

A
Catechism
ON THE
Categories
OF
Corrosion

**and the economical
selection of
adequate
maintenance paints
and coatings**

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Q. What can Hercules, which makes no finished paints or coatings of any kind, contribute to the general fund of knowledge on corrosion-resistant coating systems, maintenance paint, and painting procedures?

A. Quite a bit, in a number of areas. For one, we have been producing a high-quality, highly chlorinated rubber (containing approximately 67% chemically combined chlorine) as a film-former for coatings for over twenty years. During that time, we have studied the material and all of its proper applications intensively.

Then, we are in constant contact with almost every one of the more than 2,000 coatings manufacturers in the country. A majority make good use of our Parlon® chlorinated rubber in one way or another.

And other points of contact with the coatings industry include synthetic resins, pentaerythritol as a preferred polyol in alkyds, and the other film-formers such as nitrocellulose and ethyl cellulose.

In a third area, all of Hercules' plants require constant maintenance painting, involving all degrees of exposure to weather and chemical environments. These thus serve as excellent practical test areas. In addition, we have had the benefit of the best advice and intelligence of noted outside consultants.

Q. And what does all this lead to?

A. A system of classifying maintenance exposures, and the types of painting systems they need, into specific categories based on severity.

Q. How many of these "categories" are there, and what do they mean?

A. We recognize four, and define them as follows, in descending order of severity and cost.

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Category I: Most severe corrosion exposure conditions—very strong chemicals, strong fumes and condensation, liquid chemical exposures and immersions, steady salt spray. This type of exposure calls for the most resistant coating systems.

Category II: Moderate-to-bad chemical exposures—intermittent salt spray, and severe weather exposures alone or in combination with noticeable industrial fume attack.

Category III: Intermediate exposures—industrial fume and possible chemical attack, fume and weathering combined with or without steady moisture condensation. Distant salt-spray existence also in this category.

Category IV: Ordinary exposures—as found in 50 to 70 percent of all maintenance painting. Weathering and ordinary big-city and industrial-community atmospheres are the most severe conditions normally encountered.

Q. What is the practical value of these categories?

A. They provide a rational basis for economical paint specification. As in all other phases of engineering, both overdesign and underdesign carry economic penalties, and either one will show up sooner or later on the maintenance cost sheets. By classifying all surface- and paint-area exposures according to these four categories, adequate paint selection and maintenance-painting procedures can be developed. Only in this way is it possible to arrive at the desired ideal maximum protection of structure and equipment at the lowest cents-per-square-foot-per-year cost.

Q. From your experience and test work, what maintenance-painting procedures would you recommend?

A. We would suggest these minimum adequate specifications for maintenance painting:

1. *Prepare the surface as well as can be practically done*—removing all loose rust, tight rust,

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and mill-scale by whatever procedure is needed to secure a surface of clean, bright metal. If rust cannot be removed by brushing or blasting because of other conditions, the surface should be chemically cleaned or passivated and an oil-base primer with better-than-average metal-wetting action used.

2. *Apply a minimum of 5 mils dry film thickness*, using at least three coats—a system of primer and two topcoats, or a primer, a special midcoat, and a topcoat—designed to meet the requirements of the exposure category. Three coats are the minimum number needed to be sure that the film is continuous. Four or five coats are sometimes better, to secure films thicker than 5 mils for most severe service conditions.

3. *Then, set up regular inspection schedules*, which will assure that all surfaces are inspected and their conditions recorded at intervals of three months to one year, depending on the severity of exposure. Here again the category classifications arrived at in the original engineering analysis, modified by experience, will serve to organize the inspection work. Particular attention should be paid to edges, welds, surface irregularities, etc. Here is where corrosion will start first, and the corrosion products will spread rapidly under the sound coating on nearby surfaces.

4. *Spot-repair all rusted or corroded spots* with the full coating system as soon as they appear, taking the surface down to clean metal for as far as surface or under-film corrosion is evident.

With this procedure, repainting will be needed only when the entire structure requires it, either through complete overall failure, or when a washcoat is called for to improve appearance.

Q. Where can Parlon-based paints fit into my corrosion-resistant and regular maintenance painting work?

A. Parlon itself is chemically inert and is not affected by acids, alkalies, chemicals, or water.

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It is softened only by animal and vegetable oils and strong solvents, and it forms a less porous film than most other organic coating material.

Coatings are made from Parlon by most leading paint companies. There are four distinct formulation types, each meeting the particular requirements of one of the Four Categories of Corrosion.

To meet Category I service, where severe corrosion is encountered, the coatings are predominantly lacquer-type and contain only Parlon chlorinated rubber and chemically resistant resins and plasticizers selected for this purpose. In such paints, the Parlon constitutes over half of the total vehicle solids. Each phase should be specially formulated to match the overall system requirements, and to develop the desired 5-mil minimum dry film thickness in the prescribed number of coats.

For Category II service, some alkyd resin can be used, with a slightly lower Parlon content and a reduction in the total chemical-resistant resin and plasticizer. Although there is some reduction in chemical resistance from the Category I formulations, other advantages accrue—among them noticeable improvements in outdoor durability, adhesion, brushability, resistance to abrasion and mechanical damage, and lower cost levels.

To meet the standards of Category III, Parlon content is reduced to 25 to 30 percent, and the remainder is a typical alkyd resin vehicle. Here costs come closer to "regular paint" levels; yet the coatings have much higher chemical resistance than conventional enamels. Outdoor durability is excellent; some special formulations of this type, using premium-performance resins, have shown outdoor durability and gloss retention indistinguishable from the new "no-waxing" acrylic automotive enamels. These are truly "glamour" maintenance paints.

Even in Category IV service, Parlon, when used in more than marginal amounts, contributes a speed of dry and enough resistance to mild

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fume- and wet-exposure conditions to bring it into volume use in a number of lines. Here, too, better-than-minimal formulation leads to outstanding performance and durability, and makes the finished coatings outstanding economic values.

Added to this are the special Parlon-drying oil primers, the zinc-rich paints, and other premium-value maintenance vehicles which are available for special services such as unavoidably rusty metal surfaces; marine deck and hold paints; waterworks, paper-mill, and other equipment where the metal must be painted when wet; and so forth.

Q. Can I find one single Parlon chlorinated rubber-based paint that will serve all my needs?

A. No, as indicated previously. There are special needs for each type of exposure which can be met only by a coating developed especially for that category.

No one formulation will do all things well. This is true not only with Parlon but is equally true of all of the special materials on which maintenance paints are based. And it is quite uneconomical to use a Category I paint where a Category II or III product will deliver adequate protection. Some paint companies offer a complete line of Parlon-based coatings for all four categories of use, and some specialize in one or another of the possible types.

In general, if you know what your service requirements are, you will be able to find a paint supplier who can offer you a Parlon-based coating that will give you economical protection, and allow you to design and implement engineered maintenance for lowest cents-per-square-foot-per-year costs. This economic advantage is realized through better protection than can be secured with less resistant coatings, and with less surface preparation, easier application, and fewer recoating problems than with any of the other high corrosion resistant types.

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This booklet has been prepared by the Polymers Department of Hercules Powder Company, manufacturers of Parlon® chlorinated rubber, as a service to all segments of industry and business. It is intended as a useful guide to the proper selection and use of paints and protective coatings wherever maintenance of structures, equipment, and buildings is a recurrent problem.

Further information can be obtained from:

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Hercules Powder Company does not manufacture paints, but produces and supplies "Parlon" chlorinated rubber for use by the paint industry. We believe the information presented in this folder concerning the uses of Parlon paints and their effectiveness to be accurate; however, no guarantee can be made regarding its accuracy. Further, since the manner and conditions under which Parlon-based paints are used will differ, and because neither Hercules Powder Company nor the paint manufacturers have any control over these methods or conditions, they cannot make any guarantee regarding the results that will be obtained through the use of these paints. Statements concerning possible use of our products are not intended to recommend infringement of any patent.

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