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Description

This invention is directed to a two-component epoxy-polyamide based high solids coating composition for rusty steels.

- 5 Some alkyds and other oil modified products have been formulated for application over rusty steel, but these products will not withstand exposure to a heavy industrial environment. For example, zinc-based amidoamine-containing protective coatings for ferrous metals are disclosed in U.S. Patent 4,084,971. Moreover, a two-component aluminum epoxy mastic composition said to be useful for protection of rusty steel surfaces is commercially marketed under the tradename "Carbomastic 15" by Carboline Company.
- 10 An especially effective two-component coating composition suitable for rusty steels is described and claimed in U.S. Patent No. 4,342,674.

It is an object of the present invention to provide a two-component coating composition having improved pot life and corrosion resistance.

- Accordingly, the invention resides in a two-component coating composition comprising a Component A and a Component B wherein:

Component A contains an undiluted liquid polyglycidyl ether of a bisphenol, having an epoxy equivalent weight between 170 and 200; and an aluminum paste; and

- Component B contains a polyamide resin; and a fatty acid diamine salt; wherein one or both of Components A and B also contains a coumarone-indene resin having a softening point between 40°F and 60°F (4° and 15°C).

Component A and/or Component B can optionally contain thixotropic agents, moisture scavengers, fillers such as microcrystalline silica and talc and anticorrosive pigments. The Component B mixture can also optionally contain supplemental amine-based curing agents and accelerators.

- The present invention also relates to rusty steel substrates coated with the above-mentioned compositions.

The coating composition of this invention comprises two components A and B which are mixed just prior to application. Substantially equal volumes of each component can be mixed and thinned with an aromatic hydrocarbon solvent to form a coating composition which can then be applied to a ferrous metal substrate.

Component A

One essential ingredient in Component A is a undiluted liquid polyglycidyl ether of a bisphenol, having an epoxy equivalent weight between 170 and 200. Preferred materials of this type are epoxy resins which are diglycidyl ethers of bisphenol A (DGEBA), having an epoxy equivalent weight of from 185 to 192. Materials of this type are readily available commercially in undiluted form and are sold under such Trademarks as "EPON", e.g., "EPON 828", marketed by Shell.

- Another essential ingredient of the Component A mixture is leafing or non-leafing aluminum paste. Such materials are readily available commercially. A preferred paste is a leafing paste which contains 68 weight percent aluminum flakes admixed with 32 weight percent of a mixture by volume of 92% aliphatic hydrocarbon (boiling range 150—180°C) and 8% aromatic hydrocarbon (boiling range 150—175°C).

An essential ingredient of the total composition which may be used as another ingredient of the Component A mixture is a coumarone-indene resin. Coumarone-indene resins are also commercially available. Preferably, this resin has a softening point between 40°F (4°C) and 60°F (15°C), most preferably 50°F (10°C).

In addition to the foregoing ingredients, Component A can additionally contain a number of optional ingredients which serve to improve the characteristics or performance of the coating composition. One such optional ingredient of the Component A mixture is a thixotropic agent. Such agents are those organic or inorganic materials which tend to impart thixotropic properties to the Component A mixture. Organic thixotropic agents can include waxes which can be hydrocarbons, ethers of fatty acids and alcohols, ethylene polymers (e.g., Carbowax) or polyol ether-esters. A preferred organic thixotropic agent is castor wax, e.g., hydrogenated castor oil, which is commercially available at 24% solids in mineral spirits (boiling range 155—195°C). Inorganic thixotropic agents include commercially available clay materials such as smectites, attapulgites and bentonites marketed under such Trademarks as Bentone, Thixogel and Barasym.

Another optional ingredient which can be included in Component A is a moisture scavenging agent such as silica gel to substantially reduce any moisture contamination carried into the mixture with the other ingredients. Silica gels are available commercially and can be obtained under the Trademark "Syloid".

The foregoing ingredients can be admixed in any order to form the Component A of the coating composition. Suitable concentrations of such materials are set forth as follows:

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	Ingredient	Concentration (wt.%)	
		Preferred	More preferred
5	Undiluted liquid epoxy resin	at least 50	at least 55
	Thixotropic agent	0.01—2.0	0.05—1.0
	Coumarone-indene	3—25	4—10
10	Aluminum paste	25—35	28—32
	Moisture scavenger	0.1—2	0.5—1.5

15 It has been discovered that by employing the particular ingredients hereinbefore described, preferably in the concentrations set forth, formulation of the Component A mixture can be simplified in comparison with the Component A mixture of U.S. Patent No. 4,342,674 which relates to similar two-component coating compositions. By using the particular epoxy resin specified for use in the instant Component A mixture in undiluted liquid form, it is not necessary to utilize either the diluent for the epoxy resin, the urea-formaldehyde flow control agent or the 2-nitropropane solvent which are required in the Component A mixture of the coating compositions of U.S. Patent No. 4,342,674. Component A of the instant compositions can thus be substantially free of reactive diluents, urea-formaldehyde and 2-nitropropane without adversely affecting the properties of the coating composition.

25 Component B

One essential ingredient of Component B is a fatty acid polyamide resin. Fatty acid polyamide resins are the reaction product of mono-, di- or tri-basic fatty acids with an alkenyl polyamine. Such materials are commercially available under a variety of tradenames. One useful type of polyamide is prepared from diethylenetriamine and a mixture of 75% dimer fatty acid (linoleic) and 25% mono/trimer fatty acid (linolenic), the resin having a base number between 300 and 360. Polyamide resins of this type are commercially marketed under the Tradename Versamid.

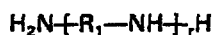
A preferred type of polyamide resin for use in Component B is a fatty acid amidoamine formed by the reaction of a monobasic fatty acid and an alkenyl polyamine. Preferably, an ethylenically unsaturated fatty acid is reacted with excess amounts of an alkenyl polyamine containing two primary amine groups and at least one secondary amine group whereby an acid amine is obtained.

A preferred fatty acid amidoamine is prepared by the interaction of linoleic or eleostearic acid with an alkylenepolyamine such as diethylenetriamine, triethylenetetramine, dimethylaminopropylene, diethylaminopropylene, and tetraethylenepentamine. These alkenyl polyamines have the formula:



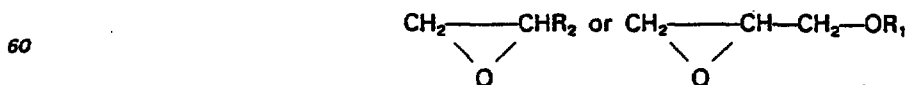
45 wherein R'' is an alkylene group having 2 to 5 carbon atoms inclusive and p is an integer having values of 1 to 5 inclusive. Such fatty acid amidoamines are available commercially under the Trademarks "Genamid", e.g., Genamid 2000, 250 and 747 from General Mills Chemicals Inc. and "Araldite 955" supplied by Ciba Company.

50 Modified fatty acid amidoamines can also be used as the polyamide resin ingredient in the Component B mixtures. Such modified amidoamines can include the polyamide adducts in U.S. Patent No. 3,900,437. These are obtained by the interaction of: (a) an amine component having the formula:



55 wherein R₁ is an aromatic group containing 6 to 10 carbon atoms or an alkylene group containing 2 to 4 carbon atoms and r is an integer having values from 1 to 5.

(b) a monoepoxide component selected from monoepoxide having the formula:



wherein R₂ is hydrogen, phenyl or alkyl having 1 to 10 carbons and R₃ is phenyl or alkyl having 1 to 10 carbon atoms; and

65 (c) an acid component selected from monomeric, aliphatic, unsaturated monocarboxylic fatty acids

containing 16 to 22 carbon atoms or polymeric fatty acids containing 32 to 44 carbon atoms. Products of this type are commercially available under the Trademark Genamid 788 from General Mills Chemicals, Inc.

Another essential ingredient of the Component B mixture is a fatty acid diamine salt useful as a wetting agent and corrosion inhibitor. Such materials are the reaction product of a fatty acid amine and a fatty acid.

Examples of such materials include N-tallow-1,3-propane diamine monooctadecenoate and N-tallow-1,3-propane diamine dioctadecenoate. Such fatty acid diamine salts are marketed under the Trademark "Duomeen".

Component B can also contain a coumarone-indene resin of the type described above with respect to Component A. The coumarone-indene resin can be used in either Component A only, in Component B only or, preferably in both Component A and Component B. It is essential, however, that at least some coumarone-indene resin be present in the coating composition formed by the admixture of Component A and Component B. Preferably the amount of coumarone-indene resin comprises from 3 to 10% by weight of the combined Component A and Component B mixtures.

Component B can also contain a thixotropic agent as an optional ingredient. The thixotropic agents which can optionally be utilized in Component B are the same as those hereinbefore described with respect to Component A.

Another optional ingredient of Component B is an inert particulate filler material useful for building solids content and improving the rheological properties of the Component B mixture. Filler materials of this type include microcrystalline silica and magnesium silicate (talc). A preferred Component B mixture contains both microcrystalline silica having an average particle size of 8.5 microns and magnesium silicate which is commercially available under the tradename Microtalc.

Another optional ingredient of Component B is a supplemental amine-based curing agent or curing accelerator. Examples of agents of this type include dimethylaminomethylphenol and 2,4,6 - tris(dimethylaminomethyl) phenol. Such materials are commercially marketed under the respective Trademarks DMP-10 and DMP-30 by the Rohm and Haas Company.

Another optional ingredient of Component B is a corrosion inhibitive pigment. Materials of this type are conventional and are known in the art. Zinc phosphate and zinc chromate are examples of corrosion inhibitive pigments which can be employed.

The foregoing ingredients can be admixed in any convenient order to form the Component B of the coating compositions herein. Concentrations of such materials which may be utilized are set forth as follows:

Ingredient	Concentration (wt.%)	
	Preferred	More preferred
Fatty acid polyamide resin	30—45	36—40
Fatty acid diamine salt	3—6	3.5—4.5
Thixotropic agent	0.1—2	0.1—1
Coumarone-indene resin	3—25	4—10
Inert particulate filler (total)	33—56	40—53
Microcrystalline silica	25—40	30—38
Magnesium silicate	8—16	10—15
Corrosive inhibitive pigment	1—6	1.5—4.5
Supplemental curing agent	0.5—3	1—2

Coating composition formulation

At the time of application, Component A and Component B are mixed in a volume ratio of from 2:1 to 1:2 and preferably in substantially equal volumes to form the coating composition. The resultant compositions can be thinned with xylene or other non-reactive aromatic hydrocarbons (substituted or unsubstituted) for application. A preferred formulation contains, by volume, 40 percent Component A, 40 percent Component B, and 20 percent xylene. Prior to mixing, each component is packaged separately.

The present coating composition is particularly suitable for coating rusty steel surfaces, where sandblasting is prohibited or impractical. The surface can be satisfactorily cleaned using hand or power wire brushing. Typical uses include structures in coastal or industrial environments, bridges deteriorating because of deicing salts, paper machine room applications, and other surfaces subject to fume conditions or high humidity or moisture condensation. Such compositions also can be used for coating weathered

galvanized siding, roofing, and fencing. The compositions are self-priming and can be used as such for general maintenance coating; but, when there is exposure to strongly acidic or alkaline environments, the coating should be topcoated with a suitable epoxy, vinyl, chlorinated rubber, or urethane coating.

The preferred method of application is by spraying. Brush or roller application can be used, but brush marks and lap marks will be visible. Application should be sufficient to provide a dry film thickness of 5—8 mils (0.13—0.2 mm) [7—11 mils (0.18—0.28 mm) wet]. The coating is dry to touch 4 hours after application at room temperature and tack free in 12—24 hours. A drying time in air of at least 24 hours should be permitted if a topcoat is to be used.

By formulating coating compositions in the foregoing manner using the particular ingredients hereinbefore described, it is possible to provide coating compositions which have improved corrosion resistance, pot life, shelf life and appearance in comparison with similar compositions as described in U.S. Patent No. 4,342,674. Such compositions embodied in this prior application are hereinafter referred to as the "Morgan" compositions.

The present coating compositions are substantially anhydrous. Furthermore, they need not contain solvents or other materials which are irritating or troublesome to package or ship. Thus, for example, unlike some coating products of the same general type, the coating compositions herein can be substantially free of irritating ingredients, e.g., phenol.

The present invention will now be illustrated by the following examples.

Example 1

Preparation of the instant coating composition

In a drum, there were added 110 pounds (49.9 kg) of undiluted liquid diglycidyl ether of bisphenol A, having an epoxy equivalent weight of 185—192, 6 pounds (2.7 kg) of Syloid AL-1 silica gel and 7 pounds (3.2 kg) of organic wax (24% solids in mineral spirits)*. This mixture was mixed at high speed for 30 minutes. The mixture was transferred to a mixing vessel, to which were then added 529 pounds (240 kg) of additional undiluted liquid diglycidyl ether of bisphenol A, having an epoxy equivalent weight of 185—192, 64 pounds (29 kg) of coumarone-indene resin [softening point 50°F (10°C)], and 323 pounds (146.5 kg) leafing aluminum paste (68% solids aluminum flakes in admixture with 92% aliphatic hydrocarbon, boiling range 150—180°C, and 8% aromatic hydrocarbon, boiling range 150—175°C, by volume). Mixing was continued until the mixture was smooth. This component contained 89.6 weight percent solids.

Component B

In a mixing vessel, there were added 438 pounds (198.7 kg) fatty acid amidoamine resin (Genamid 747), 50.0 pounds (22.7 kg) N-tallow-1,3-propylenediamine dioleate, 76 pounds (34.5 kg) of coumarone-indene resin [softening point 50°F (10°C)] and 10 pounds (4.5 kg) of organic wax (24% solids in mineral spirits)* and mixing was continued for 20 minutes. Then, 147 pounds (66.7 kg) of magnesium silicate, 397 pounds (180.1 kg) of microcrystalline silica (average particle size 8.5 microns) and 34 pounds (15.4 kg) of zinc phosphate were added. The resultant mixture was ground to Hegman NS-3, whereafter there were added 15.0 pounds (6.8 kg) of 2,4,6 - tris(dimethylaminomethyl) phenol and mixing was continued for 10 minutes. This component contained 99.4 weight percent solids.

Coating composition

There were mixed 40 volumes of Component A, 40 volumes of Component B, and 20 volumes of xylene. The resultant composition had a solids content of 81.4 weight percent and a pot life of 3-1/2 hours at 75°F (24°C). It set in air, after application, dry to touch after 4 hours and tack free after 24 hours.

Example 2 (comparative)

Preparation of Morgan coating composition

Component A

In a drum, there were added 104 pounds (47.2 kg) of diglycidyl ether of bisphenol A, having an epoxy equivalent weight of 175—195, dissolved in 11% butyl glycidyl ether and 6.7 pounds (3 kg) of organic wax (24% solids in mineral spirits)*. This mixture was mixed at high speed with a Hockmeyer mixer for 30 minutes. The mixture was transferred to a mixing vessel, and there were added 511.7 pounds (232.1 kg) of diglycidyl ether of bisphenol A having an epoxy equivalent weight of 185—192, 62.4 pounds (28.3 kg) of coumarone-indene resin [softening point 50°F (10°C)], 20.0 pounds (9.1 kg) ureaformaldehyde resin (50% solids in a mixture of 80 volume % n-butanol and 20 volume % ethylbenzene), and 312.0 pounds (141.5 kg) leafing aluminum paste (68% solids aluminum flakes in mixture with 92% aliphatic hydrocarbon, boiling range 150—180°C, and 8% aromatic hydrocarbon, boiling range 150—175°C, by volume). Mixing was continued until the mixture was smooth. Then 11.2 pounds (5.1 kg) 2-nitropropane was added and mixing was continued until mixing was uniform. This component contained 87.8 weight percent solids.

Component B

In a mixing vessel, there were added 428.9 pounds (194.5 kg) polyamide resin (diethylenetriamine—

*MPA 60, Trademark of NL Industries

34

75% dimer/25% trimer linoleic acid having a base number of 330), 50.0 pounds (22.7 kg) N - oleyl - 1,3 - propylenediamine oleate, and 76.2 pounds (34.6 kg) of coumarone-indene resin [softening point 50°F (10°C)]. The mixture was mixed at high speed for 15 minutes. Then, there was added 6.8 pounds (3.1 kg) of organic wax (24% solids in mineral spirits)* and mixing was continued for 30 minutes. Then, 571.6 pounds (259.3 kg) of microcrystalline silica (average particle size 8.5 microns) were added. The resultant mixture was ground to Hegman NS-3. When the grind was Hegman NS-3, there was added 15.0 pounds (6.8 kg) of 2,4,6 - tris - (dimethylaminomethyl) - phenol and mixing was continued for 15 minutes. This component contained 99.85 weight percent solids.

10 Coating composition formulation

There were mixed 40 volumes of Component A, 40 volumes of Component B, and 20 volumes of xylene. The resultant composition had a solids content of 80.91 weight percent and a pot life of 3 hours at 70°F (21°C). It set in air, after application, dry to touch after 4 hours and hard after 24 hours.

15 Example 3

Pot life at room temperature

The composition of the instant invention (Example 1) and the Morgan composition (Example 2) were compared for pot life at room temperature (75°F/24°C). Results are shown as follows:

	1 Gallon	5 Gallons
Instant composition	6 hours	3-1/2 hours
Morgan composition	5 hours	2-3/4 hours

25 Example 4

Salt spray resistance

Sand blasted steel panels and wirebrushed rusty steel panels were topcoated at 5 mils (0.13 mm) dry film thickness with the thinned mixtures of Examples 1 and 2. The coated panels were then subjected to salt spray for up to 4000 hours. Results of the salt spray exposure testing are set forth in Table I.

TABLE I
Salt spray exposure
Sandblasted steel Rusty steel

	Hours	Example 1 (instant composition)	Example 2 (Morgan composition)	Example 1 (instant composition)	Example 2 (Morgan composition)
35					
40	500	NE	NE	NE	NE
	1000	NE	NE	NE(8VF)	NE(8F)
	1500	NE	NE(6F)	NE(8VF)	NE(8F)
	2000	NE	8F(6M)	NE(8M)	NE(6M)
	2500	NE	8F(4M)	NE(6MD)	NE(6D)
50	3000	NE(8F)	4D(2D)	NE(6MD)	6MF(2D)
	3500	NE(6M)	2D(2D)	NE(6D)	6MF(2D)
	4000	NE(2D)	2D(2D)	NE(4D)	6M(2D)

55 Ratings:

Frequency of blisters

NE=No effect

VF=Very few

F=Few

MF=Medium few

M=Medium

MD=Medium dense

D=Dense

()=Rating in parenthesis pertains only to scribes produced in the coating

65 *MPA 60, Trademark of NL Industries

Size of blisters

8=About 1/32" in diameter

6=About 1/16" in diameter

4=About 1/8" in diameter

2=About 1/4" in diameter

Example 5

Salt spray resistance of coating systems

The thinned compositions of Examples 1 and 2 were utilized as a topcoat over systems wherein zinc rich primers were used. Such systems were then tested in accordance with the procedure of Example 4 on sandblasted steel panels. Results after 3000 hours of salt spray are shown in Table II.

TABLE II
Salt spray on systems

System	3000 Hours salt spray
Example 1/inorganic ethyl silicate zinc primer	NE
Example 2/inorganic ethyl silicate zinc primer	Some tiny blisters
Example 1/polyol silicate inorganic zinc primer	NE
Example 2/polyol silicate inorganic zinc primer	8M

Ratings of blisters according to ASTM

NE=No effect

8M=Medium blisters of #8 size

Example 6

Immersion exposure testing

Sandblasted steel panels and wirebrushed rusty steel panels were topcoated at 5 mils (0.13 mm) dry film thickness with the thinned compositions of Examples 1 and 2. These panels were then immersed in fresh water or seawater for 6-1/2 months.

Results of such testing are shown in Table III.

TABLE III
Fresh water and seawater immersion testing

Fresh water	Fresh water and seawater immersion testing	
Composition	Sandblasted steel	Rusty steel
Example 1	NE	6F
Example 2	NE	8M
Seawater	Fresh water and seawater immersion testing	
Composition	Sandblasted steel	Rusty steel
Example 1	NE	NE
Example 2	NE	8F

Key:

NE=No effect

6F=Size #6 blister—Few

8M=Size #8 blister—Medium

The foregoing testing from Examples 3—6 indicates that the coating compositions of the instant invention have improved pot life and provide better corrosion resistance characteristics in comparison with the similar coating composition of Morgan as described in U.S. Patent No. 4,342,674.

Example 7

Spot testing of chemical resistance

Sandblasted steel panels coated with the thinned composition of Example 1 were tested for resistance to drops of various chemicals for a period of 24 hours. Results of such testing are shown in Table IV.

TABLE IV
Results of spot testing of chemical resistance of Example 1 composition

5	1. 5% NaOH	Surface softened
	2. 5% H ₂ SO ₄	Surface softened
	3. 5% Acetic acid	Softened and blistered
10	4. 5% NH ₄ OH	No effect
	5. Unleaded gasoline	Slightly softened
	6. Mineral spirits	No effect
15	7. Hi flash naphtha	No effect
	8. Ethanol	No effect
20	9. Methanol	No effect
	10. Toluene	No effect
	11. Methyl ethyl ketone	No effect
25	12. Cellosolve acetate	Softened

Example 8**Room temperature stability**

30 The two components of the Example 1 composition were allowed to stand at room temperature for six months. After this period no settling or deleafing was observed in Component A. There was soft settling of the solids of Component B, but the solids of Component B could be reincorporated to a homogeneous state by agitation.

35 Claims

1. A two-component coating composition comprising a Component A and a Component B wherein: Component A contains an undiluted liquid polyglycidyl ether of a bisphenol, having an epoxy equivalent weight between 170 and 200; and an aluminum paste; and

40 Component B contains a polyamide resin; and a fatty acid diamine salt; wherein one or both of Components A and B also contains a coumarone-indene resin having a softening point between 40°F and 60°F (4° and 15°C).

2. A composition according to Claim 1 wherein:

45 a. coumarone-indene resin is utilized in both Component A and Component B,

b. Component A contains one or more additional ingredients selected from thixotropic agents and moisture scavengers, and

c. Component B contains one or more additional ingredients selected from thixotropic agents, inert particulate filler materials, supplemental amine-based curing agents and corrosion inhibitive pigments.

50 3. A composition according to Claim 1 or Claim 2 wherein the weight percent ranges for the ingredients in Component A are:

	Ingredient	Wt. %
55	Undiluted liquid polyglycidyl ether of bisphenol	at least 50
	Aluminum paste	25—35
	Coumarone-indene resin	3—25
60	Thixotropic agent	0.1—2.0
	Moisture scavenger	0.1—2.0

65 and the weight percent ranges for the ingredients in Component B are:

TABLE IV
Results of spot testing of chemical resistance of Example 1 composition

5	1. 5% NaOH	Surface softened
	2. 5% H ₂ SO ₄	Surface softened
	3. 5% Acetic acid	Softened and blistered
10	4. 5% NH ₄ OH	No effect
	5. Unleaded gasoline	Slightly softened
	6. Mineral spirits	No effect
15	7. Hi flash naphtha	No effect
	8. Ethanol	No effect
20	9. Methanol	No effect
	10. Toluene	No effect
	11. Methyl ethyl ketone	No effect
25	12. Cellosolve acetate	Softened

Example 8**Room temperature stability**

30 The two components of the Example 1 composition were allowed to stand at room temperature for six months. After this period no settling or deleafing was observed in Component A. There was soft settling of the solids of Component B, but the solids of Component B could be reincorporated to a homogeneous state by agitation.

35 Claims

1. A two-component coating composition comprising a Component A and a Component B wherein: Component A contains an undiluted liquid polyglycidyl ether of a bisphenol, having an epoxy equivalent weight between 170 and 200; and an aluminum paste; and

40 Component B contains a polyamide resin; and a fatty acid diamine salt; wherein one or both of Components A and B also contains a coumarone-indene resin having a softening point between 40°F and 60°F (4° and 15°C).

2. A composition according to Claim 1 wherein:

45 a. coumarone-indene resin is utilized in both Component A and Component B,

b. Component A contains one or more additional ingredients selected from thixotropic agents and moisture scavengers, and

c. Component B contains one or more additional ingredients selected from thixotropic agents, inert particulate filler materials, supplemental amine-based curing agents and corrosion inhibitive pigments.

50 3. A composition according to Claim 1 or Claim 2 wherein the weight percent ranges for the ingredients in Component A are:

	Ingredient	Wt. %
55	Undiluted liquid polyglycidyl ether of bisphenol	at least 50
	Aluminum paste	25—35
	Coumarone-indene resin	3—25
60	Thixotropic agent	0.1—2.0
	Moisture scavenger	0.1—2.0

65 and the weight percent ranges for the ingredients in Component B are:



	Ingredient	Wt. %
	Fatty acid polyamide resin	30—45
5	Fatty acid diamine salt	3—6
	Coumarone-indene resin	3—25
	Thixotropic agent	0.1—2
10	Inert particulate filler	33—56
	Corrosion inhibitive pigment	1—6
15	Supplemental curing agent	0.5—3.

4. A coating composition according to Claim 3 wherein in Component A said polyglycidyl ether of bisphenol is a diglycidyl ether of bisphenol A, having an epoxy equivalent weight of 185—192; said thixotropic agent is an organic wax; said coumarone-indene resin has a softening point of 50°F (10°C); said aluminum paste is leafing aluminum paste comprising 68% solids aluminum flakes in admixture with 92 volume % aliphatic hydrocarbon boiling at 150—180°C and 8 volume % aromatic hydrocarbon boiling at 150—175°C; and said moisture scavenger is silica gel; and wherein in Component B said fatty acid resin is an amidoamine which comprises the reaction product of an ethylenically unsaturated fatty acid and alkenyl polyamine; said fatty acid diamine salt is selected from N-tallow-1,3-propane diamine mono-octadecenoate and N-tallow-1,3-propane diamine dioctadecenoate; said coumarone-indene resin has a softening point of 50°F (10°C); said thixotropic agent is an organic wax; said inert particulate filler comprises both microcrystalline silica and magnesium silicate, said pigment is selected from zinc phosphate and zinc chromate; and said supplemental curing agent is selected from dimethylaminomethylphenol and 2,4,6 - tris(dimethylaminomethyl)phenol.

5. A coating composition according to Claim 4, wherein the weight percent ranges for the ingredients in Component A are:

	Ingredient	Wt. %
35	Undiluted liquid diglycidyl ether of bisphenol A	at least 55
	Organic thixotropic agent	0.05—1
	Coumarone-indene resin	4—10
40	Leafing aluminum paste	28—32
	Silica gel	0.5—1.5

45 and the weight percent ranges for the ingredients in Component B are:

	Ingredient	Wt. %
50	Fatty acid amidoamine	36—40
	Fatty acid diamine salt	3.5—4.5
	Coumarone-indene resin	4—10
55	Organic thixotropic agent	0.1—1
	Microcrystalline silica	30—38
	Magnesium silicate	10—15
60	Corrosion inhibitive pigment	1.5—4.5
	Supplemental curing agent	1—2

65 6. A composition according to any preceding claim wherein Component A and Component B are



combined in substantially equal volumes immediately prior to use of said compositions as a coating composition.

7. A composition according to Claim 6 which is thinned with an aromatic hydrocarbon solvent.

8. A composition ready according to Claim 6 for application to a rusty steel substrate containing 40 volume % of Component A, 40 volume % of Component B, and 20 volume % of xylene as solvent.

9. A wirebrushed rusty steel substrate coated with the composition according to any one of Claims 6 to 8.

Patentansprüche

1. Zweikomponenten-Überzugsmittel, das eine Komponente A und eine Komponente B umfaßt, worin: die Komponente A einen unverdünnten flüssigen Polyglycidylether von Bisphenol mit einem Epoxy-Äquivalentgewicht zwischen 170 und 200 und eine Aluminiumpaste enthält; und die Komponente B ein Polyamidharz und ein Fettsäurediaminsalz enthält, worin eine oder beide der Komponenten A und B ebenfalls ein Kumaron-Indenharz mit einem Erweichungspunkt zwischen 40 und 60°F (4 und 15°C) enthält.

2. Überzugsmittel nach Anspruch 1, worin:

a) das Kumaron-Indenharz sowohl in der Komponente A, als auch in der Komponente B verwendet wird;

b) die Komponente A einen oder mehrere zusätzliche Zusatzstoffe enthält, die aus Thixotropiermitteln und Feuchtigkeitsadsorben ausgewählt sind; und

c) die Komponente B einen oder mehrere zusätzliche Zusatzstoffe enthält, die aus Thixotropiermitteln, inerten, aus Teilchen bestehenden Füllmaterialien, auf Amin basierenden Härtungsmittelzusätzen und korrosionshemmenden Pigmenten ausgewählt sind.

3. Überzugsmittel nach Anspruch 1 oder 2, worin die Gewichtsprozentbereiche der Zusatzstoffe in der Komponente A sind:

Zusatzstoff	Gew. %
Unverdünnter flüssiger Polyglycidylether von Bisphenol	mindestens 50
Aluminiumpaste	25—35
Kumaron-Indenharz	3—25
Thixotropiermittel	0,1—2,0
Feuchtigkeitsadsorber	0,1—2,0

und die Gewichtsprozentbereiche der Zusatzstoffe in der Komponente B sind:

Zusatzstoff	Gew. %
Fettsäurepolyamidharz	30—45
Fettsäurediaminsalz	3—6
Kumaron-Indenharz	3—25
Thixotropiermittel	0,1—2
Inerter aus Teilchen bestehender Füllstoff	33—56
Korrosionshemmendes Pigment	1—6
Härtungsmittelzusatz	0,5—3

4. Überzugsmittel nach Anspruch 3, worin der Polyglycidylether von Bisphenol in der Komponente A ein Diglycidylether von Bisphenol A mit einem Epoxy-Äquivalentgewicht von 185 bis 192 ist; das Thixotropiermittel ein organisches Wachs ist; das Kumaron-Indenharz einen Erweichungspunkt von 50°F (10°C) hat; die Aluminiumpaste eine Blattaluminiumpaste ist, die 68% feste Aluminiumplättchen umfaßt, in Beimischung mit 92 Vol.% aliphatischem Kohlenwasserstoff, der bei 150 bis 180°C siedet und 8 Vol.% aromatischem Kohlenwasserstoff der bei 150 bis 175°C siedet und der Feuchtigkeitsadsorber Kieselgel ist, und worin in der Komponente B das Fettsäureharz ein Amidoamin ist, das das Reaktionsprodukt einer ethylenisch ungesättigten Fettsäure und eines Alkenylpolyamins umfaßt, das Fettsäurediaminsalz



39

ausgewählt ist aus N - Talg - 1,3 - propandiaminmonooctadecenoat und N - Talg - 1,3 - propandiamindioctadecenoat; das Kumaron-Indenharz einen Erweichungspunkt von 50°F (10°C) hat; das Thixotropiermittel ein organisches Wachs ist; der inerte aus Teilchen bestehende Füllstoff sowohl mikrokristallines Siliciumdioxid und Magnesiumsilikat umfaßt; das Pigment aus Zinkphosphat und Zinkchromat ausgewählt ist, und der Härtungsmittelzusatz aus Dimethylaminomethylphenol und 2,4,6 - Tris(dimethylaminomethyl)phenol ausgewählt ist.

5. Überzugsmittel nach Anspruch 4, worin die Gewichtsprozentbereiche der Zusatzstoffe in der Komponente A sind:

10	Zusatzstoff	Gew. %
	Unverdünnter flüssiger Diglycidylether von Bisphenol A	mindestens 55
	Organisches Thixotropiermittel	0,05—1
15	Kumaron-Indenharz	4—10
	Blattaluminiumpaste	28—32
20	Kieselgel	0,5—1,5

und die Gewichtsprozentbereiche für die Zusatzstoffe in der Komponente B sind:

25	Zusatzstoff	Gew. %
	Fettsäureamidoamin	36—40
	Fettsäurediaminsalz	3,5—4,5
30	Kumaron-Indenharz	4—10
	Organisches Thixotropiermittel	0,1—1
	Mikrokristallines Siliciumdioxid	30—28
35	Magnesiumsilikat	10—15
	Korrosionshemmendes Pigment	1,5—4,5
40	Härtungsmittelzusatz	1—2

6. Überzugsmittel nach einem der vorstehenden Ansprüche, worin die Komponente A und die Komponente B unmittelbar vor der Verwendung dieser Zusammensetzungen als Überzugsmittel in im wesentlichen gleichen Volumen kombiniert werden.

45 7. Überzugsmittel nach Anspruch 6, welches mit einem aromatischen Kohlenwasserstofflösungsmittel verdünnt ist.

8. Fertiges Überzugsmittel nach Anspruch 6 zum Auftragen auf einen rostigen Stahlträgerstoff, das 40 Vol.% der Komponente A, 40 Vol.% der Komponente B und 20 Vol.% Xylol als Lösungsmittel enthält.

50 9. Mit einer Drahtbürste behandelter rostiger Stahlträgerstoff, der mit dem Überzugsmittel nach einem der Ansprüche 6 bis 8 überzogen ist.

Revendications

55 1. Composition de revêtement à deux composants comprenant un composant A et un composant B dans laquelle:

- le composant A contient un éther de polyglycidyle liquide non dilué d'un biphenol dont le poids équivalent en époxyde est compris entre 170 et 200; et une pâte d'aluminium; et
- 60 — le composant B contient une résine de polyamide; et un sel de d'amine d'acide gras;

dans laquelle l'un des composants A et B ou tous les deux contiennent également une résine de coumarone-indène dont le point de ramollissement est compris entre 4° et 15°C (40°F et 60°F).

2. Composition selon la revendication 1, dans laquelle:

- 65 a. on utilise une résine de coumarone-indène à la fois dans le composant A et dans le composant B;



b. le composant A contient un ou plusieurs constituants supplémentaires choisis parmi des agents thixotropes et des agents absorbant l'humidité; et

c. le composant B contient un ou plusieurs constituants supplémentaires choisis parmi des agents thixotropes, des charges particulières inertes, des agents de durcissement à base d'amine et des pigments anticorrosion.

3. Composition selon la revendication 1 ou 2, dans laquelle les variations en poids des constituants du composant A sont exprimées en %:

	Ingrédient	Poids %
10	éther de polyglycidyle liquide non dilué de biphenol	au moins 50
	pâte d'aluminium	25—35
15	résine de coumarone-indène	3—25
	agent thixotrope	0,1—2,0
	agent absorbant l'humidité	0,1—2,0

et les variations en poids des constituants du composant B sont exprimées en %:

	Ingrédient	Poids %
25	résine de polyamide d'acide gras	30—45
	sel de diamine d'acide gras	3—6
	résine de coumarone-indène	3—25
30	agent thixotrope	0,1—2,0
	charge particulière inerte	33—56
35	pigment anticorrosion	1—6
	agent de durcissement supplémentaire	0,5—3

4. Composition de revêtement selon la revendication 3, dans laquelle, dans le composant A, ledit éther de polyglycidyle de biphenol est un diglycidyle de biphenol A dont le poids équivalent en époxyde est de 185 à 192; ledit agent thixotrope est une cire organique; ladite résine de coumarone-indène présente un point de ramollissement de 10°C (50°F); ladite pâte d'aluminium est une pâte d'aluminium nacrée contenant 68% de paillettes d'aluminium solides en mélange avec 92% en volume d'hydrocarbure aliphatique bouillant dans un intervalle de 150 à 180°C et 8% en volume d'hydrocarbure aromatique bouillant dans un intervalle de points d'ébullition de 150 à 175°C; et ledit agent d'absorption d'humidité est le gel de silice, et dans laquelle, dans le composant B, ladite résine d'acide gras est une amidoamine constituée du produit de la réaction d'un acide gras à insaturation éthylénique et d'une alkényle polyamine; ledit sel de diamine et d'acide gras est choisi parmi le mono-octadécénoate de N-oléyl-1,3-propane-diamine et le dioctadécénoate de N-oléyl-1,3-propane-diamine; ladite résine de coumarone-indène présente un point de ramollissement de 10°C (50°F); ledit agent thixotrope est une cire organique; ladite charge particulière inerte comprend à la fois de la silice microcristalline et du silicate de magnésium, ledit pigment est choisi parmi le phosphate de zinc et le chromate de zinc et ledit agent de durcissement supplémentaire est choisi parmi le diméthylaminométhylphénol et le 2,4,6 - tris(diméthylamino-méthyl)phénol.

5. Composition de revêtement selon la revendication 4, dans laquelle les intervalles de % en poids des constituants du composant A sont:





	Constituant	Poids %
	éther de polyglycidyle liquide non dilué de biphenol	au moins 55
5	agent thixotrope organique	0,05—1
	résine de coumarone-indène	4—10
	pâte d'aluminium nacré	28—32
10	gel de silice	0,5—1,5

et les variations en poids exprimées en % des constituants du composant B sont:

15	Constituant	Poids %
	amidoamine d'acide gras	36—40
	sel de diamine et d'acide gras	3,5—4,5
20	résine de coumarone-indène	4—10
	agent thixotrope organique	0,1—1
25	silice microcristalline	30—38
	silicate de magnésium	10—15
	pigment anticorrosion	1,5—4,5
30	agent de durcissement supplémentaire	1—2

6. Composition selon une quelconque des revendications précédentes, dans laquelle on combine le composant A et le composant B en volumes sensiblement égaux immédiatement avant l'utilisation de ces compositions comme composition de revêtement.

7. Composition selon la revendication 6, diluée avec un solvant d'hydrocarbure aromatique.

8. Composition prête à l'emploi selon la revendication 6, pour application sur un substrat d'acier rouillé contenant 40% en volume de composant A, 40% en volume de composant B et 20% en volume de xylène comme solvant.

9. Substrat d'acier rouillé passé à la paille de fer revêtu de la composition selon l'une quelconque des revendications 6 à 8.

