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(54) **USE OF A COATING AGENT THAT CURES AT
ROOM TEMPERATURE**

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(57) **ABSTRACT**

The invention relates to the use of a coating agent that cures at room temperature.

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In order to provide a room-temperature-curing coating agent for preventing cathodic corrosion and for application as an aerosol or as brush-on paint, it is proposed that the coating agent be produced by the following method:

- a) Mixing 5 to 95 wt. % metal alkoxide with 5 to 95 wt. % metal pigment,
- b) Adding a solvent and up to 10 wt. % (relative to the amount of solid matter) of a catalyst, the catalyst being selected from the group consisting of Lewis acids, organic acids and bases, inorganic bases, functional silanes, in particular aminosilanes, inorganic acids, in particular sulphuric or phosphoric acid, phosphates or blocked phosphates, the coating agent being applied onto a metallic substrate and subsequently dried at room temperature.

(30) **Foreign Application Priority Data**

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USE OF A COATING AGENT THAT CURES AT ROOM TEMPERATURE

[0001] The invention relates to the use of a coating agent that cures at room temperature.

[0002] Metallic coating agents based on zinc or zinc alloys for active protection against corrosion are known from the prior art. In the salt spray test, these coating agents provide active corrosion protection for approx. 100 hours when the coating thickness is approx. 7 µm. It is therefore customary to use coatings of 50 to 60 µm thickness in order to obtain sufficient corrosion protection,

[0003] Where permanent corrosion resistance is required, surfaces to be protected may additionally be passivated by the application of paints, varnishes or what are known as welding primers, or by electrochemical dip-coating.

[0004] Alternatively, the thickness of the zinc coating may be increased to approx. 70 µm, for instance by hot-dip galvanizing.

[0005] Zinc flake coatings show very good corrosion resistance, even when applied in relatively thin layers of 5 to 10 µm thickness, but they are unsuitable for spray application because a temperature of at least 250° C. is specified for curing them.

[0006] The object of this invention is thus to create a room-temperature-curing coating agent that provides cathodic corrosion protection and is applicable as an aerosol and as brush-on paint.

[0007] For use according to the preamble, this object is established by the invention in that a room-temperature-curing coating agent for providing cathodic corrosion protection is used in the form of an aerosol or a brush-on paint, the coating agent being produced according to the following method:

[0008] a) Mixing 5 to 95 wt. % metal alkoxide with 5 to 95 wt. % metal pigment,

[0009] b) Adding a solvent and up to 10 wt. % (relative to the amount of solid matter) of a catalyst.

[0010] Cathodic protection is obtained in this way, which effectively prevents contact corrosion in substrates consisting of different metals. It was shown in the context of this invention that the coating agent of the invention achieves a controlled reduction in activity by covering the individual metal particles with a conductive or semi-conductive metal oxide coating, for example a titanium dioxide coating on zinc. The metal particles are passivated "in situ" by the metal alkoxide, preventing the formation of white rust typical of conventional zinc coatings that cure at room temperature. Weldability is preserved and the coating agent can be overpainted. The surface of the coating agent is dirt-repellent and has hydrophobic and oleophobic properties. Thanks to its "self-healing surface", the coating agent is relatively scratch-proof and abrasion resistant, and offers a good adhesion surface for polyurethane sealants and silicone sealants.

[0011] One embodiment of the invention consists in that up to 20 wt. %, preferably 0 to 10 wt. % and best of all 0.1 to 2.5 wt. % (in each case relative to the amount of solid matter) additives are added.

[0012] It is also within the scope of the invention that up to 50 wt. %, preferably 0 to 25 wt. % and best of all 0 to 10 wt. % (in each case relative to the amount of solid matter) colourants are added.

[0013] The coating agent, which already has a metallic effect, may be adjusted to suit the respective substrate by the addition of inorganic or organic colourants or pigments. For example, it is possible to create various zinc and metallic shades, such as stainless steel and aluminium, but also other colours.

[0014] The coating agent of the invention may be applied by spraying, in particular from an aerosol can or a spray gun, brushing or roller application onto a metallic substrate, in particular steel, alloy steels, zinc, galvanized steel sheet, aluminium or aluminium alloys, and subsequently dried at room temperature. The substrate may also be a composite material comprising two or more of these metals joined together, for example by means of welding, bolting or riveting.

[0015] It is within the scope of the invention that the coating agent is applied in layer thicknesses of 5 to 60 µm, preferably in layer thicknesses of 5 to 25 µm and even more preferably in layer thicknesses of 10 to 15 µm.

[0016] It transpired within the scope of the invention that distinctly thinner coating thicknesses than in the prior art suffice to produce very good corrosion protection.

[0017] A preferred embodiment of the invention consists in that the metal alkoxide is selected from the group consisting of titanium alkoxide, in particular titanium butylate, titanium propylate or titanium isopropylate, zirconium alkoxide, aluminium alkoxide and tin alkoxide, the metal content ranging in each case from 1 to 50 wt. %, preferably from 1 to 40 wt. % and even more preferably from 1 to 30 wt. %.

[0018] It is within the scope of the invention that the metal pigment is selected from the group consisting of zinc, aluminium and magnesium, as well as mixtures and alloys thereof.

[0019] Zinc and mixtures or alloys of zinc and aluminium are preferred.

[0020] According to a refinement of the invention, the solvent preferably contains or consists of water, alcohol, protic or aprotic solvents, the solvent most preferably consisting of or containing toluene, butyl glycol, xylene or isopropanol.

[0021] According to a preferred embodiment of the invention, a propellant selected from the group consisting of propane, butane, ketones, ether, carbon dioxide, nitrogen, chlorofluorocarbons or laughing gas is added if a room-temperature-curing coating agent is to be used in the form of an aerosol.

[0022] Where a room-temperature-curing coating agent is to be used in the form of an aerosol, it is expediently diluted with solvent or solvent mixtures to a solids content of 2 to 40 wt. %, preferably 5 to 25 wt. % and even more preferably 5 to 15 wt. %.

[0023] Where a room-temperature-curing coating agent is to be used in the form of a brush-on paint, it is advantageous according to another embodiment of the invention to dilute it with solvent or solvent mixtures to a solids content of 25 to 75 wt. %, preferably 40 to 60 wt. %.

[0024] The invention provides for the addition preferably of 1 to 10 wt. % catalyst, even more preferably 1 to 5 wt. % catalyst, the catalyst being selected from the group consisting of Lewis acids, Lewis bases, organic acids and bases, inorganic bases, functional silanes, in particular aminosilanes, inorganic acids, in particular sulphuric or phosphoric acid, phosphates or blocked phosphates.

[0025] It is also within the scope of the invention that the additives are selected from the group consisting of flattening agents, flow-control additives, slip additives, adhesion pro-

moters, flexibilisers, antisetling agents, in particular Aerosil, water and oil repellents, dessicants, inhibitors and hydrophilising agents.

[0026] In this context, silanes are particularly suitable adhesion promoters and silicones particularly suitable flexibilisers.

[0027] According to the invention, the colourants are selected from the group consisting of inorganic or organic pigments, titanium dioxide, carbon black and iron oxide.

[0028] The invention is explained below in detail by reference to an embodiment.

EXAMPLE

[0029] 100 g xylene are poured over a mixture of 100 g fine, flaky zinc powder and 15 g of likewise flaky aluminium pigment paste. The reaction mixture is left to stand in a closed vessel for 24 h and then homogenised for 2 h with a slow stirrer.

[0030] 40 g tetra-n-butyl-orthotitanate are stirred into the reaction mixture under an atmosphere of dried nitrogen, the mixture homogenized for 1 h with a slow stirrer and then refluxed for 12 h. The zinc and aluminium particles are surface-modified with the organometal component during this process. After the reaction mixture has cooled down to room temperature again, a further 40 g tetra-n-butyl-orthotitanate are stirred in under the dried-nitrogen atmosphere, and stirring continued for another 5 h.

[0031] Another 40 g tetra-n-butyl-orthotitanate are then added and the mixture stirred until it is homogeneous. The entire reaction mixture is then concentrated under vacuum in a rotary evaporator, at a bath temperature, until only 300 g of the original quantity are left.

[0032] During application, the liquid coating material is stirred continuously to prevent solid components from settling.

[0033] 80 g coating material are diluted with 75 g xylene and 5 g methylethyl ketone, filled into a 400-ml aerosol can, closed off and charged with 200 g propane/butane propellant mixture. The spray-can content is applied by way of the cross-hatch technique to degreased and cleaned steel sheet and dried for 1 day at room temperature (20 to 25° C.) under normal atmospheric humidity conditions (30-60% humidity). An abrasion-resistant grey-metallic coating which provides good, active corrosion protection is obtained.

1. Use of a room-temperature-curing coating agent for providing cathodic corrosion protection in the form of an aerosol or a brush-on paint, produced according to the following method:

- a) Mixing 5 to 95 wt. % metal alkoxide with 5 to 95 wt. % metal pigment,
- b) Adding a solvent and up to 10 wt. % (relative to the amount of solid matter) of a catalyst, said catalyst being selected from the group consisting of Lewis acids, organic acids and bases, inorganic bases, functional

silanes, in particular aminosilanes, inorganic acids, in particular sulphuric or phosphoric acid, phosphates or blocked phosphates,

the coating agent being applied onto a metallic substrate and subsequently dried at room temperature.

2. Use according to claim 1, wherein up to 20 wt. %, preferably 0 to 10 wt. % and best of all 0.1 to 2.5 wt. % (in each case relative to the amount of solid matter) additives are added.

3. Use according to claim 1, wherein up to 50 wt. %, preferably 0 to 25 wt. % and best of all 0 to 10 wt. % (in each case relative to the amount of solid matter) colorants are added.

4. Use according to claim 1, wherein the coating agent is applied in layer thicknesses of 5 to 60 µm, preferably in layer thicknesses of 5 to 25 µm and even more preferably in layer thicknesses of 10 to 15 µm.

5. Use according to claim 1, wherein the metal alkoxide is selected from the group consisting of titanium alkoxide, in particular titanium butylate, titanium propylate or titanium isopropylate, zirconium alkoxide, aluminum alkoxide and tin alkoxide, the metal content ranging in each case from 1 to 50 wt. %, preferably from 1 to 40 wt. % and even more preferably from 1 to 30 wt. %.

6. Use according to claim 1, wherein the metal pigment is selected from the group consisting of zinc, aluminum and magnesium, as well as mixtures and alloys thereof.

7. Use according to claim 1, wherein the solvent preferably contains or consists of water, alcohol, protic or aprotic solvents, the solvent most preferably consisting of or containing toluene, butyl glycol, xylene or isopropanol.

8. Use according to claim 1, wherein, for use of a room-temperature-curing coating agent in the form of an aerosol, a propellant selected from the group consisting of propane, butane, ketones, ether, carbon dioxide, nitrogen, chlorofluorocarbons or laughing gas is added.

9. Use according to claim 1, wherein, for use of a room-temperature-curing coating agent in the form of an aerosol, the coating agent is diluted with solvent or solvent mixtures to a solids content of 2 to 40 wt. %, preferably 5 to 25 wt. % and even more preferably 5 to 15 wt. %.

10. Use according to claim 1, wherein, for use of a room-temperature-curing coating agent in the form of a brush-on paint, the coating agent is diluted with solvent or solvent mixtures to a solids content of 25 to 75 wt. %, preferably 40 to 60 wt. %.

11. (canceled)

12. Use according to claim 2, wherein the additives are selected from the group consisting of flattening agents, flow-control additives, slip additives, adhesion promoters, flexibilizers, antisetling agents, in particular Aerosil, water and oil repellents, dessicants, inhibitors and hydrophilizing agents.

13. Use according to claim 3, wherein the colorants are selected from the group consisting of inorganic and organic pigments, titanium dioxide, carbon black and iron oxide.

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