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(C)  To Chairmen

**D E C I S I O N**  
of 15 November 1994

**Case Number:** T 0196/92 - 3.3.1

**Application Number:** 86101351.4

**Publication Number:** 0192113

**IPC:** C09D 5/44

**Language of the proceedings:** EN

**Title of invention:**

Cationic coating compositions for electrodeposition over rough steel

**Applicant:**

PPG INDUSTRIES, INC.

**Opponent:**

**Headword:**

Electrodepositable coating composition/PPG INDUSTRIES

**Relevant legal provisions:**

EPC Art. 123(2), 84, 83, 111(1)

**Keyword:**

"Content of references incorporated in claim"

"Clarity (yes, after amendment)"

"Sufficiency of disclosure (yes, after amendment)"

**Decisions cited:**

T 0006/84, T 0689/90

**Catchword:**



Case Number: T 0196/92 - 3.3.1

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.1  
of 15 November 1994

**Appellant:**

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**Representative:**

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**Decision under appeal:**

Decision of the Examining Division of the  
European Patent Office dated 21 September 1990  
refusing European patent application  
No. 86 101 351.4 pursuant to Article 97(1) EPC.

**Composition of the Board:**

**Chairman:** A. Jahn  
**Members:** P. P. Bracke  
R. E. Teschemacher

## Summary of Facts and Submissions

- I. This appeal, which was filed on 13 November 1990 (with letter of 12 November 1990), lies against the decision of the Examining Division posted 21 September 1990 refusing European patent application No. 86 101 351.4 filed on 3 February 1986 and published under the No. 0 192 113.

The appropriate appeal fee was paid on 14 November 1990 and a Statement of Grounds of Appeal was filed on 21 January 1991.

- II. The decision under appeal was based on the originally filed set of 13 claims, with Claim 1 reading

"1. An electrocoating composition comprising a cationic resin containing blocked polyisocyanate functionality, said electrocoating composition being characterized such that upon electrodeposition and heating to maximum flow, the incompletely cured coating has a profile of less than 0.160 microns, and upon heating to complete cure, the percentage cured film weight loss is less than 10, and the product of the profile and the square of the percentage cured film weight loss is less than 7.5."

The ground for the refusal was that the set of claims did not meet the requirement of clarity, because Claim 1 was merely characterised by three parameters defining the invention by a result to be achieved, namely the "profile", the "percentage cured film weight loss" and the "product of the profile and the square of the percentage cured film weight loss". Furthermore, it was found that the terms "heating to maximum flow" and "incompletely cured coating" were unclear and that additional features, which were said to be essential on

page 4, lines 12 to 21, namely the molecular weight of the electrocoating vehicle, the type of pigment grinding vehicle, the cross-linker and the molecular weight of its blocking agent and the pigment-to-binder weight ratio, were not specified in Claim 1.

Additionally, it was doubted whether the set of claims met the requirements of novelty and inventive step. However, these issues remained undecided.

III. With the Statement of Grounds of Appeal the Appellant filed a new set of claims, wherein the maximum molecular weight of the cationic resin, the molecular weight of the blocking agent and the pigment-to-resin weight ratio were specified.

IV. In response to remarks made (a) in the Annex to the summons to oral proceedings, which were held on 15 November 1994, and (b) to objections made by the Board under Articles 84 and 83 EPC during the oral proceedings, the Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 7 as submitted during the oral proceedings, with Claim 1 reading

"1. An electrodepositable aqueous coating composition comprising a cationic resin and a blocked polyisocyanate crosslinker as the film forming binder and pigment, dispersed in water characterized in that

(i) the cationic resin has amine salt groups or quaternary ammonium salt groups which are the acid-solubilized reaction products of polyepoxides and primary amines, secondary amines, tert. amines and mixtures thereof and has a weight average molecular weight as determined by gel permeation chromatography using a polystyrene standard of less than 100,000; and

that the cationic resin contains from 0.1 to 3.0 milliequivalents of cationic group per gram of resin solids,

(ii) the polyisocyanate is a mixture containing polymethylene polyphenylisocyanate and diphenylmethane-4,4'-diisocyanate and the blocking agents for the polyisocyanate having an average molecular weight of 76 or less and the amount of polyisocyanate present is so that there are 0.1 to 1.2 isocyanate groups for each active hydrogen of the cationic resin,

(iii) the pigment to resin weight ratio in the electrodepositable aqueous coating composition is less than 0.5:1 and the pigment is incorporated into the coating composition together with a grinding vehicle selected from

(A) a quaternary ammonium group-containing material which is obtained from reacting:

(i) a polyepoxide having a 1,2-epoxy equivalency greater than one, and

(ii) an amine containing at least one organic group which contains an acyclic moiety of 8 to 30 carbon atoms, or

(B) a quaternary ammonium group-containing material which is obtained by reacting:

(i) a 1,2-epoxy-containing material with

(ii) an amine containing an organic group which contains an acyclic moiety of at least 8 carbon atoms, and also containing a group of the structure  $-\text{CO.N}(\text{R}_1)-$  where  $\text{R}_1$  is hydrogen or lower alkyl containing 1 to 4 carbon atoms, or

(C) a quaternary ammonium group-containing material which is obtained from reacting:

(1) a monoepoxide, and

(2) an amine containing at least one organic group which contains an acyclic moiety of from about 8 to 30 carbon atoms,

(iv) the percentage cured film weight loss of the resultant electrodeposited coating during cross-linking is less than 10 and

(v) the surface profile of the uncured coating when heated to maximum flow over a rough steel substrate (having a profile from 1.52 to 1.78  $\mu\text{m}$ ) is less than 0.160  $\mu\text{m}$  and the product of the surface profile and the square of the percentage of the cured film weight loss is less than 7.5."

V. At the conclusion of the oral proceedings, the Board's decision to allow the appeal was pronounced.

#### Reasons for the Decision

1. The appeal is admissible.
2. *Amendments*
  - 2.1 The amendments in the preamble are supported by the originally filed application which mentions on page 14, line 35, and page 16, lines 16 and 17, that the claimed electrodepositable coating compositions are dispersed in aqueous medium, and on page 8, lines 23 to 26 and 30 to 32, in combination with page 12, lines 31 and 32, and page 15 lines 7 to 9, that the claimed compositions comprise a cationic resin and a polyisocyanate cross-linking agent as film forming binder and a pigment.
  - 2.2 The chemical structure of the cationic resins was described in the originally filed application on page 8, lines 27 to 30, and their molecular weight and the number of cationic groups were mentioned on page 12, lines 22 to 30.

2.3 The polyisocyanate mixture and the molecular weight of the blocking agent were described in original Claims 2 and 4 and the number of available isocyanate groups was described on page 14, lines 6 to 9.

2.4 The pigment-to-resin weight ratio and the incorporation of the pigment into the coating composition with a grinding vehicle were mentioned on page 15, lines 9 to 12 and lines 27 to 29, of the originally filed application.

The definitions (A), (B) and (C) of the pigment grinding vehicle correspond with the wording of the main claim of any one of the documents EP-A-0 107 089, EP-A-0 107 098 and EP-A-0 107 088 respectively, which documents were cited in the originally filed application on page 15, lines 18 to 20.

The pigment grinding vehicles were not specifically described in the description but were only referred to by reference to those documents which were publicly available at the priority date, and consequently also at the publication date of the present application. In those documents the chemical nature of the pigment grinding vehicles was precisely described and in the present application it was specifically said that the pigments are incorporated into the claimed compositions in the form of a paste, that the pigment paste may be prepared by grinding a pigment into a grinding vehicle and that suitable pigment grinding vehicles are those described in the above mentioned published European patent applications.

In the Board's judgement the information on the grinding vehicles provided by any of those documents is part of the teaching of the present description, and consequently the insertion of the definition of these

grinding vehicles as defined in the main claims of any of those documents into the wording of present Claim 1 cannot be considered as the addition of subject-matter extending beyond the content of the application as filed.

This position is in agreement with a previous decision of this Board (see T 6/84, OJ EPO, 1985, 238-241), wherein it was decided that structural features not mentioned in the application documents themselves but in a document to which they refer may be incorporated into the patent claim if they unequivocally form part of the invention for which protection is sought and if all the essential structural features which belong together, as disclosed in such document, are incorporated into the claim. Moreover, this position was confirmed in decision T 689/90 (OJ EPO, 1993, 616-629), wherein it was further specified that features mentioned only in a cross-referenced document may be incorporated into the wording of a claim if the invention as filed leaves no doubt that such features contribute to achieve the technical aim of the invention and if such features are precisely defined and identifiable within the total technical information within the reference document. Also these requirements are fulfilled in the present case because it is clear from the application as originally filed that not any grinding vehicle can be used for the present invention and that the use of the vehicles specifically referred to leads to products which exhibit the desired properties.

- 2.5 The percentage cured film weight loss of the resultant electrodeposited coating occurring during cross-linking was described on page 6, lines 30 to 32, and page 7, line 2 to 6.



The surface profile of the uncured coating on a rough steel substrate and its product with the square of the percentage of the cured film weight loss was described in original Claim 1 and page 4, lines 31 and 32, and page 5, lines 9 and 10, specifying that the surface profile is measured of the uncured coating on a rough steel substrate.

2.6 Claims 2, 4, 5 and 6 correspond with original Claims 3, 6, 9 and 7 respectively, the non-volatile plasticizers and their amounts specified in Claim 3 and the film thickness of the cured film specified in Claim 7 were described in the originally filed application on page 16, lines 10 and 11, in combination with page 4, line 18 and page 15, lines 1 to 5 respectively.

2.7 Consequently, the Board concludes that the requirements of Article 123(2) EPC are fulfilled.

3. *Article 84 EPC*

3.1 The present version of Claim 1 specifies the nature and the upper limit of the molecular weight of the cationic resin. The cross-linker is restricted to a specific mixture of blocked isocyanates wherein the blocking agent for the isocyanates has been further specified by the upper limit of its molecular weight, the pigment-to-binder weight ratio is confined to less than 0.5:1 and the claimed coating compositions have been limited by the fact that the pigment is incorporated in the composition together with specific types of grinding vehicles. The main ground of refusal, namely that essential features mentioned on page 4 of the description were not specified in the main claim is removed by these amendments.

3.2 The further references to the presence of specific amine- or quaternary ammonium salts in the cationic resin, the number of cationic groups per gram of resin solids, the number of polyisocyanate groups per active hydrogen of the cationic resin and the requirement that the pigment grinding vehicle is selected from a well-defined group of grinding vehicles are considered to positively influence the clarity of Claim 1.

From a comparison of example 1 (present application) with example 8 (comparison) it is evident that the desired results of surface profile of the uncured coating and percentage weight loss of the cured film as defined in features (iv) and (v) can only be obtained by using a pigment grinding vehicle of the type as specified in Claim 1 under (A), (B) and (C).

3.3 The Board is satisfied that the weight loss as defined in (iv) of Claim 1 is governed by the low molecular weight of the blocking agent. The Board is also satisfied that the detailed and precise definition of the technical features (i) to (iii) safeguard that the result specified in (v) of Claim 1 is achieved on a regular basis. Should the features (i) to (iii), for certain alternatives, be deficient in defining the subject-matter of Claim 1, the functional parameters under (iv) and (v) would additionally determine the matter for which protection is sought in the sense of Article 84 EPC.

Since it is well explained in the description how the surface profile of the uncured coating when heated to maximum flow over a rough steel substrate and the percentage weight loss of the cured film can be determined (see page 4, line 22 to page 7, line 6), thus enabling a skilled man to verify whether an electrodepositable coating composition is embraced

within the scope of the invention, in the Board's finding these functional parameters are not contrary to the requirement of clarity.

Moreover, it cannot be seen how the properties of the coating compositions meeting the requirements according to these functionally defined parameters could have been defined in a more precise way.

- 3.4 Consequently, the Board concludes that Claim 1 meets the requirements of Article 84 EPC, in particular, those of clarity and of support by the description. However, the word "about", which was inadvertently left in under item (C) (2) of Claim 1 should be deleted.

4. *Article 83 EPC*

During appeal proceedings the Board raised the question of sufficiency of disclosure, which had already been touched in the decision of the Examining Division in the considerations concerning Article 84 EPC (see the first paragraph of page 3).

It is the essence of the invention to provide coating compositions which are electrodepositable on metal surfaces and which form smooth surfaces after curing at elevated temperature even on rough surfaces. Features (iv) and (v) of Claim 1 define conditions which materialize only in the course of the processing of a coating composition. For an invention to be disclosed sufficiently clear and complete, it is necessary that the disclosure in the specification gives enough information to the person skilled in the art to practice the invention. If a general teaching comprises alternatives by which the desired effect is not achieved, it is necessary that the disclosure provides information how to select operable alternatives over the

whole claimed range with a reasonable expectation of success. This means for the present application that the skilled person must be able to obtain the promised result without undue burden by selecting the ingredients of the composition in such a way that a small surface profile of the uncured coating and a low percentage cured film weight loss is obtained and that the product of the surface profile with the square of the percentage weight loss is less than 7.5.

With the definition of the three structural features (i) to (iii) of the main claim as specified in appeal proceedings the Board has no more reason to doubt that the patent application provides sufficient technical information and guidance to select over the claimed ranges without undue difficulty the ingredients necessary to prepare compositions, which, with a reasonable chance of success, would result in coatings meeting the requirements according to the functional parameters described in items (iv) and (v) of Claim 1.

Consequently, the Board concludes that also the requirement of Article 83 EPC is met.

5. The ground for refusing the patent application by the Examining Division, namely lack of clarity, has been removed during the appeal procedure. Since novelty and inventive step of the application have not yet been decided by the first instance, the Board finds it appropriate to exercise its power under Article 111 (1) EPC and to remit the case to the Examining Division for further prosecution.

**Order**

**For these reasons it is decided that:**

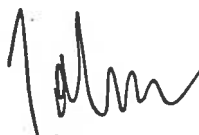
1. The decision under appeal is set aside.
2. The case is remitted to the first instance for further prosecution on the basis of Claims 1 to 7 as submitted during oral proceedings.

The Registrar:



E. Görgmaier

The Chairman:



A. Jahn