6. Priming

Surface coating specialists think in terms of coating systems, rather than individual products, with prime coats, build coats and finish coats performing their separate functions in carefully planned combinations.

Prime coats are used:

(a) To prevent or retard the spread of corrosion from pinholes in the coating film or breaks in the coating system caused by mechanical damage.

(b) To provide good adhesion to the surface for subsequent coats which may not have good adhesive properties. Protect a blast cleaned surface from deterioration until the

(c) whole structure is blasted and subsequent coats will not be contaminated by dust and blast media.

6.1 Types of Primers For Steel

Primers can be divided into four classes each having very distinct and useful properties.

(a) **Inhibitive Primers** are generally those that function by interrupting the reaction at either the anode or cathode in the corrosion cells that form on ferrous substrates. They are called 'inhibitive' because of the type of pigments used in their formulation.

Red lead pigment based primers give good performance in most environments but their toxicity and consequent legislation against their use has prompted the search for alternative inhibitive pigments. Because of the toxicity of the spray mist, the paint film and dust when blasting to recoat, ICI Industrial Paints recommends against the use of red lead based coatings particularly as satisfactory replacements such as Hi-Build Epoxy Zinc Phosphate are now available.

Zinc chromate (chemically zinc potassium chromate) pigment functions by releasing the corrosion inhibiting chromate ion when in contact with aqueous permeants- Zinc chromates have a degree of water solubility and are not recommended for primers subject to water immersion or poundage as osmotic blistering may occur. Some studies have shown that chloride ion, such as in marine environments can render the chromate ion passivation ineffective. There is also some concern with the toxicity of zinc chromate and it, like red lead could be the subject of restrictive legislation.

Zinc phosphate is a non-toxic environmentally non-polluting inhibitive pigment that is now experiencing widespread use because of its proven effectiveness in urethane oil and chlorinated rubber based coatings. It is also widely used in epoxy based primers because, being virtually insoluble in water, it does not contribute to osmotic blisters.

(b) **Non-Inhibitive Primers** are based on non-reactive, water-insoluble pigments such as talc, silica, mica, aluminum flake, and micaceous iron oxide. They are most often used on non-ferrous and concrete surfaces where iron corrosion is obviously not a problem and adhesive properties are more important. They are also used as tie-coats over inorganic zinc to eliminate 'bubbling' in subsequent coats or as tie-coats over aged alkyd or oleoresinous films to enable overcoating with more durable two-pack coatings whose strong solvents may cause wrinkling of the alkyd film.

(c) **Lock-out Self-Priming Coats** are designed for use on ferrous substrates but function by use of a film so thick that electrolytes or moisture are unable to penetrate through to the surface. The prime types are ultra high build epoxy coatings. The coating may also contain oriented micaceous pigments that act as barrier pigments, such as water-ground mica, micaceous iron oxide, aluminum powder.

Lock-out coatings offer the potential to last the life of the structure as there are no active ingredients being consumed in performing their anti-corrosive function.

(d) **Galvanic** coatings contain a high loading of zinc metal dust which, as in zinc metal galvanising, sacrificially corrodes in preference to iron. Studies have shown that zinc rich coatings also form an impermeable film of zinc carbonate salts which act as a lock-out barrier to corrosive salts and moisture.

Zinc rich coatings can be separated into two distinct types. One uses an organic film former such as epoxy, while the other group is referred to as inorganic zinc silicate coatings.

Organic zinc rich coatings generally lend themselves to brush application and are not as critically dependent upon surface preparation. However, they perform in a manner similar to conventional organic based coatings on outdoor exposure.

The properties exhibited by inorganic zinc coatings can vary widely depending on how they are formulated and the silicate binder used in the formulation. However, in general, inorganic

zinc coatings possess several unique features which has led to their widespread use as anti-corrosive primers in the protection of structural steelwork and steel tanks.

Inorganic zinc primers as a class possess the following advantages:

(1) Unaffected by weather and resistant to fungus, UV radiation and wide ranges in temperature.

(2) As the inorganic binder chemically reacts with steel substrate, adhesion is excellent and damaged coating does not undercut or allow underfilm corrosion.

(3) Unaffected by most organic solvents, petrol and petroleum products.

(4) Suitable for use in friction grip connections (all other coatings act as lubricants).

(5) A hard wearing coating with excellent resistance to damage in transport.

It must be borne in mind that self-curing solvent based, inorganic zinc coatings depend upon moisture in the atmosphere for curing and may require spraying with a mist of water spray to ensure completion of cure in areas of low humidity.

6.2 Primers for Galvanised Iron

Most of the failures of paint systems on galvanised and similar surfaces can be traced to incorrect use of the prime coat, or no prime coat at all.

6.3 Primers for Aluminum

Conventional alkyd enamel or polyurethane top-coats should be applied over Etch Primer applied at a thickness of 5 to 7 microns d.f.t.

6.4 Primers for Concrete, Masonry, Brickwork, Fibro/Cement Sheet

For epoxy or polyurethane finishes, priming should be undertaken with Epoxy Floor & Concrete Coating applied at a spreading rate to give 50 microns d.f.t.

If efflorescence or laitance is present, this must be removed by blasting or acid etching, as described in the section on surface preparation.

6.5 Primers for Timber

For decorative low build finishes a standard system of primer, undercoat and finish is normally required. Suitable solvent based primers, undercoats and finishes are available in the NC & PU range of timber finishes.