

IMPORTANT INFORMATION FOR SPECIFIERS:

SUCCESSFUL COATINGS APPLIED ONTO PROPERLY PREPARED CONCRETE SURFACES AND OTHER FIRM 'PREPARED-FOR-COATING' SURFACES



INTRODUCTION:

Professional specifiers, builders, painters, concreters, plasterers and other building industry professionals are often called upon to arrange the application of liquid coatings or paints to existing concrete and other hardened cement based surfaces. Correctly these should be applied to the surfaces of hardened concrete and mortars that are at least twenty eight (28) days old and have been **prepared** for coating by being made firm and clean – making them ready to receive liquid coatings that are to be applied to these cleaned surfaces and from which all adulterants have been removed and that when hardened the selected coating should therefore have excellent adhesion.

The intention by most people is to apply a suitable coating to either make concrete and mortar waterproof, to decorate it and 'spruce-it-up' with colour, to protect the surface from aggressive chemical contamination or to rectify it from past chemical damage, physical wear or perhaps by patching depressions and building up with a number of coats of a thick coating its total thickness to make it horizontally level.

Unfortunately, a range of variables – from the proper preparation of the surface to be coated to the nature, type and durability of the intended coating being considered can make this somewhat difficult. For example after the preparation work is completed the specifier has to determine whether the base concrete is required to be primed with a coating primer prior to the actual coating being applied or left unprimed – all the way through to the client's expectations of a particular coating's performance, and its suitability for the particular coating project – means these decisions and which coating type to use is rarely simple and if incorrect, or it is applied incorrectly, the attainment of a successful result may be doubtful.

This article examines some of the issues that can complicate coating projects. Some may eventuate into a failure, or a complete disastrous debacle requiring expensive removal and a new start. It hopefully offers some suggestions to help the reader achieve a successful ideal outcome.

For a more technical discussion of these issues, refer to Robert F Barber's paper, *Some Important Requirements for Paints & Coatings Intended for Concrete Surfaces*, available from Ability Building Colours, 133-135 Northern Road, West Heidelberg, Victoria, 3081 (PH: [03] 9457 6488), or download the paper from Ability's Web site: www.abilityproducts.com.au. Mr Barber is a licentiate of the Surface Coatings Association of Australia (SCAA) as well as the of Managing Director of ABC – Ability Building Colours.

CHEAP COATINGS? FORGET IT!

The old saying "You only get what you pay for!" has particular relevance to the quality and longevity of many applied coatings for concrete – especially for exterior applications – that are open to degrading weather and abrasive wearing from traffic. A high build coating recommended for concrete surfaces should be thick enough when set and hardened – at least one (1) to two (2) millimetres (mm) in dry film thickness – possibly to be applied in a number of coats or layers – usually a minimum of two (2) or three (3) coats and tough enough to last for at least for ten (10) and possibly for twenty (20) years under mild abrasive traffic and average or very high ultra violet (UV) Australian exterior weather exposure conditions.

For a top quality long lasting coating available from Ability of which a minimum of two (2) coats are always required will probably **last** as long as the concrete itself can be highly recommended, it's called duro paint™. More of this later.

Think about it! The selected coating will be expected to look good in the sense of its appearance, provide durable performance, hardness and wear resistance, have overall integrity and give decorative, non-fading lasting colour for a long time. To lastingly provide optimum protection for the concrete – say to prevent the penetration of water and perhaps its chemical solutions, to provide high resistance to the erosive forces of repeated wind driven rain and extreme weathering combined with its resilience to abrasion from foot and vehicular traffic as well as resistance to deteriorating chemicals – for example corrosive salt solutions – for 24 hours a day, 7 days a week, for anything up to ten (10) – possibly even fifteen (15) to twenty (20) years. That's a **big** ask!

Incidentally for exterior situations – it is preferable to choose coatings that are coloured – not clear. Preferably pigmented coloured coatings are recommended for permanent use that incorporate Ability's abilox® opaque, UV. fade resistant everlasting pigment colours. Clear coatings without pigments being adversely affected by UV light from the sun tend to microscopically craze, then crack, lose their adhesion and tend NOT to last on exterior concrete! Of course if you wish to see the concrete's decorative colours and surface texture design, in interior locations a clear transparent coating is mandatory but make sure if you must use it in harsh sunlit exterior situations that it is applied with at least two (2) coats that it contains a U.V. stabiliser and is **guaranteed** to last for what you consider to be a reasonable time.

FIRSTLY IN IMPORTANCE – THE PREPARATION:

The most successful coating projects depend to a very large degree on proper **prior preparation** of the surface to be coated.

If you are a specifier and wish to specify the preparation of an existing concrete surface properly – in detail – such as making sure it is to be made clean to be completely uncontaminated and has a firm sound base (note that removal of old existing coatings for the preparation can be a labour-intensive and possibly a costly job).

If you get the best technical advice available and insist on specifying the best quality paint/coating materials – which include some of those from Ability, such as the tough, long lasting **duro paint™** product – you will probably be able to guarantee to your client that a particular coating that's been specified **WILL** last and live up to the owners expectations of hard wearing toughness, plus a very long-life as well as its watertightness and its protection and colourful decoration of the concrete's surface.

Proper preparation is essential for ALL coatings to ensure a clean non-contaminated and sound firm stable surface onto which to apply the liquid coating and when hardened to have it stick well – taking full advantage of its hopefully high adhesive properties for it **not** to lift off in spots or the whole total film thickness due to delamination from the concrete surface.

However, if 'short cuts' are taken with this important preparation and/or you get inadequate preparation advice from the local hardware store and you choose to use cheap coating materials, you are virtually guaranteeing an expensive call-back – perhaps within the period of a solid workmanship guarantee which you would be wise to insist upon from the contracted applicator before the start of your coating project.

The message is clear: 'don't even think about using cheap low cost, low film build, poorly adhering coatings that gives only low wear resistance for your building project. It will almost certainly let you down and possibly cost you twice, three (3) or four (4) times as much to rectify in the long run!'

FAILURE OF COATINGS:

There are only three (3) basic reasons that surface coatings such as paints and sealers used on concrete and other cement based surfaces fail – particularly externally. These are:

- ☀ poor or inadequate preparation for coating which causes them to fail by lack of adhesion – they usually peel off easily and promptly
- ☀ they have been applied too thinly – say only one (1) coat, OR they have low coatings solids and contain evaporative solvents – sometimes known as 'thinners' which 'dry' the coating and 'thin it down' to reduce its applied dry film thickness (dft) AND/OR they are not thick enough and tough enough in their applied dry coating thickness to stand up to everything mother nature will throw at them during their '**expected**' design life, and/or
- ☀ when dried or hardened many typically normal organic coatings sooner or later shrink – leaving gaps, break up and additionally under UV. radiation from the sun they craze microscopically, then crack, flake, peel and lift off – losing adhesion, from the surface they are meant to be protecting and/or decorating
- ☀ they have inadequate hardness, abrasion and water erosion resistance. Perhaps they are not absolutely watertight and as a consequence soften as a result of water penetration to simply deteriorate by being washed away slowly or even rapidly during periods of heavy rainfall.

DEFINITION:

Before we go further, we had better define what is meant by the term 'coating'.

In the building industry context, it can be anything from a coating that has the lowest film forming binder solids to result in overly thin coatings per coat – such as resin based clear transparent 'sealer' coatings (not recommended in exterior locations because thin **clear** non-pigmented 'sealers' tend not to last) or thicker opaque coloured paving paints or stains – applied to prepared hardened concrete to decorate it with colour – to trowel applied cement based much thicker render mortar coatings for walls.

Obviously, coatings vary considerably in thickness, from something thinner than a single layer of human skin to a fairly thick high-build, high binder solids, sturdy cement based paint or a solid thick cement based trowel applied coating finish, which can be as much as ten (10) to twenty-five (25) millimetres in thickness.

In general terms the thicker the coating per applied coat or layer, combined with its innately high adhesion qualities, the longer it will last.

In between these thin and thick coatings is duro paint™ - a tough special cement based vertical or horizontal painted finish coating with the highest possible binder solids of 100% with exceptional hardness to give high abrasion resistance for floors and hardscapes/pavements. Applied in a minimum of two (2) coats and designed to permanently protect and beautify concrete surfaces – it also features non-slip/non-skid surfaces and are provided with either a stippled, matte/flat or smooth low sheen decorative coloured finishes.

FOR NEW CONCRETE CONSTRUCTIONS.**STEPS TO TAKE WITH THE SUPPLY OF LIQUID READY-TO-USE PRE-MIXED CONCRETE AND ITS CORRECT PROCESSING:**

Proper preparation begins as far back as the formulation (mix design) of the concrete itself and particularly **how** when adequately mixed with water and of a liquid 'plastic' easily finishable consistency this concrete is cast and processed. There are a number of important steps the reader can take to ensure the best possible concreting job.

For installation of **NEW** concrete you should:

- ☀ select an ethical pre-mixed concrete supplier, preferably in Australia, one who is a member of the Australian Cement Concrete & Aggregates Association;
- ☀ ensure that the concrete is made from sound high quality raw materials by insisting that the concrete is produced according to the relevant Australian Standard – AS 1379-2010, 'Specification and Supply of Pre-Mixed Concrete';

- ☀ realise that concrete typically has only about 26% of its strength and hardness at one (1) full day after it sets (in air that ideally has a temperature of 23°C and 50% relative humidity condition) and takes further time – specifically twenty-eight (28) days, combined with preferably moist CURING, to reach 85% of its ultimate strength, hardness and abrasive wear resistance;
- ☀ ensure that the concrete is of an adequate compressive strength grade for its potential use conditions, is properly placed (or pumped) onto/into the building site **without** adding extra water, is adequately compacted, float finished and moist **cured** by preventing its mix water from evaporating for an adequate number of days – possibly by using one of the best moisture retaining curing procedures such as the application of a quality CURING COMPOUND COATING. Ability's 'Duro-Seel CLEAR' in a single applied coat to the still damp concrete after it's finishing according to AS 3600-2012 'Concrete Structures' is an efficient, easy, labour saving way to do this – to ensure by means of your specification that concrete finishers faithfully follow this - **important procedure of this concrete mix water retaining method of moist CURING for an extended period of time.**
- ☀ There are several other methods available to ensure the concrete retains its (preferably LOW) water content IMMEDIATELY after the finishing operation is carried out that allows it to eventually harden to its potential design strength, hardness and abrasion resistance but many engineers are of the opinion that Ability's Duro-Seel CLEAR curing compound method is the best and lasts for many months to maintain the continuance of cement hydration to its ultimate strength.
- ☀ Also ensure that NO extra dilutive water is to be added 'on site' when the wet 'plastic' concrete mix is to be discharged to make it 'easier to place'. Also ensure that the 'placed wet' concrete is compacted by a vibration process to remove air bubbles to densify it and that it is skilfully screeded and float finished prior to commencing the moisture retentive curing procedure.
- ☀ seek out an outstanding concreting contractor company who is proud of their work and are happy to show you some of their past concrete placement projects that are over 5-10 years old to illustrate to you their durability.

Ability thoroughly recommends the simple use of their liquid '**Duro-Seel' Clear** which although a clear coating will last for many months and is actually an easy-to-use, one coat applied liquid **curing compound**, for immediate brush or spray application to the finished set, but still damp, just set concrete surface – just **before**, or just **after** it sets – the time of setting being dependant on the concrete temperature. 'Duro Seel' Clear forms a moisture retentive, evaporation resistant special solvent resin based liquid coating applied onto all the concrete's exposed-to-air surfaces to form a film that retains the concrete's (preferably low) mix water content to prevent evaporative moisture shrinkage which more often than not, leads to cracked concrete.

The concrete can be overcoated a few days later with a **further** coat of 'Duro-Seel' Clear to make the concrete CURED and SEALED with its moisture sealed in – for a period in excess of 120 days for perfect curing OR to remain **curing the concrete continuously** until it weathers away or is coated over with another suitable adhering long-life protective coating.

Kindly request additional information.

'Duro-Seel' Clear may be used as the preferred method of curing concrete, as it is very effective. IT MAY BE OVERCOATED WITH TWO (2) COATS OF ONE OF THE THREE (3) **duro paints™** as the **PREFERRED** LONG LASTING MOST DURABLE COATINGS FOR CONCRETE – MADE BY ABILITY – AND FOR LARGE PROJECTS SUPPLIED IN A CUSTOM abilox® PERMANENT COLOUR OF YOUR CHOICE.

ALWAYS PREPARE THE SURFACE:

Coatings to be applied over a hardened 'Duro-Seel' Clear curing compound coating which has enabled continuous moist curing and hardening of concrete, including tough, high build coatings such as one of the three (3) Ability **duro paints™**, which do not dry conventionally but are chemically hardened. These should be applied only to non-contaminated surfaces that have been prepared to make the concrete surface sound, reliably firm – removing any weakness and to be in a thoroughly clean condition.

YOU CAN ALSO request a hard copy of the Ability information sheet "SURFACE PREPARATION FOR PAINTING"

THE LAITANCE ENIGMA:

Laitance on concrete surfaces is a particular problem. One that probably affects a large proportion of all new recently placed non-weathered concrete – such as council footpaths and many other pavements and floors cast in Australia.

THE PROBLEM OF LAITANCE:

Laitance appears when concrete having **excessive** mixing water rises to the surface whilst being finished by screeding and trowel floating to bring highly diluted, almost exhausted grains of cement plus sand particles to the surface. UNLESS the CURING regime outlined in AS 3600 'CONCRETE STRUCTURES' such as the use of a good curing compound can be adopted, which may save concrete from laitance formation, overwet 'plastic' concrete that, after placement, only partially sets and hardens on its surface to result in laitance – a soft unsound, low-strength milky white layer of cement 'scum' that covers up to 1-5mm of the surface depth of concrete that when partially 'hardened' dusts easily on being swept with a broom.

A partially hardened concrete surface suffering from laitance is an **unsuitable** base for an applied coating because it's weak and unsound to result in very poor adhesion of coatings and has totally unsatisfactory abrasive wear resistance. Any applied coating will stick only TEMPORARILY to this weak surface layer of laitance.

If concrete is affected at its surface by soft weak laitance, this 'spongy' layer **must be removed** completely before any coating is applied. The most effective removal methods are in order of effectiveness are acid etching, a 3000 psi at the nozzle pressure water blasting machine such as a 'Gerni' type blasting machine and/or a professional grit blasting machine using high pressure air.

HAS THE LIQUID COATING MATERIAL THE ABILITY TO STICK (GIVE HIGH ADHERENCE) LONG-TERM, UPON DRYING OR CHEMICAL HARDENING WITHOUT THE SO CALLED 'HELP OF POROSITY?'

You will sometimes hear people in the building industry talk about "adhesion by penetration", which is a theory that a liquid paint coating will be forced into the tiny evaporated water capillaries and air voids that form in concrete surfaces – such as those contained in uncompacted or partly compacted concrete in particular – 'to lock' the coating in place.

However, this is only partly true because concrete – particularly the denser, higher strength grades – that has been properly **compacted** by vibration equipment – a densifying process to remove air bubbles and voids, then further densified by applying pressure to the process of float-finishing – **plus** efficiently carrying out the procedure of proper moist curing to harden it – should **not** be porous enough to increase the adhesion of any coating material having previously demonstrated adequate adhesion to a screeded/trowel floated concrete surface which has little or no porosity.

More and more builders are insisting that concrete used in the building industry – for pavements, suspended slabs, walls and roofs – **is properly** compacted, pressure float finished and moist **cured** by a recognised procedure to prevent its mix water from evaporating to result in dense, lowest porosity to water, other liquids and highly wear resistant concrete. Therefore, you may become ‘unstuck’ if you completely accept this theory.

Long-life coatings should not depend on having normal or a low liquid viscosity for coating concrete to gain the required adhesion. They must have **innate satisfactory adhesion** characteristics in their own right and regardless of how smooth and dense - the surface of the concrete is. This principle should apply even if a concrete substrate has a smooth shiny surface that has for example been achieved by casting concrete against plate glass. The selected coating – perhaps with the aid of roughening or abrading the concrete’s surface – must still be able to achieve good ‘stickable’ adherence long-term in its own right.

THE DIVERSITY OF COATINGS:

The variety and quality of coatings on the market is huge!

A quality coating for concrete is hopefully intended to achieve a particular benefit or several beneficial outcomes – to actually make improvements to cast in place and wall render applied cement based materials. This is usually achieved by a sturdy and solid coating and tough enough to provide abrasive wear resistance with a consistently thick film formation, adequate adherence, resistance to UV. light and watertightness to completely seal surfaces from wind driven rain and aggressive chemical water solutions eg. sulphate and salt solutions and other corrosive liquids to prevent concrete damage.

Additionally some coatings are intended to achieve certain improvements such as for pigmented paints/stains to form a pleasant overall fadeless decorative colour, to alter the concrete’s surface texture by using a suitable coating having the required texture finish, together with a high degree of essential hardness – to increase the durability of the base concrete – and to provide it with extra longevity by boosting the concrete’s wear resistance to traffic and/or select coatings that provide durable, hard, safe, non-slip and/or non-skid surfaces, such as Ability’s duro paint™ STIPPLE.

One of the most widespread requirements and uses for coatings intended for concrete is to make that concrete watertight – particularly when applied to leaky suspended slabs to make them waterproof and for the rust corrosion protection of steel-reinforced concrete, to guard against ‘spalling’ – which cause lumps of concrete to break up, disengage and fall off a structure. If not enough concrete cover thickness is provided over its embedded reinforcing steel, causing it to corrode – and as a result, spalling of the concrete will probably occur which looks ugly and adversely affect a building’s watertightness as well as its structural integrity. Spalling – or ‘concrete cancer’, as it’s more commonly known - can happen if rain or sea water penetrates into concrete – as deep as encapsulated steel reinforcing bars, rods or mesh. This may happen – particularly in poorly compacted concrete – to cause actual rusting of the reinforcement which expands in volume to cause the concrete’s break up by ‘pushing’ it outwards in ‘lumps’ or ‘spalls’.

Ability Building Colours, a proudly Australian-owned company based in West Heidelberg, Melbourne, offers a range of two (2) part chemically reactive but one step preparation powders to be power mixed into clean water. These super long-life coatings are called duro paints™ - available in either textured stipple, textured smooth matte or low sheen finishes.

Properly mixed and applied, duro paint’s™ are absolutely watertight, have high adhesion, are high build in coating thickness, non-slip/skid, highly abrasive wear resistant and also lastingly pigmented with Ability’s fadeless abilox® mineral oxide colours.

These top coatings are provided with comprehensive advice on their use and application for architects and other professionals involved in the building industry who need most durable coatings – please ask for duro paint™ ‘APPLICATORS MANUAL’.

PLEASE NOTE - duro paints™ are to be applied ONLY by Ability approved applicators.

Ability Building Colours have invented, developed and specialise in mineral (special cement) based very long life ‘duro paint™’ coatings. These are supplied as easy-to-mix-into-water powders which are easily power mixed on site.

duro paint’s™ come in three finishes such as the stippled texture finish, ‘duro paint™ STIPPLE’, or the almost smooth, slightly textured finish version called ‘duro paint™ MATTE’, and the ultra-smooth, almost glossy ‘duro paint™ LOW SHEEN’.

These all stick admirably to properly prepared smooth dense concrete, metals, wood and many other materials. They are GUARANTEED to perform for many, many years.

They can be made available in ANY of the standard seventy (60) Ability’s permanent abilox® oxide pigment colours that may be required or even in a CUSTOM made special blend abilox® colour of your choice.

Ability believes that duro paints™ are one of the BEST most durable longest lasting paint coatings available for concretes mortars, building wall claddings and most other building materials.

duro paints™ are non-organic true special cement based concrete coatings that are proven to excel for over thirty (30) years and are often considered by many architects, landscape architects and builders as coatings for other building applications by being regarded as universally superior to and lasting longer than many conventional synthetic organic coatings on the global market.

As a specifier, your choice of a particular coating may depend on the client’s brief and desired outcome.

Probably if some of the details and recommendations outlined above are followed, a potentially, successful very long-life result may be achieved.

The Ability Building Colour company is located at 133-135 Northern Road, West Heidelberg, Victoria, 3081 (PH: [03] 9457 6488) – with Sales Agents in all States and key locations in Australia, Singapore and Peoples Republic of China. For details of its product range, click on to its Website: www.abilityproducts.com.au or www.duropaint.com or call **(03) 9457 6488** and ask for our Client Representative, Mitch Barber.