

4. Floor Substrate Testing Prior to Floor Paint application

At Buy Floor Paint we have tried to summarise some simple and practical tests that you can do with commonly available materials and equipment, in order to test the condition and therefore the surface preparation requirements for successful floor painting on your project.

As previously outlined above, if you are uncertain of the condition of your specific floor, then we may well be able to talk you through it, or even do it, or arrange for someone to carry this out for you. Please call any of our offices and one of our flooring specialists will be happy to discuss the possibilities for your specific project.

The simple tests that we recommend that you carry out before floor painting on your project include:-

4. i. Surface Permeability / Absorbency Test (Water Droplet Testing)

The application of single droplets of water onto a concrete surface, observing any movement, and monitoring their rate of absorbency can give a good indication of the surface level, density and permeability, the presence of any previous surface treatments and therefore if a floor paint will successfully be able to penetrate into the concrete.

Water droplet testing should be carried out using groups of approximately 6 water droplets in each part of the floor, and on any typical locations and any areas that are discernibly different in appearance or texture / profile. Place the droplets using a simple 'dropper', syringe or pipette (available from any chemist) , place them together within an area approximately 10cm x 10cm, be sure to always test at least the centre and the perimeter areas of your floor – as these can often be finished differently by concrete flooring contractors and they can also be used and trafficked differently in service.

For Dense Concrete Surfaces – Smooth, hard and almost 'shiny' surfaces.



Water Droplet: Pipette Application
Note no immediate absorption



Water Droplets Applied
Still no absorption evident after 5 Minutes

If this area is to receive a floor paint coating and then be subject to vehicular traffic or other aggressive exposure then mechanical preparation is required to open the surface and ensure good penetration and adhesion of the floor paint.

For Open Textured Concrete Surfaces – Concrete surfaces that are 'dull' and not shiny in any areas,

[BuyFloorPaints Preparation and Cleaning Guide for Successful Floor Painting](#)

and may have already been brush or wood float finished, or previously mechanically finished or prepared i.e. by grinding or sanding to level or for other reasons (such as wall construction etc.).



Water Droplet: Pipette Application
Note the immediate absorption

Water Droplets Applied
Absorption continues and diameter increases

This concrete surface is almost suitable for the application of a floor paint coating with only thorough cleaning and the removal of any existing dirt and dust – preferably by use of a suitable industrial vacuum cleaner. Wet vacuum if detergent cleaning and rinsing is necessary.

A Typical Table of Results and Conclusions from the Water Droplet Test

Project Area 1	Central Part	All Droplets	Observed at times of 30 seconds, 1 min, 5 mins. Result = No absorbency. Observed at 10 mins. Result = Slight absorbency (5mm darkened ring when droplet removed with a cloth from the surface).
	Perimeter	All Droplets	Immediately evident absorbency. At 5 min – all droplets completely absorbed (5-10mm darker ring).
Project Area 2	Central Part	All Droplets	Observed at times of 30 seconds, 1 min, 5 min – No absorbency. 10 min – slight absorbency (5mm darker ring).
	Perimeter	All Droplets	Immediately evident absorbency. At 5 min – All droplets completely absorbed (5-10mm darker ring).

Conclusions from this Floor Testing Example: In this example it is evident that the perimeter of both areas has a different concrete surface to the central areas. – This could be due to the central areas being power floated and the perimeters being hand trowelled (i.e. there has been less ‘finishing’ and there has not been so much laitance brought to the surface, or that it is a very good, dense, non-absorbent concrete surface – with or without an additional curing agent applied). Alternatively the perimeter areas may have been ground with a grinding machine to ensure a good ‘key’ for building the blockwork walls.

In either situation this concrete floor definitely requires additional mechanical preparation before applying a successful floor paint finish. The most practical and cost effective solution is vacuum blastcleaning, which will cost approximately £2 to £4 per square metre, dependent on the area and access, etc. Alternatives could include mechanical grinding at a similar cost. Rotary Scabbling would be more expensive and more destructive, as it fractures larger aggregates and creates a rougher profile that is also not ideal for floor paints, which are normally applied in 2 or 3 coats to a total thickness of 150-300 microns (0.15 to 0.3mm) thickness. Acid etching should never be used as a preparatory treatment for

floor painting, as explained below in Section 4.

4. ii. Surface Strength – Scratch Testing / Cross Hatch Testing

There are a number of tests for the surface strength of concrete floors that generally involve fairly expensive to very expensive equipment from Schmidt Hammers to Nuclear Density Testing Machines – However there are some far less expensive practical tests that anyone can do with only basic equipment, to still give a very good indication of the surface strength and its condition.

-Concrete surfaces can be assessed with:

A simple surface ‘Scratch Test’, carried out by carefully using a new ‘Stanley knife’ blade against a metal straight edge to try and cut into the concrete surface vertically over a length of about 30cm; and then also with The ease and depth that the blade can cut into the surface should be observed and recorded, together with any ‘powdering’ or ‘flaking’ that occurs.

A ‘Cross Hatch’ test using another of the same type of (new) sharp knife blades. This cross hatching should be made as a grid of at least 5 vertical and 5 diagonally crossing horizontal lines, each at least 30mm in length and with approximately 2-3mm spacing. Then apply and quickly remove ‘gaffer’ or similar strong adhesive tape and examine the results for the depth of the cuts and if there is any discernible fracture or flaking off of the concrete surface around the cross hatch cuts and which will therefore be visible on the back of the tape.

(Note: A similar cross hatch test is also widely used for assessing the adhesion performance of paints and other coatings on steel and other material surfaces).

From a Dense Concrete Example



Surface Scratch Test – No visible / significant cut dimensions



Cross Hatch Test – No visible cuts or flaking on the back of the tape

There is no surface powdering or flaking, there is no cement laitance layer, however the surface is extremely hard and dense. If this area is to be subjected to vehicular traffic or other aggressive exposure, then this concrete floor surface requires additional mechanical surface preparation such as blast cleaning or grinding etc., to obtain an open-textured ‘sandpaper’ like surface, which is ideal for achieving optimum penetration / adhesion of a floor paint.

4. iii. Moisture Content of Concrete Floors Prior to Floor Painting

The moisture content of a concrete floor or cement screed is another very important factor in achieving a successful floor painting job. This applies to both new and existing floors and relates to not only the original excess concrete mix water, i.e. the water content of the fresh concrete that must be allowed to evaporate; but to the presence and integrity (or not) of an adequate Damp Proof Membrane (DPM) beneath the concrete floor slab; plus to the presence and integrity (or not) of any water supply or drainage system through the concrete; and finally of course to the areas recent exposure to rainfall or water from cleaning or other processes.

As previously stated elsewhere in this website, the general rule for painting concrete floors is that for a vapour tight floor paint or resin coating to be applied successfully, the substrate moisture content must be less than or equal to 4% by volume of the concrete.

To explain this briefly:

An average concrete mix per m³ today is:

- 400 kgs cement
- 1800 kgs sand and aggregates
- 200 kgs / litres of water

As the concrete hardening process (hydration) uses only around 100 litres (0.27 W:C ratio) then there are approximately 100 litres per m³ that need to come out – and as a new floor should always have a good DPM below it, then the vast majority of this water must come out through evaporation from the floor's top surface. With a typical 200mm thick industrial / commercial concrete floor slab, one cubic metre of concrete provides 5 square metres of floor – This means there are 20 litres of water that need to evaporate from every square metre – A considerable amount to come out of the surface.

This hopefully also explains why adequate ventilation and curing techniques are also important for the correct hardening of the floor. In order to ensure uniform strength, particularly of the new concrete's - surface layer, this rate of water evaporation must be minimised and controlled in its early stages, so that the water evaporation pore diameter is small, and that the surface layer itself is able to hydrate and harden correctly. – Otherwise this surface layer of the concrete floor slab will be weak, porous, easy to wear and prone to dusting.

This correct curing is normally best achieved by covering the freshly laid and finished concrete with a combination of hessian, plastic sheeting, or even special concrete floor curing mats.

Alternatively on large new concrete floor areas, resin or wax based Curing Agents can sometimes be sprayed on the freshly finished floor surface to act as a barrier and reduce the rate of evaporation. However, as previously mentioned, this method is totally inappropriate when floor painting is subsequently to be carried out.

New concrete should normally remain covered for 2-3 weeks followed by a further period of at least 2 weeks uncovered, but protected from the weather, and with good ventilation. This results in the minimum 28 day 'rule of thumb' period of curing prior to any floor painting or over coating works being carried out.

However as this is obviously a very generalised rule, given all the possible variables, at Buy Floor Paint

[BuyFloorPaints Preparation and Cleaning Guide for Successful Floor Painting](#)

we always recommend that the actual moisture content of a floor is still always tested and in several representative areas, to confirm it's compliance with the requirements of the floor paint or resin flooring system selected. This is exactly the same requirement that we recommend on both new and existing concrete and cement screed floors.

4. iii. Measuring the Concrete Floor's Water / Moisture Content

Moisture Testing Equipment:

Fortunately this is easily done by measuring the actual moisture content with a Surface Moisture Meter (such as a Tramex Meter, which are now widely available and they cost around £300 to £600 according to capabilities.) However the test procedure itself is also critically important because the meter will only measure the moisture content of the surface (as the name says), which does not take into account the residual moisture throughout the rest of the slab, or water that is still moving through the slab as water vapour, en-route to evaporate from the floor surface.



Tramex Surface Moisture Meter



Tramex Inserted Probe Moisture Meter

In most concrete flooring situation the cheaper type of surface moisture measuring meters are ideal, provided the test procedure is carried out correctly.

Moisture Testing Procedure for Concrete Floors Prior to Floor Painting:

The concrete floor areas selected to be tested should first be covered with a dense, impermeable plastic or rubber mat. NCC Buy Floor Paint recommend that this must have dimensions of at least 600mm x 600mm (although current USA standards now propose 900mm x 900mm), for a period of at least 24 hours before removing it and immediately testing the moisture content of the concrete surface beneath it in several places (always take an average of at least 3 results.)

Concrete Floor Moisture Testing Tip: If water droplets are present or if a significantly darker patch has developed when the mat is lifted, then a further waiting period and drying-out is required, -or an alternative floor painting system that can accommodate these conditions is necessary.

Buy Floor Paint can usually arrange to help you test the moisture content of your floor in an appropriate way, by using our own equipment, or by putting you in touch with a local specialist having the right equipment and experience to assist you. Call any of our offices and of our flooring specialists will be pleased to assist you.