

Duremax[®] GPE ZP

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The “Other Zinc” Coating

Zinc rich primers have been the foundation of high performance protective coating systems for decades. Recently we have seen the price of zinc metal increase by as much as 55%. The cost of zinc-rich products increases correspondingly.

Similarly labour input costs have also increased, probably ahead of recognised inflation rates. The effect is quite simple, with higher material costs and higher labour costs it is more costly to apply high performance coating systems.

While our industry focus has been on zinc rich products, we have probably not put **zinc phosphate epoxies** in the frame and recognised them as a good low cost option to zinc rich coatings, particularly where additional coats are to be applied. **High-build zinc phosphate epoxies** may, in fact, effectively cover the “middle ground” between two and three coat systems.

What is Zinc Phosphate?

Inorganic zinc inhibitive pigments, such as **zinc phosphate**, offer **active** anti-corrosive protection to the steel substrate. Zinc phosphate ($Zn_3(PO_4)_2$) is only slightly soluble in water. It hydrolyzes in water to produce zinc ions (Zn^{2+}) and phosphate ions (PO_4^{3-}). The phosphate ions act as **anodic inhibitors** by phosphating the steel and rendering it passive. The zinc ions act as **cathodic inhibitors**.

What is Duremax[®] GPE ZP?

Duremax[®] GPE ZP is a two-pack epoxy steel primer formulated with **zinc phosphate** to protect the metal from corrosion. The epoxy resin provides high strength adhesion to the substrate as well as excellent cohesion, binding the pigments together tightly to form a tough barrier. Therefore, **Duremax[®] GPE ZP** provides both **active inhibitive protection** and **passive barrier protection**.

How Does Duremax[®] GPE ZP Compare With Other Zinc Primers?

This is a brief presentation on a small exposure series of current, commercially available zinc phosphate primers and a zinc-rich epoxy primer top-coated with a polyurethane.

The Test

The objective was to compare the effectiveness of corrosion resistance of three primers, applied at the recommended dry film thickness and top-coated with a two-pack polyurethane finish (Weathermax[®] HBR). All products were applied by conventional spray application onto abrasive blast cleaned panels.

1. Durepon[®] P14 @ 65 μ m,
2. Duremax[®] GPE ZP @ 130 μ m and
3. Zincanode[®] 402 @ 72 μ m

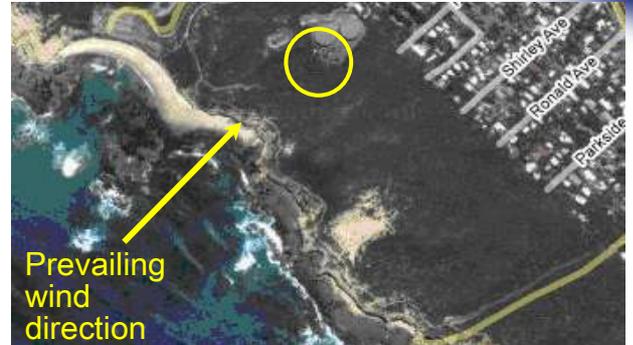
After 7 days curing all panels were cross-scribed to introduce a controlled defect into the coating so that corrosion of damaged areas could be evaluated.



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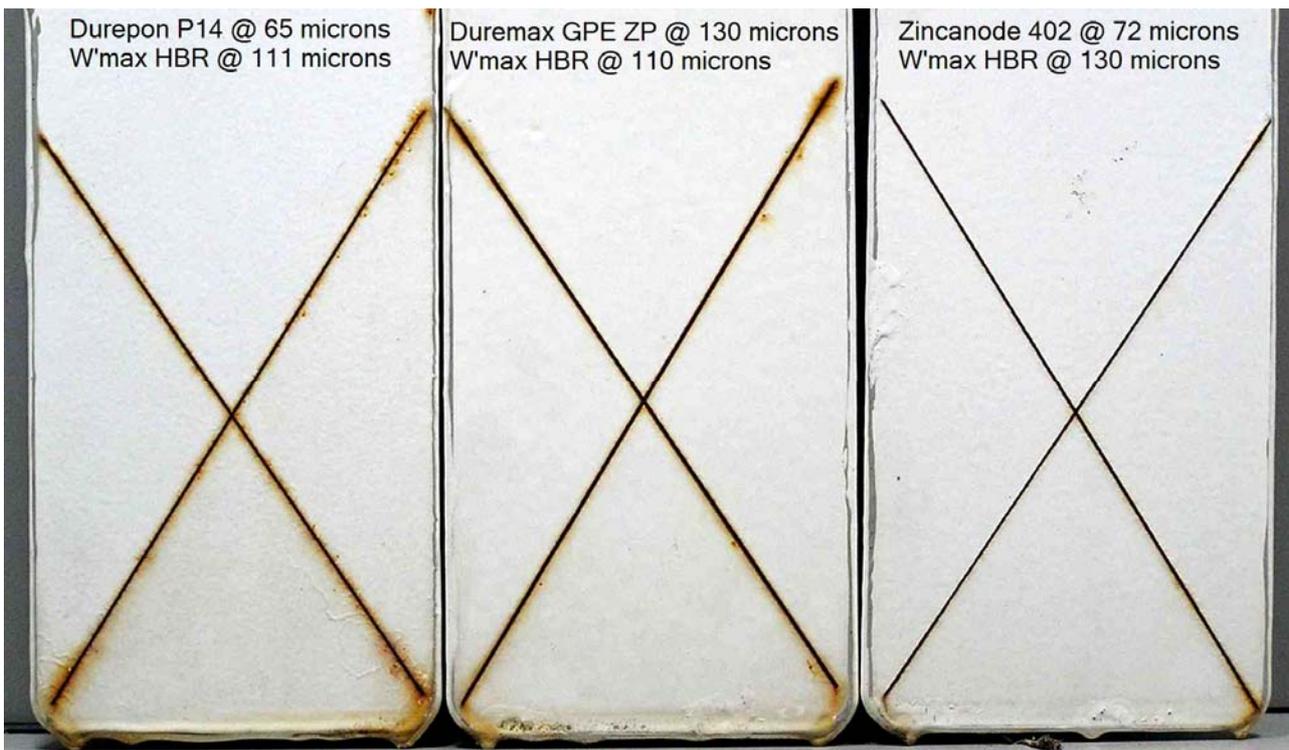
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On March 30th 2000, these panels were placed on exposure at a site in Sorrento Victoria, adjacent to Melbourne Water storage tanks. The panels were placed in vertical racks, facing the sea and in the general direction of prevailing winds. According to the Definitions in AS2312 Section 2, this site could be classified as category D (High) or category E-M Very High Marine Corrosivity depending on wind directions.



The Results

After 80 months, the Durepon[®] P14 primed panel shows some filiform corrosion, described as undercutting corrosion extending away from the scribe line in fine, irregular lines or tendrils similar in appearance to the root system of a plant. While the average undercutting on this panel was recorded as 1-2mm this filiform corrosion extends irregularly for some distance from the scribe. The Duremax[®] GPE ZP primed panel did not show any signs of filiform corrosion. Note that away from the scribe line there is no degradation or corrosion.



The panels, as they appear after 80 months exterior exposure. The cross-scribes introduce uniform defects that reveal important information about corrosion behaviour, and allow clear differentiation between samples in a much shorter period of time than would otherwise occur.

In Summary

This exposure testing shows that in medium to high corrosion environments, a two-coat system using Duremax[®] GPE ZP as a primer under Weathermax[®] HBR delivers performance greater than would be expected from a two coat system as described in AS2312 and, under these conditions, is comparable to a zinc rich epoxy. In fact, the Duremax[®] GPE ZP may deliver performance approaching that of a three-coat system, defined as AS2312 PUR 3 or PUR 4, which have expected time to first maintenance of 10-15 years in a category D environment.

For more information, please contact the Dulux Protective Coatings Technical Consultant in your state.