqm / 24 hrs). The set membrane must then allow other flooring layers to be applied

One of the oldest established surface DPMs is mastic asphalt, which is usually laid on a fibreglass quilt or other isolating membrane. However asphalt floors are often susceptible to long term embrittlement and cracking. In addition heavy point loadings or repeated trafficking can cause indentations and ruts to form, and there may be health and safety issues associated with its application and accessibility.

More recently, advances in epoxy resin technology enabled the formulation of coatings that are tolerant of high levels of moisture in the base to which they are to be applied, and which allow trapped moisture to permeate in a controlled way without causing distress to the membrane or to the applied floor finish.

Most surface DPMs are based on Epoxy resin technology due to its excellent adhesive properties although there is no inherent reason why other resin types might be suitable. The membranes are generally applied by trowel, brush, roller or squeegee in two or more coats, depending on the specification in relation to the level of moisture in the base concrete. Each coat is preferably applied

at right angles to the previous coat in order to ensure a complete and uniform coverage.

How do Surface Membranes Work?

A surface membrane is effectively a vapour release control valve and works on the principle that **all** resin finishes, in the same way as polyethylene film, are vapour permeable to some degree. In selecting a Surface Membrane for a particular situation, the properties of all of the subsequent resin layers must be considered to ensure that there is adequate control of Moisture Vapour transmission to prevent failure. A coarse quartz-filled screed for example; is likely to have a much higher vapour transmission rate than a 3-4mm self levelling system.

It is important to note that the performance of these products depends on their ability to adhere to the substrate and restrict the passage of moisture vapour to a level which does not adversely affect the floor finishes. It is critical, therefore, that the coating is applied uniformly across the whole surface, is **free from holes and applied at the correct thickness**. Failure to observe these basic requirements can result in an increase in the moisture vapour transmission rate and subsequent failure of the flooring system.

Some manufacturers offer what are called single coat membranes but their claims need to be fully evaluated, particularly with respect to limitations, warranties, etc.

Some surface DPMs require a primer and/or aggregate blinding prior to the application of pumped cementitious underlayment systems in order to create an adequate mechanical key.

Many manufacturers supply products that form surface membranes but it is essential to recognise the subtle difference between a Surface DPM and a Moisture Vapour Suppressant:

A **Surface Damp Proof Membrane** is designed to suppress excess residual/ construction moisture in new screeds and concrete **and** to protect against rising moisture from the earth.

Moisture Vapour Suppressants will not protect against continued rising moisture from the earth. They are designed to suppress excess residual/ construction moisture only.

DPMs in existing buildings

In the absence of positive evidence to the contrary it is wise to assume that any pre 1970 buildings are unlikely to have an **effective** DPM incorporated into their construction. It was not until that time that the necessity of a DPM was more widely

acknowledged in the Building Regulations. Since then, polyethylene or bituminous sheet membranes became more commonly used but experience has shown that these cannot always be relied on. All too often the joints were not correctly taped and welted and these membranes were frequently punctured by steel reinforcement and site traffic before the concrete was even poured. A small failure in a sheet membrane can have catastrophic effects on floor finishes applied directly above.

DPMs in new construction

Some modern warehouse buildings are still built without an effective DPM on the assumption that the concrete floors will remain uncovered. In many cases this is a short-sighted policy. If there is subsequently a change of use, eg from storage to process area, or ill-considered renovations (e.g. office conversions and decorative coating application) then damp problems can soon arise with major disruption to normal operations in the building.

The increased demand for denser, higher performance and lower maintenance resin flooring systems has increased the number of floor failures which are due to excess moisture in the subfloor. Where a sandwich membrane has not been included under the screed or slab, or where the integrity of the DPM is questionable, a surface DPM will be necessary.

Surface Membranes - Do We Need Them?

IN NEW BUILDINGS, WE SHOULD NOT!

The Specifier has designed the building and selected the floor finish to meet usage and performance requirements.

The Builder constructs the building to this specification and applies a work schedule which gives the specialist contractor all the help required within the British Standards and Building Regulations to allow the quick and effective laying of the floor finish.

The British Standards Codes of Practice recommend that the building is protected against rising moisture by incorporating a sandwich DPM, so that the selected floor finish can be laid safely and effectively.

So in new buildings a surface membrane will not be needed if:

1. There is an effective and approved damp proof membrane (to British Standards).
2. It is placed in the correct position (the Specifier)

3. It is laid correctly (the Builder)
4. If sufficient time is allowed for the natural drying out of the sand/cement or concrete (the Specifier/Builder).

What happens if there is insufficient time to allow the subfloor to dry out naturally?

Traditional guidance requires that concrete of good quality, and laid conventionally, would take about one month per inch thickness to dry to an adequate level for further work to be undertaken.

Fast Track construction is now much more common as the demand for faster turn round of prime development sites has grown. Many new buildings (particularly Retail multiples) are designed to be operational well before the anticipated drying of the slabs occurs.

Even when refurbishing, building owners are keen to keep revenue losses and disruption to an absolute minimum.

In both cases a Surface Damp proof membrane can be used to ensure the satisfactory installation of the floor finish and ensure that the building opens on time.

Moisture Testing

Before commencing the installation of any floor finish, it is important that we know the moisture content of the base. It is widely recognised that the surface hygrometer is the preferred and most accurate method in the UK (as specified in British Standards BS8203 & BS8204); however, dense concrete substrates may require the instrument to be in position for several days in order to obtain a steady and precise reading. The feasibility of leaving surface hygrometer boxes for several weeks on site is questionable. In addition, an accurate reading cannot be guaranteed over existing smoothing compounds and adhesives thereby necessitating the need to mechanically remove these compounds just to take the tests! Because of these limitations, other forms of invasive testing (e.g. 'in-depth' hygrometer or Vaisala probe) may be considered more practical and reliable. Regular calibration of all these instruments is essential and may prevent costly disputes on site. The use of electrical conductivity type meters, whilst indicative, do not give sufficiently accurate or reliable data for the proper assessment of these surfaces, and are vulnerable to the presence of salts within the concrete.

However the British Standard method must always be used in cases of dispute.



Application and Curing

Most of the commercial liquid DPMS are applied by Trowel and/or Fluff Free Rollers. Some manufacturers recommend a squeegee but whichever method is recommended it is essential that sufficient material, as specified by the product manufacturer is applied evenly on the floor.

The cure time of these products will generally be between 6 and 24 hours dependent on floor and ambient temperatures. Some manufacturers can provide an additive which will accelerate the curing. However it is important to ensure that operatives are able to apply the surface DPM well within its working life and so not lose any of its performance characteristics (e.g. moisture vapour transmission rate, flexibility and bond strength).

Limitations on the use of surface DPMS

Any compound (cementitious or otherwise) must be moisture tolerant when used below a Surface Damp Proof membrane.

Screeds based on Calcium sulfate binders (often known as gypsum, anhydrite or hemi-hydrate) are now being used increasingly because of their rapid cure potential. However these screeds are adversely affected by outside moisture.

Consequently the suppliers of these types of screed do not recommend the use of a surface DPM where the risk of retained moisture can lead to subsequent degradation of the screed. As there are conflicting views with respect to moisture testing, always check the manufacturer's recommendations for testing and always insist that tests are carried out by an expert.

Surface DPMS are not designed to resist Hydrostatic pressure.

Surface DPMS cannot be relied on to prevent osmotic blistering (Please refer to separate FeRFA Guidance Note on Osmosis)

Protection of liquid applied DPMS

When a liquid applied dpm is applied to a surface it functions by forming a uniform film over the surface, and this uniform film provides the control of moisture permeability. It follows that if the surface is penetrated by mechanical wear, or by other means such as the drilling and fixing of racking etc, the protection is breached, and localised failures can occur. This can result in moisture penetration and breakdown. It is therefore important to ensure that the dpm surface is protected by the application of either coatings or screed systems that provide mechanical protection to the surface.

Thermal properties

When a surface is sealed with surface applied dpm systems it is possible for the moisture level to rise in the underlying slab, this can give rise to an increase in the heat capacity of the surface and in certain specific situations can, where the floor slab is cold and warm moist air passes over it, result in condensation occurring on the surface. The presence of condensation may always have been the case, however the surface seal make this more apparent, and can sometimes be confused with and reported as a failure of the membrane. This condensation can be substantially reduced or prevented by the application of a cementitious levelling compound over the surface, and should always be considered where floorings such as vinyl, tile or sheet, are to be laid.

Subsequent finishes

When applying subsequent finishes such as vinyl, sheet or tile, or carpets to surface dpm systems the manufacturer's advice should be sought to ensure that the materials being used to bond these are suitable and will not adversely affect the dpm system. This will be particularly important with some adhesives that function through loss of solvent or water: the presence of a dpm under the surface can result in delayed drying of the surface.

Summary

Surface DPMS are a valuable tool for the resin flooring applicator but their selection and method of use need to be made with a clear understanding of what they can achieve in relation to the physical demands of the particular job.

FeRFA

FeRFA, the Resin Flooring Association represents resin flooring product manufacturers, specialist contractors and allied trades. Established in 1969, FeRFA now represents over 60 UK based companies. The Association has established Codes of Practice for full members. It takes an active role in promoting resin flooring and in developing both national and international standards.

All FeRFA publications are freely downloadable from the website at www.ferfa.org.uk for further information, contact FeRFA at: Association House, 99 West Street, Farnham, Surrey, GU19 7EN E: ferfa@associationhouse.org.uk T: 01252 739149 F: 012525 739140

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ISBN: 0 9538020 8 6 Edition: November 2005 © 2005 FeRFA