

AUSTRALIA

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**DECLARATION IN SUPPORT OF A CONVENTION OR NON-CONVENTION  
APPLICATION FOR A PATENT OR PATENT OF ADDITION**

no. 83245/87

Name(s) of  
Applicant(s)

In support of the application made by BASF LACKE & FARBEN  
AKTIENGESELLSCHAFT

for a patent for an invention entitled WATER-DILUTABLE COATING COMPOSITIONS  
FOR THE PRODUCTION OF HEAT-CURABLE COATINGS

PLEASE ADD NAME  
AND TITLE OF PERSON

Signature(s) and  
address(es)  
of person(s)  
making  
declaration

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do solemnly and sincerely declare as follows:—

1. I am/we are the applicant(s) for the patent, or authorised by the abovementioned applicant to make this declaration on its behalf.
2. The basic application(s) as defined by Section 141 of the Act was/were made in the following country or countries on the following date(s) by the following applicant(s) namely:—

Country, filing  
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application

in Germany on 25th October 19 86  
by BASF LACKE & FARBEN AKTIENGESELLSCHAFT  
in \_\_\_\_\_ on \_\_\_\_\_ 19 \_\_\_\_\_  
by \_\_\_\_\_

3. The said basic application(s) was/were the first application(s) made in a Convention country in respect of the invention the subject of the application.
4. The actual inventor(s) of the said invention is/are  
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of the or each  
actual inventor

5. The facts upon which the applicant(s) is/are entitled to make this application are as follows:—

The said applicant is the assignee of the said  
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DECLARED at Münster this 27th day of April 1989

BASF Lacke + Farben AG

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(57) Claim

1. A water-dilutable coating composition for the production of heat-curable coatings, in which the binder is composed, at least in part, of an epoxide resin-modified, water-dilutable polyester, wherein the epoxide resin-modified, water-dilutable polyester has been prepared by

- (A) synthesizing a polyester from
- (a<sub>1</sub>) at least one polycarboxylic acid containing at least three carboxyl groups, or reactive derivative of this acid, and/or
  - (a<sub>2</sub>) at least one polyol containing at least one carboxyl group and
  - (a<sub>3</sub>) at least one polycarboxylic acid containing two carboxyl groups, or a reactive derivative of this acid, and
  - (a<sub>4</sub>) at least one polyol,  
at least 10 mol% of the components (a<sub>1</sub>) (a<sub>2</sub>), (a<sub>3</sub>) and (a<sub>4</sub>) employed containing  
(relative to (a<sub>1</sub>) + (a<sub>2</sub>) + (a<sub>3</sub>) + (a<sub>4</sub>) = 100 mol%) at least one (cyclo)-aliphatic

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structural element containing at least six  
C atoms,

the polyester having an average molecular weight  
(number average) less than 2,000, an acid number  
from 35 to 240, and an OH number from 56 to 320,  
and all the ( $a_1$ ) and ( $a_3$ ) components in the  
polyester being co-condensed via at least two  
carboxyl groups, and

- (B) subsequently reacting the polyester thus obtained  
with 0.3 to 1.5 equivalents per polyester  
molecule of an epoxide resin having an epoxide  
equivalent weight of 170 to 1,000, and based on a  
bisphenol, and/or with a derivative of this  
epoxide resin containing at least one epoxide  
group per molecule, under reaction conditions in  
which essentially only carboxyl groups react with  
epoxide groups, to give an epoxide resin-modified  
polyester which, after at least part of the free  
carboxyl groups have been neutralized, is present  
in a water-dilutable form.

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| <b>(51) Internationale Patentklassifikation <sup>4</sup> :</b><br><br><b>C09D 3/58</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>A1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>(11) Internationale Veröffentlichungsnummer: WO 88/ 03159</b><br><br><b>(43) Internationales Veröffentlichungsdatum:</b> 5. Mai 1988 (05.05.88) |
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**(54) Title:** WATER-DILUTABLE COMPOSITIONS FOR THE MANUFACTURE OF HEAT-SETTING COATINGS**(54) Bezeichnung:** WASSERVERDÜNNBARE ÜBERZUGSZUSAMMENSETZUNGEN ZUR HERSTELLUNG VON HITZEHÄRTBAREN ÜBERZÜGEN**(57) Abstract**

In the compositions described, the binder consists at least in part of a water-dilutable and at least partly epoxy-resin modified polyester. Said compositions are characterized in that the said polyester is produced (a) by synthesizing a polyester from (a<sub>1</sub>) at least one polycarboxylic acid containing at least three carboxyl groups or a reactive derivative of this acid and/or (a<sub>2</sub>) at least one polyol containing at least one carboxyl group and (a<sub>3</sub>) at least one polycarboxylic acid containing two carboxyl groups or from a reactive derivative of this acid and (a<sub>4</sub>) at least one polyol, - at least 10 moles %, preferably 30-70 moles %, of the components employed (a<sub>1</sub>, a<sub>2</sub>, a<sub>3</sub>, a<sub>4</sub>) (related to (a<sub>1</sub>) + (a<sub>2</sub>) + (a<sub>3</sub>) + (a<sub>4</sub>) = 100 moles %) comprising at least 6 carbon atoms; this polyester has a mean molecular weight (numerical mean) of less than 2000, preferably between 500 and 1500, an acidity index of between 35 and 240, preferably between 50 and 120, an OH index of between 56 and 320, preferably between 80 and 200, and all the components (a<sub>1</sub>) and (a<sub>3</sub>) are condensed by means of at least two carboxyl groups. (b) The polyester thus obtained is made to react with 0.3 to 1.5, preferably 0.5 to 1.0 equivalent per molecule of polyester of an epoxy-resin, having an equivalent epoxy weight of between 170 and 1000, preferably between 170 and 500, based on a biphenol, preferably biphenol A, and/or with a derivative of this epoxy-resin, containing at least one epoxy group per molecule, in reaction conditions where essentially only carboxyl groups react with epoxy groups, in order to produce a polyester modified by an epoxy resin, which, after neutralization of at least a part of the free carboxyl groups, is in a water-dilutable form.

This document contains the  
 amendments made under  
 Section 49 and is correct for  
 printing.

**(57) Zusammenfassung** Wasserverdünnbare Überzugszusammensetzungen zur Herstellung von hitzhärtbaren Überzügen, deren Bindemittel zumindest zum Teil aus einem epoxidharzmodifizierten wasserverdünnbaren Polyester bestehen. Die erfindungsgemäßen wasserverdünnbaren Überzugszusammensetzungen sind dadurch gekennzeichnet, daß der epoxidharzmodifizierte wasserverdünnbare Polyester hergestellt worden ist, indem (A) aus (a<sub>1</sub>) mindestens einer mindestens drei Carboxylgruppen enthaltenden Polycarbonsäure bzw. einem reaktiven Derivat dieser Säure und/oder (a<sub>2</sub>) mindestens einem mindestens eine Carboxylgruppe aufweisenden Polyol und (a<sub>3</sub>) mindestens einer zwei Carboxylgruppen enthaltenden Polycarbonsäure bzw. einem reaktiven Derivat dieser Säure und (a<sub>4</sub>) mindestens einem Polyol, - wobei mindestens 10 Mol%, bevorzugt 30-70 Mol%, der eingesetzten Komponenten (a<sub>1</sub>), (a<sub>2</sub>), (a<sub>3</sub>) und (a<sub>4</sub>) (bezogen auf (a<sub>1</sub>) + (a<sub>2</sub>) + (a<sub>3</sub>) + (a<sub>4</sub>) = 100 Mol%) mindestens ein mindestens 6 C-Atome aufweisendes (cyclo)-aliphatisches Strukturelement enthalten - ein Polyester synthetisiert worden ist, der ein mittleres Molekulargewicht (Zahlenmittel) von unter 2000, bevorzugt 500 bis 1500, eine Säurezahl von 35-240, bevorzugt 50-120, eine OH-Zahl von 56-320, vorzugsweise 80-200, aufweist und in dem alle (a<sub>1</sub>)- und (a<sub>3</sub>)-Komponenten über mindestens zwei Carboxylgruppen einkondensiert sind und (B) dieser so gewonnene Polyester anschließend mit 0,3 bis 1,5, vorzugsweise 0,5 bis 1,0 Äquivalenten pro Polyestermolekül eines ein Epoxidäquivalentgewicht von 170 bis 1000, bevorzugt 170 bis 500, aufweisenden Epoxidharzes auf Basis eines Bisphenols, vorzugsweise Bisphenol A, und/oder einem mindestens eine Epoxidgruppe pro Molekül enthaltenden Derivat dieses Epoxidharzes unter Reaktionsbedingungen, bei denen im wesentlichen nur Carboxylgruppen mit Epoxidgruppen reagieren, zu einem epoxidharzmodifizierten Polyester umgesetzt worden ist, der nach Neutralisation von mindestens einem Teil der freien Carboxylgruppen in wasserverdünnbarer Form vorliegt.

#### LEDIGLICH ZUR INFORMATION

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BASF Lacke+Farben AG, Münster

Water-dilutable coating compositions for the production  
of heat-curable coatings

5 The invention relates to water-dilutable coating compositions for the production of heat-curable coatings, in which the binders are composed, at least in part, of an epoxide resin-modified, water-dilutable polyester.

10 In the assembly-line painting of automobiles, a primer is usually first applied, then a filler and finally the top-coat.

15 In assembly-line painting, the filler layer is preferably applied by means of electrostatic spraying processes. The use of electrostatic spraying processes compared with other spraying processes achieves a considerable saving in materials, associated with a high degree of automation.

20 It is extremely important for assembly-line painting that the filler material should have a good application behavior, that is to say good sprayability in, preferably, electrostatic or electrostatically assisted spraying processes, advantageous rheological properties, good absorption of spray mist and advantageous drying behavior.



One function of the filler consists in filling in and covering inequalities in order to level the substrate for the subsequent topcoat. This covering of substrate structures and defects must be accomplished without  
5 carrying out extensive rubbing-down work on the filler layer; this is a requirement which can only be met if the filler material has good leveling properties.

As well as optical quality, important mechanical and technological properties of the paint coating, such as,  
10 for example, corrosion resistance and, above all, resistance to flying stones and other mechanical attacks, depend quite decisively on the quality of the filler layer.

At the present time stoving paints based on organic solvents are mainly used as the filler materials.

15 The surface-coating industry is endeavoring, for economic and ecological reasons, to replace filler materials containing solvents by water-dilutable stoving paints.

The invention is based on the object of developing water-dilutable coating compositions for the production of  
20 heat-curable coatings, which have the application properties required for use in automobile assembly-line painting and which afford coatings having properties as good as, or even better than, the coatings produced by means of conventional filler materials containing organic



solvents.

This object is achieved, in accordance with the invention, by means of water-dilutable coating compositions in which the binders are composed, at least in part, of an epoxide resin-modified, water-dilutable polyester which has been prepared by

(A) synthesizing a polyester from

(a<sub>1</sub>) at least one polycarboxylic acid containing at least three carboxyl groups, or a reactive derivative of this acid, and/or

(a<sub>2</sub>) at least one polyol containing at least one carboxyl group and

(a<sub>3</sub>) at least one polycarboxylic acid containing two carboxyl groups, or a reactive derivative of this acid, and

(a<sub>4</sub>) at least one polyol,  
at least 10 mol%, preferably 30-70 mol%, of the components (a<sub>1</sub>), (a<sub>2</sub>), (a<sub>3</sub>) and (a<sub>4</sub>) employed containing (relative to (a<sub>1</sub>) + (a<sub>2</sub>) + (a<sub>3</sub>) + (a<sub>4</sub>) = 100 mol%) at least one (cyclo)-aliphatic structural element containing at least six C atoms,

the polyester having an average molecular weight (number average) less than 2,000, preferably 500 to 1,500, an acid number from 35 to 240, preferably 50 to 120, and an OH number from 56 to 320, preferably 80 to 200,

and all the (a<sub>1</sub>) and (a<sub>3</sub>) components in the polyester being co-condensed via at least two carboxyl groups, and

(B) subsequently reacting the polyester thus obtained

5 with 0.3 to 1.5, preferably 0.5 to 1.0, equivalents per polyester molecule of an epoxide resin having an epoxide equivalent weight of 170 to 1,000, preferably 170 to 500, and based on a bisphenol, preferably bisphenol A, and/or with a derivative of this epoxide  
10 resin containing at least one epoxide group per molecule, under reaction conditions in which essentially only carboxyl groups react with epoxide groups, to give an epoxide resin-modified polyester which, after at least part of the free carboxyl groups have been  
15 neutralized, is present in a water-dilutable form.

In preparing the binders according to the invention, the type and amount of the components (a<sub>1</sub>), (a<sub>2</sub>), (a<sub>3</sub>) and (a<sub>4</sub>) should be so selected that at least 10 mol%, preferably 30 to 70 mol%, of the components (a<sub>1</sub>), (a<sub>2</sub>), (a<sub>3</sub>)  
20 and (a<sub>4</sub>) employed contain (relative to (a<sub>1</sub>) + (a<sub>2</sub>) + (a<sub>3</sub>) + (a<sub>4</sub>) = 100 mol%) at least one (cyclo)aliphatic structural element containing at least six C atoms, and that it is possible, on the basis of generally known principles of synthesis, to synthesize from the components (a<sub>1</sub>) and/or  
25 (a<sub>2</sub>), (a<sub>3</sub>) and (a<sub>4</sub>) a polyester which has an average molecular weight (number average) less than 2,000, preferably 500 to 1,500, an acid number from 35 to 240, prefer-

ably 50 to 120, and an OH number from 56 to 320, preferably 80 to 200, and in which all the (a<sub>1</sub>) and (a<sub>3</sub>) components have been co-condensed via at least two carboxyl groups.

- 5 The carboxyl groups of the polyester are supplied by the components (a<sub>1</sub>) and/or (a<sub>2</sub>). The polyester can be synthesized by using only the carboxyl group suppliers (a<sub>1</sub>) or (a<sub>2</sub>) or by using a mixture of the components (a<sub>1</sub>) and (a<sub>2</sub>).

- 10 Bearing in mind the requirements mentioned above, the component (a<sub>1</sub>) employed can, in principle, be any polycarboxylic acid, or a reactive derivative (for example an anhydride, ester or halide) suitable for the preparation of polyesters and containing at least three carboxyl groups, or a mixture of such acids or acid derivatives. Examples  
15 which may be mentioned are trimellitic acid, trimesic acid (1,3,5-benzenetricarboxylic acid), pyromellitic acid and trimeric fatty acids. It is preferable to employ trimellitic acid.

- 20 Bearing in mind the requirements mentioned above, the component (a<sub>2</sub>) employed can, in principle, be any polyol suitable for the preparation of polyesters and containing carboxyl groups, or a mixture of such polyols, a polyol being understood to mean an organic compound carrying at  
25 least two hydroxyl groups. It is advantageous to employ



dimethylolpropionic acid as the (a<sub>2</sub>) component.

Bearing in mind the requirements mentioned above, the component (a<sub>3</sub>) employed can, in principle, be any polycarboxylic acid, or a reactive derivative (for example an anhydride, ester or halide), suitable for the preparation of polyesters and containing two carboxyl groups, or a mixture of such acids or acid derivatives. The following may be mentioned as examples of suitable acids: phthalic acid, isophthalic acid, terephthalic acid, fumaric acid, maleic acid, endomethylenetetrahydrophthalic acid, succinic acid, adipic acid, suberic acid, azelaic acid, sebacic acid and dimeric fatty acids. It is preferable to employ phthalic acid, isophthalic acid, adipic acid and dimeric fatty acids.

Bearing in mind the requirements mentioned above, the component (a<sub>4</sub>) employed can, in principle, be any polyol or a mixture of polyols, suitable for the preparation of polyesters, a polyol being understood to mean an organic compound carrying at least 2 hydroxyl groups. The following are examples of suitable polyols: ethylene glycol, propanediols, butanediols, pentanediols, neopentyl glycol, hexanediols, diethylene glycol, glycerol, trimethylolethane, trimethylolpropane, pentaerythritol, dipentaerythritol, neopentyl glycol hydroxypivalate, 2-methyl-2-propyl-1,3-propanediol, 2,2,4-trimethyl-1,3-pentanediol and 2,2,5-trimethyl-1,6-hexanediol. It is



preferable to employ neopentyl glycol, 1,6-hexanediol and neopentyl glycol hydroxypivalate.

The polyester prepared from the components (a<sub>1</sub>) and/or (a<sub>2</sub>), (a<sub>3</sub>) and (a<sub>4</sub>) and having the characteristic data mentioned above is reacted with 0.3 to 1.5, preferably 0.5 to 1.0, equivalents per polyester molecule of an epoxide resin having an epoxide equivalent weight of 170 to 1,000, preferably 170 to 500, and based on a bisphenol, preferably bisphenol A, or with a derivative of this epoxide resin containing at least one epoxide group per molecule, under reaction conditions in which essentially only carboxyl groups react with epoxide groups, to give an epoxide resin-modified polyester according to the invention, which, after at least part of the free carboxyl groups have been neutralized, is present in a water-dilutable form.

The epoxide resins based on a bisphenol, preferably bisphenol A, are, as a rule, reaction products of bisphenols with epichlorohydrin. These epoxide resins should have an epoxide equivalent weight of 170 to 1,000, preferably 170 to 500, and should preferably contain on average one to two, particularly preferably two, epoxide groups per molecule.

It is also possible to employ derivatives of these epoxide resins containing at least one epoxide group per molecule.

- Suitable derivatives which can be used are reaction products containing at least one epoxide group per molecule and formed from the epoxide resins mentioned above and from a (cyclo)aliphatic monocarboxylic or polycarboxylic acid, preferably a monocarboxylic or polycarboxylic acid having a (cyclo)aliphatic structural element containing at least 6 C atoms. These derivatives can be prepared by reacting the epoxide resins in question with, for example, polymeric, preferably dimeric, fatty acids, adipic acid, azelaic acid, dodecanedicarboxylic acid, long-chain monocarboxylic acids, tetrahydrophthalic acid or hexahydrophthalic acid, in such a way that reaction products which still contain at least one epoxide group per molecule are formed.
- 15 Water-dilutable coating compositions which are very particularly preferred are obtained if the polyester synthesized in stage (A) has been reacted with 0.3 to 1.5, preferably 0.5 to 1.0, equivalents per polyester molecule of a reaction product containing at least one epoxide group per molecule and formed from an epoxide resin based on a bisphenol, preferably bisphenol A, having an epoxide equivalent weight of 170 to 1,000, preferably 170 to 500, and from a (cyclo)aliphatic monocarboxylic or polycarboxylic acid having a (cyclo)aliphatic structural element containing at least 18 C atoms, preferably a polymeric fatty acid and particularly a dimeric fatty acid.

The reaction between the polyester synthesized in stage (A) and the epoxide resin or epoxide resin derivative must be carried out in such a way that essentially only the carboxyl groups of the polyester are reacted with the epoxide groups of the epoxide resin, and that competitive reactions, such as, for example, the reaction of hydroxyl groups with epoxide groups, only take place to a minor extent.

Suitable reaction conditions are, for example: a reaction temperature of 25-180°C, preferably 80-160°C. The reaction can be carried out in an inert solvent or without a diluent and is advantageously catalyzed by means of basic catalysts, such as, for example, tertiary amines.

After at least part of the carboxyl groups present in the epoxide resin-modified polyester according to the invention have been neutralized with basic compounds, such as, for example, ammonia, aliphatic secondary and tertiary amines, such as diisopropanolamine, dimethylaminoethanol and diethylaminoethanol, and trimethylamine, triethylamine and tripropylamine, preferably with tertiary amines, the epoxide resin-modified polyester according to the invention is present in a water-dilutable form.

The coating compositions according to the invention are prepared by processing the epoxide resin-modified polyesters according to the invention, crosslinking agents (for



example amino resins, in particular those of the type of hexamethoxymethylmelamine, urea resins, water-dilutable epoxide resins and the like), if appropriate, further binders, pigments, fillers and further customary additives  
5 to give a water-dilutable coating composition.

In addition to water, the water-dilutable coating compositions according to the invention can also contain, as diluents, minor amounts of solvents.

10 A great advantage of the polyesters according to the invention consists in their good compatibility with the other paint components, in particular with crosslinking agents and further binders which may be present in the coating composition.

15 In an advantageous embodiment, the coating compositions according to the invention contain the polyester according to the invention as the sole binder; this embodiment is made possible by the fact that, by virtue of its excellent pigment wetting properties, the polyester according to the invention can also be used as a grinding resin.

20 The coating compositions according to the invention exhibit excellent application properties, even at fluctuating humidity values, and are very suitable for use in assembly-line painting. Above all, they can be readily applied by means of electrostatic, or electrostatically assisted,



spraying processes and display advantageous rheological properties, good absorption of spray mist, good leveling properties, an advantageous drying behavior and a good wetting behavior towards PVC.

The stoved films obtained by means of the coating compositions according to the invention display not only a good anti-corrosion action, but also a reduced tendency to yellowing, compared with known systems, and optimum intercoat adhesion properties. In cooperation with the primer and the topcoat film(s) they result in paint coatings which have a very good topcoat appearance and - even at very high and very low temperatures - an excellent resistance to flying stones and other mechanical attacks.

The possible uses of the coating compositions according to the invention are not limited to the painting of automobiles. They can also be used for applying a mono-layer or multi-layer coating to any other substrates. Suitable substrates can be composed, for example, of ceramics, glass, concrete, plastics or preferably metals, such as iron, zinc, copper, aluminum, steel and the like.

The coating compositions according to the invention make it possible to obtain coatings having a particularly high gloss.

Additionally, the coating compositions according to the invention afford coatings which adhere excellently to the substrates, if appropriate after pretreatment, and which exhibit very good values of resistance to mechanical at-  
5 tacks and organic solvents.

The invention is illustrated in greater detail in the following examples. Unless anything to the contrary is expressly stated, all data relating to parts and percentages are by weight.

10 Preparation of an epoxide resin-modified, water-dilutable polyester according to the invention (polyester A)

442.4 g of 1,6-hexanediol and 166.6 g of a technical polymeric fatty acid (dimer content at least 80% by weight, trimer content not more than 20% by weight and monomer  
15 content not more than 1% by weight) are weighed out into a stainless steel reaction vessel which can be heated by means of heat transfer oil and is equipped with an anchor stirrer, a packed column, a vapor condenser with a receiver, a protective gas inlet (N<sub>2</sub>) and temperature sen-  
20 sors for the temperature of the reaction material and the vapor temperature at the head of the column, and are heated to 130°C. 184.3 g of isophthalic acid are then added and heating is continued. As soon as water from the condensation reaction is formed (above about 160°C) the tem-  
25 perature of the reaction material is increased, while the



water from the condensation reaction is distilled off, to not more than 220°C sufficiently slowly for the vapor temperature at the head of the column not to exceed 103°C. Condensation is carried out at 220°C until the acid number  
5 of the reaction material has reached 10.5. After cooling to 140°C, 266.7 g of trimellitic anhydride are introduced into the reaction material in portions and with stirring. The reaction material is then heated to 150°C and esterification is continued until the acid number has  
10 reached 67.7. The material is then cooled to 120°C and diluted with sufficient ethylene glycol monobutyl ether to give a solution having a solids content of 85% by weight (determined after drying for 60 minutes at 130°C in a circulating air drying cabinet). A sample diluted to  
15 50% by weight with ethylene glycol monobutyl ether has a solution viscosity of 420 mPa.s (23°C ICI plate-cone viscometer).

The 85% strength polyester solution is heated to 140°C, and 209.6 g of an epoxide resin formed from bisphenol A  
20 and epichlorohydrin and having an epoxide equivalent weight of 490 are added in portions, with stirring. The mixture is then reacted at 140°C until an epoxide equivalent weight of more than 50,000 and an acid number of 42.1 (relative to solids) have been reached. It is then cooled  
25 to 100°C and neutralized with 64.6 g of N,N-dimethylethanolamine. The reaction material is then discharged, with stirring, into 2,000 g of demineralized water,



previously heated to 60°C, and vigorous stirring is applied to produce a stable binder dispersion, which is adjusted with 180 g of demineralized water and N,N-dimethylethanolamine to a solids content of 35% by weight (determined after drying for 60 minutes at 130°C in a circulating air drying cabinet) and to a pH of 6.67 at 23°C.

Preparation of an epoxide resin-modified, water-dilutable polyester according to the invention (polyester B)

922.5 g of an epoxide resin formed from bisphenol A and epichlorohydrin and having an epoxide equivalent weight of 185 and 2.5 g of N,N-dimethylbenzylamine are weighed out into the apparatus described in the preparation of polyester A, the packed column and the vapor condenser being replaced by a reflux condenser, and are heated to 100°C with stirring. 600.0 g of the polymeric fatty acid used for the preparation of polyester A are then added in portions at 100°C, and the mixture is heated to 140°C. Reaction is continued until an acid number of 1.5 and an epoxide equivalent weight of 535 have been reached. The mixture is then diluted with 380 g of diethylene glycol monobutyl ether. (A 50% strength by weight solution of the product in diethylene glycol monobutyl ether has a solution viscosity of 120 mPa.s (23°C, ICI plate-cone viscometer).

1,110 g of a 90% strength by weight solution in ethylene

glycol monobutyl ether of the polyester prepared in the first stage of the preparation of polyester A are prepared, and 270 g of the epoxide resin solution prepared by the process described above are added. The mixture is heated  
5 to 140°C and is reacted at 140°C until the product has an acid number of 40.9 (relative to solids) and an epoxide equivalent weight of more than 50,000. The reaction material is then cooled to 100°C, neutralized with 63.0 g of N,N-dimethylethanolamine and converted, analogously to  
10 the preparation of polyester A, into an aqueous dispersion having a solids content of 35% by weight and a pH of 6.60.

Preparation of some coating compositions according to the invention

Deionized water and N,N-dimethylethanolamine are added,  
15 in accordance with the weight ratios indicated in Table 1, to the aqueous polyester dispersions obtained by the instructions described above, the mixtures are made into a paste with after-treated titanium dioxide of the rutile type, and an unsaturated, branched diol is added as an  
20 anti-foaming agent. These mixtures are filled into a discontinuous laboratory sand mill and are dispersed until a fineness of not more than 10 µm, determined in a Hegmann Grindometer, is reached. The coating compositions 1, 2, 3 and 4 according to the invention (see Table 1) are then  
25 obtained from the dispersion mixtures by generally known methods by adding further polyester dispersion, low-



molecular melamine resin highly etherified with methanol, ethylene glycol ethers, water-dilutable acrylic resin as a leveling agent and demineralized water.

Application to phosphated steel sheets

- 5 The coating compositions prepared by the instructions described above were set with demineralized water to a viscosity of 25 s, measured in a viscosity cup as specified in DIN 4 at 20°C, and were sprayed onto phosphated steel sheets in two cross-way operations with a 10 minute period of intermediate exposure to the air, using a flow cup gun (nozzle orifice 1.2 mm; air pressure 4.5 bar). Application was carried out at an air temperature of 23°C and a relative humidity of 60%. The sprayed panels were exposed to the air for 10 minutes at 23°C and 15 for 10 minutes at 80°C in a circulating air oven and were then stoved for 20 minutes at 160°C in a circulating air oven and were cooled and assessed.

- The coating compositions prepared by the instructions described above were also applied by electrostatic means. 20 This was effected using an Esta-Behr apparatus having a TOS 300/5/8 cone and at a distance of 30 cm and a speed of 30,000 revolutions per minute at a relative humidity of 40-70%.

Although no special conditioning of the spray booth was



carried out, coatings having high gloss and very good leveling were obtained both with thin (approx. 30  $\mu$ m) film thicknesses and with thicker film thicknesses (approx. 54  $\mu$ m). The coatings had an excellent elasticity, good ad-  
5hesion, high resistance to yellowing and good wetting behavior for PVC (see Table 2).

Application of the coating compositions according to the invention to steel sheets coated with an electrodepositing primer

- 10 Coating compositions 1 to 4 according to the invention were sprayed by the process described above onto phosphated steel sheets coated with an electrodepositing paint as specified in Example 6 of German Offenlegungsschrift 2,701,002. The resulting coatings exhibited very good  
15 leveling, covered the structure of the electrodepositing paint very well and exhibited good intercoat adhesion to the primer of electrodepositing paint (see Table 3).

Application of the coating compositions according to the invention as fillers

- 20 The coating compositions according to the invention were applied as described above to electrodepositing steel sheets and were stoved. After cooling, the panels were then additionally oversprayed with a white stoving topcoat containing solvent and based on an alkyd resin containing

saturated and unsaturated fatty acids (acid number 12, OH number 110) in combination with a medium molecular weight melamine resin (ratio 2:1) partly etherified with n-butanol, and pigmented with an after-treated titanium dioxide of the rutile type (PVC 21%) and containing solvents and additives customarily employed for processing a paint for assembly-line painting of automobiles, and the panels were stoved for 30 minutes at 130°C (dry film thickness 37 to 40 µm).

- 10 The coatings are distinguished by good leveling, good covering of the structure of the primer and good inter-coat adhesion (see Table 4).



Table 1

| Coating composition                                                          | 1     | 2     | 3     | 4     |
|------------------------------------------------------------------------------|-------|-------|-------|-------|
| Polyester A                                                                  | 20.0  | 20.0  | -     | -     |
| Polyester B                                                                  | -     | -     | 20.0  | 20.0  |
| 5 Demineralized water                                                        | 5.8   | 5.8   | 5.8   | 5.8   |
| N,N-dimethylethanolamine                                                     | 0.1   | 0.1   | 0.1   | 0.1   |
| Titanium dioxide                                                             | 20.0  | 20.0  | 20.0  | 20.0  |
| Anti-foam<br>(50% solution<br>in ethylene glycol<br>monobutyl ether)         | 0.3   | 0.3   | 0.3   | 0.3   |
| Dispersion mixture                                                           | 46.2  | 46.2  | 46.2  | 46.2  |
| Polyester A                                                                  | 44.3  | 37.1  | -     | -     |
| Polyester B                                                                  | -     | -     | 44.3  | 37.1  |
| 15 Melamine resin (100%)                                                     | 2.6   | 5.1   | 2.6   | 5.1   |
| Diethylene glycol<br>monobutyl ether                                         | 3.0   | 3.0   | 3.0   | 3.0   |
| Ethylene glycol mono-<br>butyl ether                                         | 2.0   | 2.0   | 2.0   | 2.0   |
| 20 Leveling agent<br>(50% solution<br>in ethylene glycol<br>monobutyl ether) | 1.0   | 1.0   | 1.0   | 1.0   |
| Demineralized water                                                          | 0.9   | 5.6   | 0.9   | 5.6   |
| 25                                                                           | 100.0 | 100.0 | 100.0 | 100.0 |

(all data in % by weight)



Table 2

| Coating composition              |                                                  | 1    | 2      | 3    | 4    |
|----------------------------------|--------------------------------------------------|------|--------|------|------|
| Film thickness ( $\mu\text{m}$ ) |                                                  | 41   | 45     | 45   | 45   |
| 5                                | Cross-cut test as specified in DIN 53,151 (Gt B) | Gt 2 | Gt 1-2 | Gt 2 | Gt 2 |
| Erichsen cupping                 |                                                  | 8.5  | 7.1    | 8.7  | 7.5  |
| Gloss (Gardner 60°)              |                                                  | 94   | 96     | 94   | 92   |
| Buchholz hardness                |                                                  | 91   | 118    | 91   | 105  |
| 10                               | Yellowing, 3 hours/160°C                         | 0    | 0      | 0-1  | 0    |
| PVC wetting*                     |                                                  |      |        |      |      |
| Intercol 0787                    |                                                  | 1    | 1      | 1    | 1    |
| Togol                            |                                                  | 1    | 1      | 1-2  | 1    |
| 15                               | Unitecta                                         | 1-2  | 1      | 2    | 2    |

\* Scale of ratings 0 (very good) to 5 (very poor)

Table 3

| Coating composition              |                                                  | 1      | 2    | 3      | 4    |
|----------------------------------|--------------------------------------------------|--------|------|--------|------|
| Film thickness ( $\mu\text{m}$ ) |                                                  | 41     | 45   | 45     | 45   |
| 20                               | Cross-cut test as specified in DIN 53,151 (Gt B) | Gt 0-1 | Gt 1 | Gt 0-1 | Gt 1 |
| Buchholz hardness                |                                                  | 91     | 105  | 100    | 105  |
| Erichsen cupping                 |                                                  | 6.7    | 5.8  | 6.9    | 6.2  |
| 25                               | Gloss (Gardner 60°)                              | 96     | 97   | 94     | 94   |

Table 4

| Coating composition                        |                                                                                                                                                                                                                                                                                 | 1    | 2      | 3      | 4      |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|--------|--------|--------|
| Film thickness of filler ( $\mu\text{m}$ ) |                                                                                                                                                                                                                                                                                 | 40   | 43     | 46     | 45     |
| 5                                          | Cross-cut test as specified in DIN 53,151 (Gt B)                                                                                                                                                                                                                                | Gt 1 | Gt 2-3 | Gt 1-2 | Gt 1-2 |
|                                            | Erichsen cupping                                                                                                                                                                                                                                                                | 6.2  | 5.8    | 6.0    | 5.8    |
|                                            | Flying stones test                                                                                                                                                                                                                                                              | 3    | 3-4    | 2-3    | 3      |
| 10                                         | The flying stones test was carried out using a VDA ("Automobile Industries Association") flying stones test apparatus (model 508) (single bombardment with 1,000 g of steel shot inside 20 seconds; pressure 2 bar). The assessment scale ranges from 1 (very good) to 10 (very |      |        |        |        |
| 15                                         | poor).                                                                                                                                                                                                                                                                          |      |        |        |        |



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A water-dilutable coating composition for the production of heat-curable coatings, in which the binder is composed, at least in part, of an epoxide resin-modified, water-dilutable polyester, wherein the epoxide resin-modified, water-dilutable polyester has been prepared by

(A) synthesizing a polyester from

(a<sub>1</sub>) at least one polycarboxylic acid containing at least three carboxyl groups, or reactive derivative of this acid, and/or

(a<sub>2</sub>) at least one polyol containing at least one carboxyl group and

(a<sub>3</sub>) at least one polycarboxylic acid containing two carboxyl groups, or a reactive derivative of this acid, and

(a<sub>4</sub>) at least one polyol,  
at least 10 mol% of the components (a<sub>1</sub>) (a<sub>2</sub>), (a<sub>3</sub>) and (a<sub>4</sub>) employed containing (relative to (a<sub>1</sub>) + (a<sub>2</sub>) + (a<sub>3</sub>) + (a<sub>4</sub>) = 100 mol%) at least one (cyclo)-aliphatic structural element containing at least six C atoms,

the polyester having an average molecular weight (number average) less than 2,000, an acid number from 35 to 240, and an OH number from 56 to 320, and all the (a<sub>1</sub>) and (a<sub>3</sub>) components in the polyester being co-condensed via at least two carboxyl groups, and

(B) subsequently reacting the polyester thus obtained with 0.3 to 1.5 equivalents per polyester molecule of an epoxide resin having an epoxide equivalent weight of 170 to 1,000, and based on a bisphenol, and/or with a derivative of this epoxide resin containing at least one epoxide



group per molecule, under reaction conditions in which essentially only carboxyl groups react with epoxide groups, to give an epoxide resin-modified polyester which, after at least part of the free carboxyl groups have been neutralized, is present in a water-dilutable form.

2. The composition as claimed in claim 1, wherein 30 to 70 mol% of the components  $(a_1)$ ,  $(a_2)$ ,  $(a_3)$  and  $(a_4)$  employed contain (relative to  $(a_1) + (a_2) + (a_3) + (a_4) = 100$  mol%) at least one (cyclo)-aliphatic structural element containing at least six C atoms.

3. The composition as claimed in claim 1 or claim 2, wherein the polyester has an average molecular weight (number average) of 500 to 1,500.

4. The composition as claimed in any one of the preceding claims, wherein the polyester has an acid number from 50 to 120.

5. The composition as claimed in any one of the preceding claims, wherein the polyester has an OH number from 80 to 200.

6. The composition as claimed in any one of the preceding claims, wherein in stage (B) the polyester is reacted with 0.5 to 1.0 equivalents per polyester molecule of the epoxide resin.

7. The composition as claimed in any one of the preceding claims, wherein in stage (B), the epoxide resin has an epoxide equivalent weight of 170 to 500.

8. The composition as claimed in any one of the preceding claims, wherein, in stage (B), the bisphenol is bisphenol A.

9. The composition as claimed in any one of the preceding claims, wherein part of the components ( $a_1$ ) and/or ( $a_3$ ) has been composed of at least one polymeric fatty acid.

5 10. The composition as claimed in claim 9, wherein the polymeric fatty acid is dimeric fatty acid.

10 11. The composition as claimed in any one of the preceding claims, wherein the polyester obtained in stage (A) has been reacted with 0.3 to 1.5 equivalents per polyester molecule of a reaction product containing at least one epoxide group per molecule and formed from an epoxide resin based on a bisphenol having an epoxide equivalent weight of 170 to 1,000, and from a (cyclo)aliphatic monocarboxylic or polycarboxylic acid.

15 12. The composition as claimed in claim 11, wherein the polyester obtained in stage (A) has been reacted with 0.5 to 1.0 equivalents per polyester molecule of the reaction product.

20 13. The composition as claimed in claim 11 or claim 12, wherein the bisphenol is bisphenol A.

14. The composition as claimed in any one of claims 11 to 13, wherein the bisphenol has an epoxide equivalent weight of 170 to 500.

25 15. The composition as claimed in any one of claims 11 to 14, wherein the (cyclo)aliphatic monocarboxylic or polycarboxylic acid has a (cyclo)aliphatic structural element containing at least six C atoms.

30 16. The composition as claimed in one of the preceding claims, wherein the polyester obtained in stage (A) has been reacted with 0.3 to 1.5 equivalents



per polyester molecule of a reaction product containing at least one epoxide group per molecule and formed from an epoxide resin based on a bisphenol having an epoxide equivalent weight of 170 to 1,000, and from a  
5 (cyclo)aliphatic monocarboxylic or polycarboxylic acid having a (cyclo)aliphatic structural element containing at least eighteen C atoms.

17. The composition as claimed in claim 16, wherein the polyester obtained in stage (A) has been reacted  
10 with 0.5 to 1.0 equivalents per polyester molecule of the reaction product.

18. The composition as claimed in claim 16 or claim 17, wherein the bisphenol is bisphenol A.

19. The composition as claimed in any one of claims  
15 16 to 18, wherein the bisphenol has an epoxide equivalent weight of 170 to 500.

20. The composition as claimed in any one of claims 16 to 19, wherein the (cyclo)aliphatic monocarboxylic or polycarboxylic acid is a polymeric fatty acid.

21. The composition as claimed in any one of claims  
20 16 to 19, wherein the (cyclo)aliphatic monocarboxylic or polycarboxylic acid is a dimeric fatty acid.

DATED THIS 30TH DAY OF NOVEMBER 1990

BASF LACKE and FARBEN  
By Its Patent Attorneys:

GRIFFITH HACK & CO.  
Fellows Institute of Patent  
Attorneys of Australia.



# INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 87/00624

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| <b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                 |
| According to International Patent Classification (IPC) or to both National Classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                |                                                                                 |
| Int.Cl. <sup>4</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | C09D 3/58                                                                                                      |                                                                                 |
| <b>II. FIELDS SEARCHED</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                |                                                                                 |
| Minimum Documentation Searched <sup>7</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                |                                                                                 |
| Classification System                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Classification Symbols                                                                                         |                                                                                 |
| Int.Cl. <sup>4</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | C09D;C08L;C08G                                                                                                 |                                                                                 |
| Documentation Searched other than Minimum Documentation<br>to the extent that such Documents are included in the Fields Searched *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                |                                                                                 |
| <b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                |                                                                                 |
| Category *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup> | Relevant to Claim No. <sup>13</sup>                                             |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | EP, A, 0077023 (HOECHST)<br>20 April 1983<br>see claims 1-10; page 9, lines 19 -<br>page 10, line 19<br>--     | 1-4                                                                             |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | FR, A, 2377434 (SOCIETA ITALIANA RESINE)<br>11 August 1978<br>see claims 1-10<br>--                            | 1-4                                                                             |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | FR, A, 2309596 (U.C.B.)<br>26 November 1976<br>see claims 1-16<br>--                                           | 1-4                                                                             |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | US, A, 3749758 (J.A. GANNON)<br>31 July 1973<br>see claims 1-4<br>-----                                        | 1                                                                               |
| <p>* Special categories of cited documents; <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the International filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the International filing date but later than the priority date claimed</p> <p>"T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> |                                                                                                                |                                                                                 |
| <b>IV. CERTIFICATION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                |                                                                                 |
| Date of the Actual Completion of the International Search<br>24 February 1988 (24.02.88)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                | Date of Mailing of this International Search Report<br>22 March 1988 (22.03.88) |
| International Searching Authority<br>European Patent Office                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                | Signature of Authorized Officer                                                 |

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

EP 8700624  
SA 19550

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 08/03/88. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
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# INTERNATIONALER RECHERCHENBERICHT

Internationales Aktenzeichen PCT/EP 87/00624

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                          |                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| <b>I. KLASSIFIKATION DES ANMELDUNGSGEGENSTANDS</b> (bei mehreren Klassifikationssymbolen sind alle anzugeben) <sup>6</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                          |                                                    |
| Nach der Internationalen Patentklassifikation (IPC) oder nach der nationalen Klassifikation und der IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                          |                                                    |
| Int. Cl. 4 C 09 D 3/58                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                          |                                                    |
| <b>II. RECHERCHIERTE SACHGEBIETE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                          |                                                    |
| Recherchierter Mindestprüfstoff <sup>7</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                          |                                                    |
| Klassifikationssystem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Klassifikationssymbole                                                                                                   |                                                    |
| Int. Cl. 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | C 09 D; C 08 L; C 08 G                                                                                                   |                                                    |
| Recherchierte nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Sachgebiete fallen <sup>8</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                          |                                                    |
| <b>III. EINSCHLÄGIGE VERÖFFENTLICHUNGEN<sup>9</sup></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                          |                                                    |
| Art*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Kennzeichnung der Veröffentlichung <sup>11</sup> , soweit erforderlich unter Angabe der maßgeblichen Teile <sup>12</sup> | Betr. Anspruch Nr. <sup>13</sup>                   |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | EP, A, 0077023 (HOECHST) 20. April 1983, siehe Patentansprüche 1-10; Seite 9, Zeile 19 - Seite 10, Zeile 19<br>--        | 1-4                                                |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | FR, A, 2377434 (SOCIETA ITALIANA RESINE) 11. August 1978, siehe Patentansprüche 1-10<br>--                               | 1-4                                                |
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| <p>* Besondere Kategorien von angegebenen Veröffentlichungen<sup>10</sup>:</p> <p>"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist</p> <p>"E" älteres Dokument, das jedoch erst am oder nach dem internationalen Anmeldedatum veröffentlicht worden ist</p> <p>"L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)</p> <p>"O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht</p> <p>"P" Veröffentlichung, die vor dem internationalen Anmeldedatum, aber nach dem beanspruchten Prioritätsdatum veröffentlicht worden ist</p> <p>"T" Spätere Veröffentlichung, die nach dem internationalen Anmeldedatum oder dem Prioritätsdatum veröffentlicht worden ist und mit der Anmeldung nicht kollidiert, sondern nur zum Verständnis des der Erfindung zugrundeliegenden Prinzips oder der ihr zugrundeliegenden Theorie angegeben ist</p> <p>"X" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden</p> <p>"Y" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als auf erfinderischer Tätigkeit beruhend betrachtet werden, wenn die Veröffentlichung mit einer oder mehreren anderen Veröffentlichungen dieser Kategorie in Verbindung gebracht wird und diese Verbindung für einen Fachmann naheliegend ist</p> <p>"G" Veröffentlichung, die Mitglied derselben Patentfamilie ist</p> |                                                                                                                          |                                                    |
| <b>IV. BESCHEINIGUNG</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                          |                                                    |
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**ANHANG ZUM INTERNATIONALEN RECHERCHENBERICHT  
ÜBER DIE INTERNATIONALE PATENTANMELDUNG NR.**

EP 8700624  
SA 19550

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben.  
Die Angaben über die Familienmitglieder entsprechen dem Stand der Datei des Europäischen Patentamts am 08/03/88  
Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

| Im Recherchenbericht<br>angeführtes Patentdokument | Datum der<br>Veröffentlichung | Mitglied(er) der<br>Patentfamilie | Datum der<br>Veröffentlichung |
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