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PROVISIONAL SPECIFICATION.

IMPROVEMENTS IN OR RELATING TO THE PROCESS FOR THE PRODUCTION OF ZINC CHROMATE PRIMERS.

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAFI MARG, NEW DELHI-1, INDIA, AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT. (ACT XXI OF 1860.)

The following specification describes the nature of this invention.

This is an invention by Kummatthidal Santhanam Rajagopalan, Scientist, Subbiah Nadar Guruviah, Scientist, Sivaraman Chandrasekaran, Scientist, Meyyappa Sundaram, Senior Scientific Assistant, Venkatasubramania Chandrasekaran, Junior Scientific Assistant-All of the Central Electrochemical Research Institute, Karaikudi-3, India, all Indian citizens.

This invention relates to improvements in or relating to Zinc Chromate Primers.

Hitherto it has been proposed to use red oxide-zinc chromate primers for the protection of all steel structures exposed to the atmosphere.

This is open to the objection that Red oxide-zinc chromate primer does not confer corrosion protection in marine atmosphere.

The object of the present invention is to obviate the disadvantages by incorporating zinc chromate in suitable vehicles so as to obtain a highly inhibitive primer which also dries quickly and can be produced in this country.

To these ends, the invention broadly consists in mixing, zinc chromate pigment (20-40%) to specification (I.S.51) with modified phenolic stand oil (20-25%) or epoxy ester linseed oil (20-25%) or linseed alkyd + phenolic hardener (20-30%) then grinding the pigment and solvent (30-40%) e.g., white spirit, solvent naphtha, xylene together till the desirable physical properties are obtained and adjusting the consistency of the paint with white spirit. The following typical examples are given to illustrate the invention.

EXAMPLES

A. Preparation :

The pigment, vehicle and small quantity of the solvent are mixed in Stainless steel container and iron balls (1/2" dia., ground) were added. The mixture was ground till the Heghman value 6 was obtained. Then the paint was discharged from the container, washed with solvent and made up with remaining solvent. Then the cobalt and lead naphthenate were added to the extent of 0.5%.

B. Composition of chromate primers studied :

Primer	Zinc chromate	Iron oxide	Vehicle MPS	Solvent
(1) Zinc chromate primer	40%	—	20%	40% of white spirit.
(2) ..	40%	—	Epoxy ester linseed solvent 20%	40% of xylene and naphtha
(3) ..	21%	—	Linseed alkyd + phenolic hardener 71%	8% of white spirit.

The physical properties of the primer paints prepared above are compared with zinc chromate-red oxide primer in Table below:

Properties of Chromate Paint:

Paint consistency	Hard Dry Hrs.	Scratch hardness load in	Mandrel bend Flexibility in 1/4"	Ford Sp.G. cup No. 4 in Sea	
1) Zinc chromate in MPS	18	1000	passed	75	1.26
2) Zinc chromate Epoxy	18	..	..	65	1.36
3) Zinc chromate in L.A. + Ph.H.	24	..	..	50	1.45
4) Red oxide zinc chromate I.S.2074	18	..	..	60	1.55

Price : TWO RUPEES

The corrosion protection given by primers described in the invention was evaluated in comparison with red oxide zinc chromate primer at the tropicalmarine exposure station at mandapam Camp. Hand cleaned and pickled 6" x 4" steel panels were painted with 2 coats of primer, one under-coat and one finishing coat given and exposed. The under-coat used was Titanium-dioxide. The following finishing paints were used :—

1. alkyd medium pigmented with TiO_2
2. epoxy medium-pigmented with TiO_2
3. alkyd medium pigmented with carbon.
4. chlorinated rubber.
5. heavy coal tar pitch.
6. Bitumen pigmented with Aluminium flakes.

The averages of the merit values obtained with all these finishing paints are expressed in percentage in Table 1.

Values below 20% show that the surface has to be repainted. It is seen from the table that repainting is necessary with the primers developed after 18 and 24 months while it is necessary after 12 months with red oxide zinc chromate primer.

The costs of the primers are compared in Table 2.

The merit values for corrosion protection and good condition of paint at the end of 12 months are given in Table 1.

TABLE 1

Merit value in percentage of the different primers:

Primer	12 months	18 months	24 months
Zinc chromate MPS	65	34	21
Zinc chromate Epoxy	72	48	37
Zinc chromate L.A. + Ph.H.	72	35	9
Red oxide/zinc chromate	20	15	9

TABLE 2

Cost comparison of the different primers :

Primer	Cost
1. Zinc chromate in MPS	Rs. 9.96 per litre
2. Zinc chromate in epoxy ester linseed solid	Rs. 15.40 per litre
3. Zinc chromate in Linseed Alkyd + Phenolic hardener	Rs. 8.72 per litre
4. Zinc chromate red oxide - to IS 2074	Rs. 7.50 per litre

The following are among the main advantages of the invention :—

- 1) Zinc chromate primer to Examples 1 to 3 can substitute zinc chromate red oxide primer to IS 2074.
- 2) The corrosion protection given by the primers described in the invention is far superior to that of zinc chromate-red oxide to Is 2074.
- 3) The drying time of the primers described in the invention is equal to zinc chromate red oxide primer.
- 4) It is cheaper to use zinc chromate primers to this specification than zinc chromate red oxide primer to IS 2074 in view of the longer period of protection given by primers to this specification.

R. BHASKAR PAI

Patents Officer

Council of Scientific & Industrial Research.

Dated this 30th day of October, 1971.

COMPLETE SPECIFICATION.

IMPROVEMENTS IN OR RELATING TO THE PROCESS FOR THE PRODUCTION OF ZINC CHROMATE PRIMERS.

COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH, RAJI MARG, NEW DELHI-1, INDIA, AN INDIAN REGISTERED BODY INCORPORATED UNDER THE REGISTRATION OF SOCIETIES ACT. (ACT XXI OF 1860).

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

This is an invention by Kummattithidal Santhanam Raja gopalan, Scientist, Subbiah Nadar Guruviah, Scientist, Sivaraman Chandrasekaran, Scientist, Meyyapa Sundaram, Senior Scientific Assistant and Venkatasubramania Chandrasekaran, Junior Scientific Assistant, all from Central Electrochemical Research Institute, Karalkudi-3, Tamil Nadu, India and Indian citizens.

This invention relates to improvements in or relating to zinc chromate primers.

Hitherto red lead, red oxide, zinc chromate-red oxide have been used as primers for the protection of steel structures

exposed to the atmosphere. The use of these primers in marine atmosphere is open to objection that red lead primer will promote galvanic corrosion and red oxide, zinc chromate-red oxide primers do not give substantial protection in marine atmosphere.

The object of the present invention is to develop a primer which can be used for giving corrosion protection in marine atmosphere, which dries quickly and can be produced in this country.

The object of the present invention is to obviate the disadvantage by incorporating zinc chromate in suitable vehicles so as to obtain a highly inhibitive primer which can substitute red oxide zinc chromate from the point of view of corrosion protection and which also dries quickly and can be produced in this country.

The main finding of the invention is that when zinc chromate pigment is incorporated in epoxy ester linseed solid, a highly inhibitive primer is obtained.

The new result of the invention is that when these primers are used in combination with commonly used finishing paints, the protective schemes which can give protection to pickled surface in marine atmospheres for two years and more are obtained.

The composition prepared according to the process of the invention is not a mere admixture, resulting in the aggregation of the properties of the components of the composition.

According to the present invention, there is provided a process for the production of zinc chromate primer by thoroughly mixing and grinding zinc chromate pigment, and a vehicle, followed by adding xylene and cobalt naphthenate drier characterised in that the vehicle used consists of epoxy ester linseed solid whereby an inhibitive primer with improved protection in marine atmosphere is obtained.

Zinc chromate (20-40%), epoxy ester linseed solid (20-25%) and white spirit (30-40%) are mixed in stainless steel container and iron balls 1/2" dia., are added, the mixture is ground till the Heghman value 6 is obtained, the paint is discharged from the container and made up with xylene till the viscosity reaches a value of 60-70 Sec./Ford Cup No.4 and 0.05% cobalt naphthenate drier is added and mixed.

The primers in combination with finishing paints give 2 years or more of protection to steel in marine atmospheres.

EXAMPLES

The pigment, vehicle and solvent are mixed in stainless steel container and iron balls (1/2" dia.,) are added. The mixture is ground till the Heghman value 6 is obtained. Then the paint is discharged from the container, washed with solvent and made up with remaining solvent. The cobalt and Lead naphthenate are added to the extent of 0.05 and 0.06 respectively.

Composition of chromate primers studied :

Preparation :

Primer	Zinc-chromate %	Vehicle %	Solvent %
1) Zinc chromate primer	35-40	Modified phenolic stand oil (20-25)	30 white spirit
2) ..	35-40	Epoxy ester linseed solid (20-25)	30-40 xylene and naphtha
3) ..	20-25	Linseed alkyd + phenolic hardener (20-30)	30-40 white spirit

The physical properties of the primer paints prepared as above are given below. For comparison, the properties of primer to I.S. 2074 are also given in the table.

Properties of Chromate Paint.

Paint	Consistency	Surface Dry Hrs.	Hard Dry Hrs.	Scratch hardness load in gm.	Mandrel bend Flexibility in 1/4"	Ford Cup No.4 in Sec.	Sp G gm/CC
1. Zinc chromate in Modified Phenolic stand oil.	Smooth	2	18	1000	passed	75	1.26
2. Zinc chromate Epoxy Ester	Smooth & Uniform	1 1/2	18	"	"	65	1.36
3. Zinc chromate in Linseed alkyd and phenolic hardener		5	24	"	"	50	1.45
4. Control (primer to I.S. 2074)	Smooth & Uniform	2	18	"	"	60	1.55

The corrosion protection given by primers described in the invention was evaluated in comparison with red oxide/ Zinc chromate primer IS 2074 at the tropical marine exposure station at Mandapam Camp. Hand cleaned and pickled

6" x 4" steel panels were painted with two coats of primer, one undercoat and one finishing coat and exposed. The merit value for corrosion protection and good condition of paint at the end of 12 months are given in Table 1 and 2.

TABLE I
Merit value in percentage of the different primers—
Hand cleaned specimens*.

Primers	12 months	18 months	24 months
Zinc chromate in modified phenolic stand oil	66	34	21
Zinc chromate in Epoxy ester	73	48	37
Zinc chromate in Linseed alkyd + Phenolic hardener	73	34	9
Control primer to I.S.2074	20	15	9

*Average of six finishing paint.

TABLE 2
Merit value in percentage of the different primers—
Pickled Steel specimens*

Primers	12 months	18 months	24 months
Zinc chromate in modified phenolic stand oil	82	52	46
Zinc chromate in Epoxy ester	80	65	55
Zinc chromate in Linseed alkyd + Phenolic hardener	85	56	41
Control primer to I.S.2074	74	51	41

*Average of six finishing paints.

Cost of protection by protective schemes including the different chromate primers.

Name of the primer	Cost/litre	Cost of protective scheme comprising 2 coats of primer + 1 undercoat + 1 coat of finishing paint per year of satisfactory performance	
		Cost per 100 sq. ft.	
	Rs.	Hand cleaned	Pickled
Control primer to I.S. 2074	7.55	50	45
Zinc Chromate in Linseed alkyd + phenolic hardener	8.77	45	35
Zinc chromate in modified phenolic stand oil	9.96	46	39
Zinc chromate in epoxy ester	15.40	51	34

We claim :

1. A process for the production of zinc chromate primer by thoroughly mixing and grinding zinc chromate pigment, and a vehicle, followed by adding xylene and cobalt naphthenate drier characterised in that the vehicle used consists of epoxy ester linseed solid whereby an inhibitive primer with improved protection in marine atmosphere is obtained.

2. A process as claimed in Claim 1 wherein zinc chromate (20-40%), epoxy ester linseed solid (20-25%) and white spirit (30-40%) are mixed in stainless steel container and iron balls $\frac{3}{8}$ " dia., are added thereto, the mixture is ground till the Heghman value 6 is obtained, the paint is discharged from

the container and made up with xylene till the viscosity reaches a value of 60-70 Sec/Ford Cup No.4 and 0.05% cobalt naphthenate drier is added and mixed into it.

3. A process for the production of zinc chromate primer substantially as hereinbefore described.

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Dated this 6th day of July 1972.