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**" A PROCESS FOR THE PREPARATION OF AN
ANTI-CORROSION PRIMER "**

**COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, Raj
Marg, New Delhi - 110001, Indian, an Indian Registered
body incorporated under the Registration of Societies
Act, (XXI of 1860)**

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This is an invention by Kummattithidal Santhanam Rajagopalan, Subbiah Nadar Guruviah and Meyyappan Sundaram, Scientists, all from Central Electrochemical Research Institute, Karaikudi - 623006, and all Indian citizens.

This invention relates to Improvements in or relating to preparation of Zinc/Ethyl Silicate Primer for protection of steel structure.

Zinc / ethyl silicate primer is not produced in this country though it is produced in other countries. However, the details of the method of preparation is not available.

Hitherto it has been proposed to use Red Oxide/Zinc chromate primer, Red lead primer for the protection of structure exposed to atmosphere.

This is open to the objection that these primers do not give adequate protection in marine atmosphere.'

The object of the present invention is to obviate the disadvantage by incorporating zinc dust in Ethyl silicate - 40 binder so as to obtain a highly protective primer which can give cathodic protection and also protect by barrier effect so that marine pollution in any quantity does not affect its performance unlike inhibitive primers mentioned above. It has very high hiding power, being almost completely opaque.

The main finding of the invention is that when zinc dust 80-85 gms with Ethyl silicate - 40 binder 10-15 gms Xylene 6-8 gms Dibutyl phthalate 1-2 gms and TiO_2 1-5 gms by weight mixed well to form a uniform brushable primer which gives a higher degree of protection to structure in marine environments.

The following typical examples are given to illustrate the invention.

EXAMPLE 1

Zinc dust	80 gms
Ethyl silicate -40 (Binder)	10 gms
Xylene	8 gms
Dibutyl phthalate	1 gm
TiO ₂	5 gms

EXAMPLE 2

Zinc dust	85 gms
Ethyl silicate binder	10 gms
Xylene	10 gms
Dibutyl phthalate	1 gm
TiO ₂	5 gms

Ethyl silicate -40 binder was prepared by reacting equal volumes of Ethyl silicate 40, and Monoethanolamine. After 24 hours an excess of 9 volumes of ethyl silicate 40 was added to the resultant product obtained. This is the binder used for the preparation of primer.

The primer prepared in the above method was applied on pickled or sand blasted or shot blasted steel surface and evaluated by accelerated tests and electrochemical tests.

It was observed that no brown rust was observed at scratch or other area in 3% salt spray and immersion tests even after 720 hours and thus it gives adequate protection. The panels exposed at Mandapam Camp exposure yard for 12 months are performing well. It gives sufficient negative potential in 3% sodium chloride immersion test for long time (more than 120 days). The protection offered by this primer is superior

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to other conventional primers.

ADVANTAGES

The following are the main advantages of the investigation:

1. Long term protection eliminating or minimising maintenance painting.
2. This primer offers cathodic protection to the structure in addition to barrier effect.
3. Various organic and inorganic finishing paints can be applied over the primer with good intercoat adhesion.

Dated this 17th day of May, 1979.

I. M. S. MAMAR

(I.M.S. MAMAR)

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THE PATENTS ACT, 1970

COMPLETE SPECIFICATION

(Section-10)

A PROCESS FOR THE PREPARATION OF AN ANTI-CORROSION PRIMER

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, Rafi Marg,
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under the Registration of Societies Act, (Act XXI of 1960).

The following specification particularly describes and ascertains the nature of this invention and the manner in which it is to be performed :—

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This is an invention by Kummattithidal Santhanam Rajagopalan, Subbiah Nadar Guruviah and Meyyappa Sundaram, Scientists all from Central Electrochemical Research Institute, Karaikudi - 623006, Tamil Nadu, India and all Indian citizens.

This invention relates to improvements to a process for the preparation of an anti corrosive primer for protection of steel structures.

Hitherto it has been proposed to use red oxide/zinc chromate primer, red lead primer for the protection of steel structures exposed to atmosphere.

The conventional primers such as red oxide/zinc chromate, red lead primers do not give adequate protection in marine atmosphere by themselves and have to be followed by finishing paints.

The object of the present invention is to prepare an improved primer by incorporating zinc dust in ethyl silicate binder so as to obtain a highly protective primer which can give cathodic protection and also protect by barrier effect so that marine pollution will not affect its performance in the case of inhibitive primers mentioned above.

The other objects of the invention are :

- 1) to obtain a product which can be easily and readily applied to large or existing structures,
- 2) these are unaffected by most organic solvents,
- 3) the chemical resistance of the coated structures compared to pure zinc (99.5% zinc free from iron) is excellent,
- 4) these are unaffected by weather, sunlight, variation in temperature and do not chalk over a long period,
- 5) the primer gives protection and the cost of protection is less than the conventional primer.

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The main finding of this invention is that when zinc dust is incorporated in ethyl silicate binder in organic solvents such as xylene along with titanium dioxide, antimony trioxide and dibutyl phthalate a protective primer is obtained. A hard abrasion resistant coating is formed on the surface which gives protection to steel structures in marine environments. The coating which dries quickly forms an adherent coating and gives both barrier protection and cathodic protection to the base metal. Practically no rusting has taken place in the case of ethyl silicate whereas the conventional primers have rusted badly.

This invention thus provides a process for the preparation of an anti corrosive primer comprising reacting zinc dust in ethyl silicate binder with titanium dioxide, antimony trioxide and dibutyl phthalate and an organic solvent and stirring the reaction product to obtain a brushable consistency.

It is a two pack system consisting of liquids like binder and xylene as solvent in one pack and zinc dust and other solid reactants in another pack. The binder is first prepared by reacting equal volumes of ethyl silicate 40 and monoethanolamine and after 24 hours 9 volumes of ethyl silicate 40 are added to the reacted product. Dibutyl phthalate and xylene are added to the binder and kept in a pack. Zinc dust along with titanium dioxide and antimony trioxide are mixed together and kept in another pack. The two products are mixed together at the time of preparation of primer for use at site usually adding the powder part to the liquid portion, stirred well and applied on to the prepared steel surface.

Furthermore, the reaction product obtained may contain 3-10% of binder, 2-12% of xylene, 0-5% dibutyl phthalate, 70-90% pure zinc dust of particle size of -300 mesh, 0-3% antimony trioxide and 1-5% of titanium dioxide.

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The primer product obtained by this process is a coating composition similar to any paint product in use and is not a mere admixture of ingredients. The invention is further illustrated by the following examples. It is a two pack system. Solids are stored in one pack and liquids are stored in another pack. They are mixed to obtain the primer at site.

EXAMPLE 1

10 gm of ethyl silicate binder are taken and 16 gm of xylene and 2 gm of dibutyl phthalate are added to it (I). 5 gm of titanium dioxide 2 gm of antimony trioxide and 160 gm of zinc dust (-300 mesh) are mixed together (II). The solids (II) are added to the liquid portion (I) and the whole product stirred for 30 minutes.

EXAMPLE 2

10 gm of ethyl silicate binder are taken and 10 gm of xylene and 2 gm of dibutyl phthalate are added to it (I). 5 gm of titanium dioxide, 3 gm of antimony trioxide and 170 gm of zinc dust (-300 mesh) are added and mixed together (II). The solids (II) are added to the liquid portion (I) and the whole product stirred for 30 minutes.

The primer thus prepared can be applied on pickled or sand blasted surface. It has been observed under immersed conditions in distilled water and 3% sodium chloride at (room temperature) $30 \pm 1^{\circ}\text{C}$ that there is no red brown rust formation along the scratches and other areas. It gives sufficient negative potential in 3% sodium chloride under immersed condition. The protection offered by this primer has been found to be superior to other conventional primers at Mandapam Camp atmosphere during its one year exposure. The protection offered is further enhanced by application of finishing paint. No rusting was noticed even at the end of 12 months.

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Performance of primer paints at the end of 12 months at

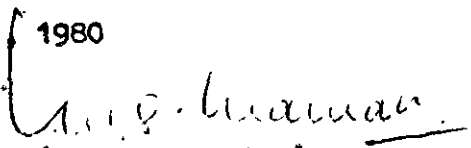
Mandapam Camp

Sl. No.	Name of primer	Merit value for 100	Visual observation
1.	Red oxide zinc chromate	30	The surface was almost covered with rust
2.	Red lead red oxide	40	Rusting nearly all over
3.	Ethyl silicate primer	80	White corrosion product Red brown rusting along the edges and at few places here and there

We Claim :

1. Process for the preparation of an anti-corrosion primer comprising reacting zinc dust in ethyl silicate binder with titanium dioxide, antimony trioxide, dibutyl phthalate and an organic solvents such as xylene and stirring the reaction product to obtain a brushable consistency.
2. Process as claimed in claim 1 wherein the solids mixture of 70-90% zinc dust, 1-5% of titanium dioxide and 0-3% of antimony trioxide is mixed with liquid mixture of 3-10% ethyl silicate binder, 0-5% dibutyl phthalate and 2-12% of xylene as an organic solvent and stirred to obtain a product with a brushable consistency.
3. Process as claimed in claims 1 and 2 wherein the zinc dust used is of particle size of upto -300 mesh and the admixture is stirred for upto 30 minutes to obtain the desired product.
4. Process for the preparation of an anti-corrosion primer substantially as herein described and illustrated.

Dated this 18th day of April 1980


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