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"CHLORUB"®

— The Modern Answer to Corrosion

a complete anti-corrosive system

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CHLORUB® THE MODERN ANSWER TO CORROSION—A COMPLETE ANTI-CORROSIVE SYSTEM

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I What is Chlorub?

"Chlorub" is a film-forming binder manufactured by chlorination of natural rubber. It is available in the form of a power soluble in all aromatic solvents and insoluble in water and alcohols, and can be plasticized into a flexible film. 'Chlorub' is an indegenous product, manufactured by M/s. Rishiroop Polymers Pvt. Ltd., Bombay, at their Nasik plant. Both the process technology and the entire raw materials are indigenous. The product 'Chlorub' is supplied to all leading paint manufacturers in the country, who in turn formulate it for different end-uses in different viscosities, colours and with different compounding ingredients to meet a specific need of a paint for the user-industries. It is a 100 percent substitution for similar imported products.

II How does "Chlorub" protect?

Chlorub protects the entire area where it is coated by incapsulating it by its film-forming properties. It is well accepted on the surface of all known materials of constructions with good adhesion.

(A) **Steel:** Steel is one of the most largely used materials of construction to build a wide variety of of plants and installations. Wealth worth millious is corroded off in steel for the simple reason of inadequate protection by proper coatings. The selection of a proper coating material is very vital because it can go a long way in the life of the entire plant. Initial coating with a proper anticorrosive paint is very important to avoid future regrets.

Surface Preparation: Both for new and old constructions of steel, a sand blasting, for once, is preferred. In new steel, the mill scale should be removed for good paint adhesion. In the case of old installations, the rust and rust-scales as well as old paints also should be removed. Sand blasting will be the preferred method of metal laundrying. For a surface already having an old coating of chlorinated rubber, there is no need for an elaborate preparation. A thorough wash of the surface to remove the dust and dirt, and drying it, will be sufficient. (This is a very important point in favour of chlorinated rubber paints, that they have very good intercoat-adhesion, even on old paint). The application can be with brush, airless spray or roller coatings.

Method of Application: A good primer also based on 'Chlorub' is ideal to start with. Over this, two high-build-system coatings are sufficient. In special cases of a preferred degree of gloss or colour, another thin finish-coat is advisable. This system will provide enough chemcal resistance. It resists passage moisture and oxygen, which together cause corrossion. A good chemical resistant coating by all standards and codes of practice (C p2008:1966) should have a minimum thickness of 125 microns (5 thou) to 200 micron (8 thou) for the best protection. With three coats of a high build "Chlorub" system, this minimum can be easily achieved, whereas conventional paints need 7 to 8 coats to achieve the same thickness.

Brush application of primer is preferred for good wetting properties on the surface. Subsequent high build systems can either be brush-applied or applied by airless spray. Formulations will differ in each case. In brush applications, nearly one litre of high build paint is required to cover approximately 4 to 5 square metres of surface area. Airless spray system is recommended in the case of large surface areas of ships and tanks. It can also be used where there is a minimum width of 30 to 40 C.M. The high build Chlorub system, for the best efficiency, should be sprayed from a distance of 30 to 45 C.M. from the surface using 375/475 micron (15/19 thou) jet. Two to three passes will give a wet thickness of 250 to 375 microns per coat (10/15 thou) equivalent to 75/125 microns (3/5 thou) dry film thickness.

(B) **Chlorub Coatings on Concrete & Masonry Work:** 'Chlorub' based formulations meant for concrete and masonry protection has the same degree of chemical inertness and resistance to other environmental corrosion. They dry quick, have good

adhesion, are chemically inert, durable and have low water and air permeability to ensure long life at low cost.

Surface Preparation and Application: All dust, loose paint from old application, any fungus or algae growth, any deposit of salt or alkali should be removed. The preferred method is to wash the surface with detergents and water. It should be dried well before coating is applied. Brush, spray or roller coating, as in the case of steel, is suitable.

(C) **Wood and Other Substrates:** Surface preparation and method of application will be similar to concrete and masonry application, except for wood. In the case of wood, a good surface peal, to make it smooth and level, followed by solvent, wipe, is ideal.

III Where to Specify Chlorub Based Paints

It is very important to decide on a coating system for any given service condition. Before a selection is made, there is a natural question of "why a particular system?" There must be very convincing reasons for selecting a specific system since it will be a basic selection and will go a long way in the life and efficiency of the unit to be protected. There are a great many number of reasons to the question **WHY CHLORUB?**

IV Why Chlorub

The summary of answers, to this question, are:—

- X Combined acid and alkali resistance,
- X Can be easily applied to all materials of construction,
- X High impermeability to water and air,
- X Single part system and no premixing.
- X Fast drying by solvent evaporation,
- X Easily formulated to low build (25 microns) or high huild system (100 minimum)
- X Easy to apply by brush, spray or roller,
- X Low (-20°C) or high (+50°C) temperature applications possible,
- X Extremely resistent to salt and hence most suitable marine paint,
- X Inhibits mould growth,
- X Very good intercoat adhesion even after years of application,
- X Approved coating for potable water storage tanks.
- X Approved coating for nuclear installations.
- X Available in all-colour range and combinations.
- X Fire Resistant and retardant to flame.

V Field of Application of 'Chlorub' Coatings

(a) **Chemical Plants:** Multifarious problems of corrosion in chemical plants is a highly discussed problem in the industry. A single solution to all the combined problems is a very difficult proposition. However, "Chlorub" has created the confidence in chemical engineers and plant-maintenance engineers. "Chlorub" has stood the test in all given conditions.

The high-build system of 'Chlorub' combines durability and versatility and is easy to apply. They withstand a wide range of chemicals, acids, aqueous solutions of alkalis, inorganic salts, oxidising chemicals, moist gases including chlorine; have a long life and tolerate a lower standard of surface preparation than other similar systems. It has excellent intercoat adhesion, irrespective of the age of the coating and is a one-pack system. It is a fast drying system and is applicable in low temperature conditions without offering drying or other problems.

(b) **Refineries and Tank Farms:** The corrosive acid atmosphere in a refinery, alkaline and acidic atmosphere in the usually nearby fertiliser units and the frequent location of refineries near the sea, are creating problems for the tank farms situated close to or even a little away from refineries. Here again, film thickness is a criterion for good resistance. High build system of Chlorub coatings are recommended for this condition.

(c) **Pipelines:** Water, oil, gas and effluents are normally conducted through giant pipe lines. These pipe lines go through all sorts of corrosion and weather conditions. To protect them both from outside and inside is of utmost importance. Application of Chlorub in this case is different from others. Mostly the pipes are laid underground and the long term durability is obtained by the high build coats of hot applied coaltar enamels or similar coating. These cannot be applied direct to steel. The long established method is "Chlorub" based priming system. Since regular maintenance is difficult, it is worth using a high quality Chlorub system.

(d) **Bridges:** The position of bridges itself is suggestive of an urgent need for long term protection. Dampness, with salt and atmospheric oxidation, make corrosive conditions and reduce the life of a bridge. Condensation of water on the underside of a bridge is a common source of corrosion. A very reliable, long term and easy maintenance type of paint is a must in this application. Chlorub-based paints meet all these requirements.

(e) **Road and Rail Tankers:** The tank cars carry a wide variety of chemicals, slurries and liquids in their cross-country travel. They pass through every type of atmospheric condition. Ranging from fumes, marshy, wet and a variety of other conditions, they are subject to rigorous environments. Resisting an all combined corrossion is the job of a special paint. 'Chlorub' coatings comes in as an easy and reliable choice in such situations, spillage of fluids carried in the tankers is the first cause of corrosion. A maintenance-free 'Chlorub' coating ensures resistance to all corrosive conditions to come. The quick application is all the more important because the tankers cannot be kept off the service for long, to justify the profitability for the owners. Long withdrawal for maintenance is a definite loss to the owners. All these needs are met in "Chlorub" based coatings for tankers.

(f) **Transmision Towers, Radio and Radar Equipment:** Some structures are practically inaccessible after installation. High rising structural towers are an example. This calls for a long-term, most reliable and maintenance-free coating. Chlorub coating is the easiest choice in this situation. Those towers are subject to rigorous weather and corrosive conditions and need protection. 'Chlorub' is the care-free choice.

(g) **Sewage and Waterworks:** The equipments and the method of operations of the two have a very close similarity; but the problem of corrosion is different. The sewage works offer all combinations of corrosion problem, whereas waterworks present mostly water and disinfectant corrosion. In the event of all these conditions anticipated, there are no two opinion of going in for Chlorub protection', which offers overall resistance to adverse conditions.

(h) **Coal Mines:** Steam, gases, acidic fumes, fumes from machines working, water and acidity at the pit-head, are all common problems of coal mines. Choice of Chlorub to protect the steel structure and machines keeps the mine maintenance and safety engineers care-free. Over and above, the fire resistance of Chlorub with the chemical resistance, makes Chlorub an automatic choice inside the mines and also outside them.

(i) **Gas Plants:** In gas plants, both acid and alkalis are used to produce and process gas and other chemical by-products. In the event of a combination of corrossive conditions, Chlorub base paints is indicated.

(j) **Nuclear Installations:** The most essential need of a paint exposed to radiation, is that it should absorb the least amount of radio-active material and should retain the least amount after de-contamination. Chlorinated rubber paints qualify in this that they easily get de-contaminated. This is proved all over the world and is accepted in all Nuclear Installations as a protective coating. In addition, chlorinated rubber-based paints are resistant to chemicals and water corrosion also, making it acceptable on all steel and concrete structures.

(k) **Food Processing Plants:** Breweries, diaries, abattoirs and fish processing units all have more or less similar corrosion problems of chemicals, preservatives, salts and water. The protective agent used must be non-toxic also. Meeting all these condition, with an easy to maintain property, there is only one paint that is based on Chlorub. Chlorinated rubber based paints are extensively used in these areas throughout the world. The resistance to attack of Bacteria is a very remarkable property of chlorinated rubber based paints. The ease of application to steel, masonry and concrete substrate, which are part of the whole complex; makes chlorinated rubber based paint an ideal choice in such establishments.

(l) **Concrete Curing Compound:** The reactions that take place when concrete cures is lamplex. Retention of water on the surface is very essential. In vertical concrete castings, it is difficult and cumbersome to keep it moist till complete curing takes place. A Chlorub based lacquer is ideal in this that it ensures a better retention of water than other systems. Chlorinated rubber films are quick drying and are resistant to rain within a few minutes of its application. It will also ensure that concrete road surfaces have more effective road markings with good adhesion. This will be particularly useful on runways and aeroplane parking lots.

(m) **Road and Runway Marking Paints:** Markings on road and runways ensure safety and good road utilisation. Many conventional systems have been tried so far. Since a few years ago, chlorinated rubber based paints are considered a standard in comparison with other systems. Fast-drying with longer life has qualified chlorub based paints on this application. Both yellow and white markings are equally effective. Long wear resistance of chlorub based road marking makes it all the more acceptable to this application.

(n) **Railway Structures:** Apart from wagon and tank cars for corrosive chemicals' transportation,

structures supporting overhead lines for electrified trains as well as platform shade trusses are subject to atmospheric corrosion. Metallic pigmented or otherwise, "Chlorub" paints are ideal in this application.

(o) **Sugar and Jaggery Factories:** It is a very common sight in sugar and Khandessary factories, the trusses are severely corroded, because of high humidity and Sulphur dioxide coming out of bleaching tanks. Chlorinated rubber based paints are ideal in this application, since annual maintenance is easy and avoid extensive preparation of surfaces. The cost of recoating becomes negligible and the cost of surface preparation is considerably ruduced.

(p) **Transmission Towers:** Overhead high voltage electric transmission tower is a significant field of corrosion protection. It passes through a wide variety of terrain and weather conditions. Supply lines closer to chemical and fertiliser factories are very much vulnerable to chemical corrosion. Choice of a convenient and most effective paint in all conditions nuturally falls on chlorinated rubber paints.

(q) **Swimming Pools and Water Reservoirs:** Quick drying and protective nature of Chlorub based paints can be made good use of in application where good adhesion to concrete and cement surfaces are of importance. The underwater behaviour chlorinated rubber based paints are excellent and superior to most other paints. It is resistant to micro-organisms and algae. Annual maintenance is very easy and thus Chlorub based coating becomes the right choice for swimming pools and water reservoirs' maintenance.

(r) **Overhead Watertanks for Potable Water:** Potable water disinfected with chlorine is a definite source of corrosion. Internal pitting of overhead tanks accounts for the corrosion by water and chlorine. This type of water distribution system is mostly confined to industrial and other major cities where the atmosphere also is with corrosive fumes. In such a situation, a non-toxic, anti-corrosive paint for both inside meet all these requirements. The fire-resistance and bacteria resistance are additional advantages.

(s) **Ships and Other Marine Applications:** This is the most important field of application of chlorinated rubber bassed paints. These paints, being resistance to a wide variety of salts present in sea water, are the most ideal paint to protect ships. Ship builders and ship owners throughout the world are very specific on the use of chlorinated rubber based paints. All the international and other marine paint specifications favour chlorinated rubber based paints. The ease of application and possibility of a 5 mil or more thickness in one coat of a high build paint system and the increased use of airless spray system in ship-yards, lead to great labour cost savings. This, in turn, is added to the attraction of using Chlorinated rubber paint. The ease of recoatability without extensive surface preparation is another attraction to adopt chlorinated rubber based paints in ships and building industry.

Both primers and top coats are easy to apply and is an all-weather paint. If the solvent is partially miscible with water, even in wet condition, painting can be carried out. For low temperature application chlorinated rubber based paints are ideal. Antifouling paints based on Chlorub has good adhesion to most substrates and can be mixed with a variety of toxins. For both boot and top sides, where mechanical damage is more often, Chlorub is ideal. Even after repairs in mid-sea or in winter, chlorinated rubber based paints are ideal for use and easy to apply.

For deck paintings, Chlorub based paints, modified by adding sand or powdered polypropylene to make it non-skid, are extensively used. When aluminium or galvanised iron is to be coated, an etch primer is recommended. High build Chlorub based paints are used for cargo holds, bulkheads, coffer dams and other structurals.

Chlorubs is not recommended as crude oil tank coating, since it gets softened by crude oil. The fire retardant property of chlorinated rubber based paints makes it an ideal choice for engine rooms and other places of suspected fire hazards. Since only short time intervals are available in dry docks, the quick drying of Chlorub based paints are considered a boon for quick work. The drying time and intervals between the coats entirely depends on the thickness of single coats. If a 2 mil coat is applied, the next coat can be done within 3 hours. But for 4 to 5 mil thick coats, about 6 hours is preferred for the next coat. At least 24 hours drying should be given before immersion in sea water.

(t) **Water Treatment Plants for Soft Water Needs:** This is an area where water, salt and environmental resistance are important. The water treatment plants are usually located in industrial establishments for boiler feed and similar soft water necessities. Chlorub based paints qualify for both inside and outside protection of water treatment plants.

VI Protection Life of Chlorub Based Paints

The life span of any paint system is difficult to define. It solely depends on the severity of the corrosive conditions. A newly fabricated system with a fresh Chlorub coating normally needs recoating after 5 years. If it has been used as a maintenance coat on an already existing old system, a life of three years is easily expected. Considering the low maintenance needs of Chlorub based paint, it is more attractive to use for any given environment or as general corrosion protection from atmospheric and chemical agents.

VII Economics of Chlorub Coating

Chlorub based coatings are one-part systems which dry hard by solvent evaporation. No premixings are necessary before coating. No gases of reactions are involved. Because Chlorub based coatings are solvent borne, intercoat adhesion is always good, irrespective of the interval of recoating. This feature, with quick drying properties, makes it an economic proposition where quick service of the coated surfaces is needed. Adhesion to a wide variety of primer systems, other than Chlorub based, also makes it easy to use, without any fuss, by any conventional method on any material of construction.

The cost of painting is not only the cost at the time of first painting. It is to be measured in terms of the frequency of repainting required for a specific condition of use. In the case of conventional painting systems, extensive surface preparation is required every time a recoating is done. In painting cost, the major part of the cost is surface preparation. The cost of the paint itself is mostly less than 30% of the total cost of painting. Chlorub does not require such extensive surface preparation every time a recoating is done. Since Chlorub is formed by solvent evaporation and being solvent borne, there is hardly any surface preparation required for recoating to give good adhesion. Thus chlorinated rubber paints are the most economic long-term protective coating available for anticorrosive applications.

"CHLORUB" is the registered trade mark for Chlorinated Rubber Manufactured by M/s. Rishiroop Polymers Pvt. Ltd., 160, D. N. Road, BOMBAY-400 001.