

SURFACE PREPARATION OF CONCRETE (FLOORS)

1496

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GENERAL ASPECTS

Once a coating or a polymer flooring has been selected it is essential that the surface preparation of concrete is done correctly, otherwise optimum performance will not be obtained.

New concrete: In the case of newly made concrete it is important that the concrete has been laid for a minimum of 28 days before applying a coating or polymer flooring. The moisture content of the concrete should be below 4 % by weight. The release of the surplus water is dependant on the thickness of the concrete, the season, the temperature and relative humidity of the environment and the prevailing ventilation conditions. So the moisture content of the concrete should always be measured.

The moisture content at the concrete surface can be measured by an electronic instrument called Protimeter (Protimeter plc, U.K. telex 849305).

An indication in the red area means that the concrete is still too wet.

An indication in the green area means that the concrete can be coated.

An indication in the yellow area means be careful. A concrete area of approx. 4 m² should be covered by a plastic sheet for 24 hours after which the measurement has to be repeated. If the indication becomes red then the subfloor is still too wet to apply a flooring.

A major problem with new concrete floors is the top surface layer known as laitance. This water rich top layer is formed during the binding period and is mechanically weak. In addition to the poor mechanical properties, the laitance has a chemical composition different from the rest of the concrete. Concrete floors with this laitance are obviously poor substrates to apply coatings to. It should therefore be a pre-condition that the laitance has been removed prior to the application of any floor coating or polymer flooring.

Old concrete: The removal of all oils, greases etc., together with the removal of the remains of any previously applied coating is required to ensure a sound base for the application of a coating, polymer flooring or screed.

SURFACE PREPARATION

In order to ensure good adhesion and the long term performance of any floor coating or polymer flooring it is essential that the correct type of surface preparation is carried out. The removal of chemicals, oil, grease and fat must be completed before any other preparation work commences such as e.g. blasting or acid etching.

Mechanical tool cleaning must always be followed by removal of dust by means of vacuum cleaners.

Removal of chemicals from floor surfaces: Concrete that has become contaminated by chemicals must be neutralised before coating. If the contamination is acidic, it must be neutralised with an alkaline cleaner and rinsed thoroughly with fresh water.

If the contamination is alkaline it can be cleaned with detergents and/or steam.

Oil and grease contamination can be removed by a combination of solvents, steam and/or detergents depending on the severity of the contamination.

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Abrasive blast cleaning: Abrasive blast cleaning should always be the best choice for the pretreatment of concrete if polymer flooring systems have to be applied. Blast cleaning is normally carried out using an enclosed system such as a Vacu-Blast, or Auto-Blast type machine. These systems are virtually dust free and work on the principal of propelling small particles of abrasive i.e. steel shot, against the floor surface whilst at the same time vacuum recovering the dust and abrasive to a recovery hopper. In addition to cleaning the floor and removing any laitance, blasting will leave the floor surface with a profile which will enable the coating to gain a physical as well as chemical adhesion to the substrate. Blast cleaning is the recommended system for large floor areas.

Scarifying: Scarifying (sometimes known as scabbling) involves the use of rotating wheels and brushes to scour the concrete surface. The scarifying equipment is pushed over the floor and the enclosed rotating wheels abrade the surface. It is not as efficient or as dust free as a Vacu-Blast machine and can in the wrong hands, cause excessive damage to the substrate. It is most effective on small areas or areas where abrasive blast cleaning cannot be carried out.

Power grinding: Similar to scarifying this method can be used to open up holes and voids and to remove loose materials from the surface of poured concrete and pre-cast slabs. Power grinding is slower than blasting but could be considered for small external floor areas. One should take care that the concrete surface is not polished by the power grinding.

Wire brushing: Wire brushing can be used to remove loose material from the surface and open up holes and voids in poured concrete. This can be either by power or hand wire brushing, power wire brushing giving increased productivity and effectiveness.

Impact tools: Concrete surfaces can be roughened using impact tools such as needle guns etc. However this method can be slow and should only be used for small repairs. Granulating or Hammering machines work quicker but should only be used if very hard concrete must be roughened or if flooring screeds have to be applied.

Impact tools are normally electrically or compressed air driven and work on a principal of a sharpened tool vibrating against the surface. It is fairly easy for an inexperienced operative to gouge the concrete surface and therefore great care should be taken when using this method of preparation.

Acid etching: This method of surface preparation is most suited for use on new concrete floors (not for sand/cement screeds). It is carried out to remove laitance but will not remove old paint or oil and grease and should only be used in areas where sufficient drainage exists to allow the removal of the water and acid solutions. To carry out acid etching the following procedure should be followed:

- Before commencing acid etching the concrete surface should be cleaned of all loose concrete. Deposits of oil and grease should be removed by steam cleaning or by using an alkaline cleaner or detergents.
- Thoroughly wet the floor with water
- Sprinkle an 8% to 10% solution of phosphoric acid in water uniformly over the floor. The approximate spreading rate is 1,5 m² to 1 litre of solution.

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- The acid solution should remain on the surface for 2 to 4 minutes and then be rinsed thoroughly with clean water. The rinsing can be done with a water hose and a sweeping broom.
- It is important that the rinsing is done immediately to prevent the formation of salts on the surface, which are difficult to remove.
- The concrete surface should be checked for acidity using pH paper and should have a pH of 7 or higher.
- Depending on the type of concrete, more than one operation may be required to achieve a satisfactory surface profile.
- A thorough rinsing with clean water should be carried out after each acid etch application. The surface profile after acid etching should be similar to fine sandpaper.
- The concrete should be allowed to dry prior to applying the coating.

Personnel involved in acid etching operations should be provided with safety goggles, protective clothing, rubber gloves and rubber boots.

Rubber buckets should be used for mixing the solution. **THE ACID SHOULD ALWAYS BE ADDED TO THE WATER** rather than the water added to the acid.

Flame cleaning: Where conditions permit, deeply impregnated oils and greases can be removed from concrete floors by flame or superheated compressed air.

This method involves the use of heat to bring the oil, grease etc. to the surface and should be carried out under strict supervision with the necessary precautions being taken in view of the possible hazards involved.

After flame cleaning the surface should always be power tool cleaned.

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