
PURPOSE

The purpose of this section is to provide information on the surface preparation of concrete, new and old, removal of release and chemical agents, and surface preparation tools.

INTRODUCTION

Concrete structures are used for the containment of various types of liquids - typically fresh, sea, potable and waste waters. Corrosive materials cannot be contained since these would react with the concrete and lead to failure. In all cases, correct surface preparation is essential for optimum performance.

New Concrete

New made concrete must be cured for a minimum of 28 days before applying a coating – the moisture content of the concrete should be below 4% by weight. Release of surplus water is dependent upon:

- Concrete thickness.
- Season.
- Temperature and relative humidity of the environment.
- Prevailing ventilation conditions.

Moisture content of the concrete should always be measured, this is possible with an electronic instrument called a Protimeter. Use in conjunction with the Manufacturer's specifications.

New concrete may have release agents (formwork oils, curing compounds) present on the surface. The presence of these will be indicated where water on the surface forms droplets instead of an even film. These contaminants are detrimental to the adhesion of a coating system and must be removed prior to any other surface preparation.

Old Concrete

The removal of all oil, fat and other contaminants is essential prior to any other surface preparation. In most cases, the existing coating system will need to be removed entirely to ensure a sound base for the new system.

SURFACE PREPARATION

To ensure good adhesion and the long-term performance of any coating for concrete, 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.

Removal of Release Agents

These can be removed with high pressure water cleaning and detergent. If the contamination is heavy, hard nylon brushes should be used. After cleaning, the surface should be flushed thoroughly with copious quantities of clean, fresh water. It should then be allowed to dry (below 4% moisture content) before any coating application takes place.

Removal of Chemicals

Chemically contaminated concrete requires neutralisation before coating. If contamination is acidic, neutralisation is with an alkaline cleaner, rinse thoroughly with clean, fresh water. If the contamination is alkaline it can be cleaned with detergents and/or steam.

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

It should be noted that there are always some risks involved in painting over previously contaminated concrete.

ACID ETCHING

The majority of concrete surfaces should be acid etched before painting. This method of surface preparation carries out two functions:

1. Etches the concrete surface, removing loose particles giving the paint a better footing on which to adhere.
2. Neutralises excess free alkali which may cause failure of the paint system.

The concrete surface is etched by the application of a diluted hydrochloric acid solution. A satisfactory solution may be prepared by adding **one part** of Commercial Hydrochloric Acid to **four parts** of water by volume.

CAUTION: ALWAYS ADD ACID TO WATER – NEVER WATER TO ACID.

ALL NECESSARY SAFETY PRECAUTIONS SHOULD BE TAKEN WHEN HANDLING ACIDS.

The acid solution is liberally flushed over the concrete and a bubbling action should be evident. The solution should be left in contact with the concrete for about 15 minutes, after which the surface should be hosed off, or liberally flushed using clean, fresh water. Brooming off the surface whilst flushing will also help to remove any loose particles. The surface must be thoroughly dry before painting – a drying period of up to one week is recommended.

For old and aged concrete, acid etching is normally not required. Stiff brooming to remove loose particles and dust is sufficient preparation. If however, the concrete is smooth, acid etching is necessary.

Abrasive Blast Cleaning

This is the only suitable method for preparing large surface areas that are common with concrete tanks. It is normally carried out using a fine abrasive. Caution is required to ensure that the concrete surface is not gouged out. Dust and spent abrasive must be thoroughly removed after blasting, pressure potable water washing is preferred.

Power Grinding

This method can open up holes and voids and 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 areas. The concrete surface should not be polished by 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. Power or hand options – power wire brushing produces increased productivity and effectiveness.

Impact tools are typically electrically or compressed air driven and operate on the principal of a sharpened tool vibrating against a surface. Inexperienced operators can gouge the concrete surface and care should be taken when using this method of preparation.

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 operate more quickly, this method should only be used if very hard concrete must be roughened.



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**CUSTOMER CARE HOTLINE
WEBSITE**

**Australia
132 101
www.wattylpc.com**

**New Zealand
0800 735 551
www.wattylpc.com**

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