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SPRAYABLE WELDABLE PRIMER CONTAINING POLYVINYL BUTYRAL, CHROMIUM TRIOXIDE, AND ALUMINUM POWDER

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This invention relates to coating compositions. More particularly this invention relates to sprayable weldable primers for metal plate.

Steel and other metal plate for use in ship and outdoor construction is usually coated with a wash primer and anti-corrosive primer to protect the metal from corrosion while it is stored awaiting use. These anti-corrosive primers afford excellent protection but present a drawback in that they must be removed prior to fabrication by welding into the constructed article. A need exists for a shopcoat primer which will protect the metal plate and which does not need to be removed prior to welding, priming and topcoating of the metal.

An object of this invention is to provide a sprayable weldable anti-corrosive primer for metal which does not require removal before welding.

Another object of this invention is to provide a sprayable weldable anti-corrosive primer for metal which does not require removal before priming and topcoating the metal.

Another object of this invention is to teach a method for preparing a sprayable weldable anti-corrosive primer for metal which does not require removal before welding, priming and topcoating.

These and other objects are attained by anti-corrosive primer composition which comprises: From 7.3 to 10.5 parts of polyvinyl butyral; from 76.5 to 85 parts of at least one organic liquid which is a solvent for the polyvinyl butyral; from 0.09 to 0.15 part of chromium trioxide; from 1.4 to 1.8 parts of aluminum powder of less than 100 mesh; and from 6.15 to 9.05 parts of water; wherein the aforementioned parts are parts by weight based on a total of 100 parts by weight of primer and wherein the viscosity of the primer is of from 10 to 500 centipoises.

The following examples are given in illustration of the invention and are not intended as limitations thereof. All parts and percentages are by weight unless otherwise specified.

Example I

A sprayable weldable anti-corrosive primer of the following composition:

	Parts
Isopropanol 99%	40.90
Toluol	40.90
Polyvinyl butyral	9.20
Water	5.40
Chromic acid (6.1% aqueous solution)	1.97
Aluminum powder (less than 100 mesh)	1.63
	100.00

is prepared by dissolving the polyvinyl butyral in the isopropanol/toluene mixture, adding the water after the resin is dissolved and then slowly adding the chromic acid solution to the resin solution while maintaining good agitation.

The anti-corrosive primer is sprayed onto shot-blasted steel in two passes to yield a 0.7-mil dry film. After a 30-day exposure in the salt fog cabinet or a 30-day immersion in synthetic sea water, or two hours in synthetic sea water at 175° F., or 430 hours in the Weather-O-Meter, the primed steel shows no sign of corrosion. Weldability of coated surface is excellent, as determined by arc welding tests. This shopcoat protects steel for at least 12 months under conditions of normal exposure.

Example II

Example I is repeated but reducing the water portion to 2.5 parts. The resulting anti-corrosive primer gels and is unfit for use.

Example III

Example I is repeated but increasing the chromic acid solution to 2.94 parts. The resulting anti-corrosive primer is partially coagulated and unsuitable for spraying.

Example IV

Example I is repeated using a 81.80 parts of a 1:1:1 weight ratio of xylene:ethanol:acetone solvent mixture with equally good results.

The order of addition of the ingredients is critical in the preparation of this anti-corrosive primer. The resin is slurried in the cold solvent (i.e., at 15–30° C.) using adequate agitation. Heat may be employed to help dissolve the resin but if heat is employed care must be taken to prevent the loss of solvent. Such means as condensers, pressure vessels, etc., are adequate. After complete solution of the resin the batch is cooled to below 30° C. and from 4.5 to 7.0 parts by weight of water based on a 100 parts by weight of total primer is added. From 0.09 to 0.15 part of chromium trioxide is then added preferably as a 6.5 to 7.5 percent aqueous solution of chromic acid (chromium trioxide on solution in water forms chromic acid). At this point from 1.4 to 1.8 parts of aluminum powder of less than 100 mesh is added to the above solution. The agitation which is maintained throughout this procedure is continued until all the aluminum is uniformly dispersed. The weldable primer should have a viscosity of between 10 and 500 centipoises at 25° C. with a viscosity of about 20–200 centipoises especially preferred for spraying.

The polyvinyl butyral resin employed in the practice of this invention may have a vinyl alcohol content of from 5 to 30 weight percent and a residual acetate content of less than 10 weight percent as based on the total resin weight. Especially preferred are polyvinyl butyrals with a vinyl alcohol content of from 14 to 22 percent and a residual acetate content of from 1.0 to 5.0 percent. The weight average molecular weight of the polyvinyl butyral may vary from 25,000 to 250,000 with a preferred range of 25,000 to 50,000. One may use from 7.3 to 10.5 parts by weight of polyvinyl butyral based on a total of 100 parts of primer. Especially preferred is a primer with about 8.5 to 9.5 parts by weight of polyvinyl butyral.

The chromium trioxide used is necessary to insure good adhesion, water resistance and corrosion protection.

The organic solvent employed in the practice of this invention should constitute from 76.5 to 85 parts by weight of 100 parts of the weldable anti-corrosive primer. The solvent should completely dissolve up to about 12 percent by weight of the polyvinyl butyral used based on the total weight of resin and solvent. Furthermore, the solvent should not be corrosive to the metal plate or react adversely with any of the other ingredients in the weldable primer. Examples of suitable solvents include: n-butanol, cyclohexanone, diacetone alcohol, dioxane, ethanol, mono-ethyl ether of ethylene glycol, ethylene chloride, isopropanol, methyl acetate, mono-methyl ether of ethylene glycol, methyl butynol, methyl pentynol, toluene:ethyl alcohol, 60:40 by weight, xylene:n-butynol 60:40 by weight and mixtures of the foregoing.

Especially preferred is a 1:1 weight ratio of isopropanol:toluene solvent pair which constitutes about 79 to 81 arts by weight per hundred parts of the weldable primer.

The aluminum powder employed in the practice of ıis invention should be less than 100 mesh in order to ısure good dispersion throughout the resin solution. The mount of the aluminum may vary from 1.3 to 1.9 parts y weight based on a total of 100 parts of primer. Es-ecially preferred is from 1.5 to 1.7 parts of aluminum.

The aluminum serves to make a conductive coating hrough which an arc can be struck, and serves to make ıe anti-corrosive primer weldable. It also functions as good deoxidizer, and welding flux and also aids in im-ıarting weathering resistance to the coating.

It is obvious that many variations may be made in the ıroducts and processes set forth without departing from he spirit and scope of this invention.

What is claimed is:

1. A sprayable weldable anti-corrosive primer comprising from 7.3 to 10.5 parts of polyvinyl butyral; from 76.5 to 85 parts of at least one non-corrosive organic liquid which is a solvent for the polyvinyl butyral; from 0.09 to 0.15 part of chromium trioxide; from 1.4 to 1.8 parts of aluminum powder of less than 100 mesh; and from 6.15 to 9.05 parts of water; wherein the aforementioned parts are parts by weight based on a total of 100 parts by weight of primer and wherein the viscosity of the primer is from 10 to 500 centipoises.

2. A sprayable weldable anti-corrosive primer as in claim 1 wherein the polyvinyl butyral has a vinyl alcohol content of from 5 to 30 percent, a residual acetate content of below 10% and a weight average molecular weight of from 25,000 to 225,000.

3. A sprayable weldable anti-corrosive primer as in claim 1 wherein the solvent is a 1:1 weight ratio of toluene:isopropanol.

4. A process for preparing a sprayable weldable anti-corrosive primer comprising dissolving from 7.3 to 10.5 parts of polyvinyl butyral in from 76.5 to 85 parts of at least one non-corrosive organic liquid which is a solvent for the polyvinyl butyral; adding from 4.5 to 6.5 parts of water to the polyvinyl butyral solution; adding of from 0.09 to 0.15 part of chromium trioxide to the polyvinyl butyral solution, the chromium trioxide being dissolved in from 1.65 to 2.05 parts of water; and then adding from 1.4 to 1.8 parts of aluminum powder of less than 100 mesh; wherein the aforementioned parts are parts by weight based on a total of 100 parts by weight of primer and wherein the viscosity of the primer is of from 10 to 500 centipoises.

5. A process as in claim 4 wherein the polyvinyl butyral has a vinyl alcohol content of from 5 to 30 percent, a residual acetate content of below 10% and a weight average molecular weight of from 25,000 to 225,000.

6. A process as in claim 4 wherein the solvent is a 1:1 weight ratio of toluene:isopropanol.

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