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**Datasheet for the decision
of 14 September 2006**

Case Number: T 0223/04 - 3.3.01

Application Number: 97929301.6

Publication Number: 0935642

IPC: C09D 201/06

Language of the proceedings: EN

Title of invention:
Heat-hardenable paint compositions

Patentees
BASF Coatings AG, et al

Opponent:
PPG Industries, Inc.

Headword:
Heat-hardenable paint compositions/BASF

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no): comparative examples - no comparison
with the closest prior art - obvious solution"

Decisions cited:
-

Catchword:
-



Case Number: T 0223/04 - 3.3.01

D E C I S I O N
of the Technical Board of Appeal 3.3.01
of 14 September 2006

Appellants:

(Patent Proprietors)

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Respondent:

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 30 December 2003
revoking European patent No. 0935642 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: A. J. Nuss
Members: C. M. Radke
J. Van Moer

Summary of Facts and Submissions

- I. The Appellants (Proprietors of the patent) lodged an appeal on 10 February 2004 against the decision of the opposition division posted on 30 December 2003 by which European patent no. 0 935 642 was revoked. On 7 May 2004 he filed a written statement setting out the grounds for appeal.
- II. The decision under appeal was based on claims 1 and 2 as granted which read as follows:

"1. Heat-hardenable paint composition which contains (A) polyol which has in each molecule two or more sterically protected secondary hydroxyl groups, being a polyol obtained by means of an esterification reaction of an epoxy group containing compound (A1) which has one epoxy group and which does not have a polymerizable unsaturated bond and a carboxyl group containing compound (A2) which has two or more carboxyl groups; and (B) 1,3,5-triazine-2,4,6-tris-carbamic acid ester which can be represented by general formula (1) indicated below, or an oligomer thereof, wherein the mol ratio secondary hydroxyl groups originating from the aforementioned (A) component : HNCOOR groups originating from the aforementioned (B) component in the composition is from 1 : 3 to 3 : 1, and the general formula (1) is



wherein R represents an alkyl group which has from 1 to 20 carbon atoms, an aryl group which has from 6 to 20 carbon atoms or an aralkyl group which has from 7 to 20

carbon atoms, and these groups may be the same or different.

2. Heat-hardenable paint composition which contains (A) polyol which has in each molecule two or more sterically protected secondary hydroxyl groups, being a polyol obtained by means of an esterification reaction of an epoxy group containing compound (A1) which has one epoxy group and which does not have a polymerizable unsaturated bond and a carboxyl group containing compound (A2) which has two or more carboxyl groups; (B) 1,3,5-triazine-2,4,6-tris-carbamic acid ester which can be represented by general formula (1) indicated below, or an oligomer thereof; and (C) acrylic polyol which has primary hydroxyl groups, wherein the mol ratio secondary hydroxyl groups originating from the aforementioned (A) component : hydroxyl groups originating from the aforementioned (C) component in the composition is from 100 : 0 to 100 : 100, and the mol ratio of all the hydroxyl groups originating from the aforementioned (A) and (C) components : HNCOOR groups originating from the aforementioned (B) component in the composition is from 1 : 3 to 3 : 1, and the general formula (1) is



wherein R represents an alkyl group which has from 1 to 20 carbon atoms, an aryl group which has from 6 to 20 carbon atoms or an aralkyl group which has from 7 to 20 carbon atoms, and these groups may be the same or different."

III. The following documents were cited during opposition and/or appeal proceedings:

(D1) US-A-3 549 583

(D2) US-A-5 180 773

(D3) US-A-5 216 078

(D4) EP-A-0 604 922 .

IV. The Opposition Division was of the opinion that the subject-matter of the claims as granted was not based on an inventive step in view of documents (D1) and (D4).

Document (D1) was considered to represent the closest prior art; it did not teach to employ a 1,3,5-triazine-2,4,6-tris-carbamic acid ester as the crosslinking agent but a polyisocyanate. The Opposition Division was of the opinion that the problem solved in view of (D1) was to improve the resistance against yellowing on baking. It deemed that the solution of this problem by using a 1,3,5-triazine-2,4,6-tris-carbamic acid ester as the crosslinking agent was obvious in view of (D4) as this document taught that such an ester improved the yellowing overbake resistance of resin films based on crosslinked polyols.

V. Oral proceedings before the Board were held on 14 September 2006.

VI. The Appellants considered document (D1) as the closest prior art. He argued that the objective technical problem solved by the subject-matter claimed was to provide heat-hardenable paint compositions forming films having good acid resistance, accelerated weathering and heat resistance, while achieving under

severe overbaking conditions a good yellowing resistance without loss of impact resistance. Document (D4) gave no indication as to the solution of this problem; on the contrary, (D4) taught that the use of triazine tricarbonates led to yellowing at high baking temperatures (see (D4), page 2, lines 10 and 11). Document (D4) solved this problem by employing an acid catalyst which allowed to lower the baking temperature (see (D4), page 2, lines 38-41).

The comparative tests described in the patent in suit, so he argued, showed that this problem was solved. He considered the blocked isocyanate employed in comparative example 2 of the patent in suit (namely Desmodur[®] BL-3175) to be comparable with the one used in the examples of document (D1) (i.e. with Desmodur[®] N-75). While admitting that Desmodur[®] N-75 had free isocyanate groups, he claimed that its remaining isocyanate groups were blocked. Consequently, he argued, both Desmodur[®] BL-3175 and Desmodur[®] N-75 were blocked isocyanates. As document (D3) stated that aliphated isocyanates only gave rise to significant yellowing if they were blocked, he concluded that both the isocyanate used in comparative example 2 of the patent in suit and the one employed in the examples of document (D1) were comparable in their tendency to cause yellowing. Therefore, he concluded, comparative example 2 of the patent in suit allowed for a proper comparison with document (D1) as the closest prior art.

The Appellants further submitted that different binders were employed in documents (D1) and (D4) and that different crosslinking agents were used. Moreover, the overbaking conditions in (D4) were considerably milder

than those used in the examples of the patent in suit; document (D4) required the use of an acid catalyst which the patent in suit did not, as was evident from the examples of the patent in suit.

Hence, the person skilled in the art would not have consulted document (D4) when trying to solve the problem mentioned above.

Moreover, the Appellants were of the opinion that the person skilled in the art would not have taken into account the comparative tests described in example 7 of document (D4) since an amino resin crosslinking agent and an acid catalyst were employed therein and the baking temperatures were lower than those used in the examples of the patent in suit.

VII. The Respondent also considered document (D1) to represent the closest prior art.

He deemed that the comparative tests described in the patent in suit did not allow for a proper comparison with document (D1) as the isocyanates used in the examples of (D1) were clearly unblocked while a blocked isocyanate was employed in comparative example 2 of the patent in suit.

He emphasized that not only document (D4) but also the patent in suit mentioned the use of amino resins crosslinking agents (see paragraph [0040]) and acid crosslinking catalysts (see paragraph [0041]).

He argued that document (D4) taught the skilled person that the triazine triscarbamate crosslinker was

responsible for achieving a high yellowing on baking resistance. In addition to that, the comparative tests in example 7 of document (D4) showed that the partial replacement of the amino resin by the triazine triscarbamate crosslinker gave rise to superior acid etch resistance. Taking into account that triazine tris carbamates are capped polyisocyanates, the expert would have replaced the polyisocyanate crosslinker disclosed in document (D1) by the triazine triscarbamate disclosed in document (D4) in order to solve the problem posed.

VIII. The Appellants requested to set aside the decision under appeal and to maintain the patent as granted.

The Respondent requested that the appeal be dismissed.

IX. At the end of the oral proceedings the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.
2. *Novelty*

In the decision under appeal novelty of the claimed subject-matter was acknowledged (see point 2 of the reasons). This finding was not contested by the parties during appeal (see, e.g. point 3 of Respondent's letter dated 13 July 2004). The Board agrees with this finding. In view of the outcome of this appeal there is no need to give detailed reasons for this.

3. *Inventive step*

3.1 The Board agrees with the opposition division and the parties that document (D1) is to be considered to represent the closest prior art (see points IV, VII and VIII above).

This document relates to heat-curable coatings for, *inter alia*, metal, in particular steel panels (see column 4, line 72 to column 5, line 7 and column 7, lines 13-21). The coating compositions used in the examples of document (D1) contain a polyol which falls under the definition of polyol (A) in claims 1 and 2 of the patent in suit (see (D1), column 5, lines 11-29 and Table 1).

3.2 The problem addressed in the patent in suit was "to provide heat-hardenable paint compositions with which paint films which have excellent acid resistance, weather resistance, heat resistance and yellowing resistance can be formed" (see paragraph [0007] of the patent in suit).

3.3 When assessing which problem is indeed to be solved in view of document (D1) starting from the problem addressed in the patent in suit, it is required to assess to which extent this problem reflects what is realistically achieved in view of (D1). In the course of this assessment it is to be determined if the comparative tests in the patent in suit allow for a proper comparison of the subject-matter claimed in the patent in suit with the teaching of (D1). In that context it is relevant to note that comparative example 2 of the patent in suit employs a blocked

aliphatic isocyanate as the crosslinking agent (see footnote 5 under Table 2 on page 8 of the patent in suit). It was undisputed that the isocyanate used in the examples of document (D1) contains unblocked isocyanate groups. Hence the isocyanate employed in comparative example 2 of the patent in suit differs in chemical structure from the one used in the examples of document (D1). In view of that, the Board cannot exclude that this difference in structure has an effect on the properties of the coatings crosslinked by these isocyanates. This is the more the case as it is stated in document (D3) that blocked aliphatic isocyanates give rise to significant yellowing during crosslinking whereas unblocked aliphatic isocyanates do not (see column 1, lines 53-58). The Board thus concludes that comparative example 2 of the patent in suit cannot form a basis for a proper comparison between the teaching of document (D1) as the closest prior art and the subject-matter claimed in the patent in suit.

Hence, the objective problem to be solved in view of document (D1) can only be as to provide alternative heat hardenable paint compositions from which films may be formed having excellent acid resistance, weather resistance, heat resistance and yellowing resistance.

As a solution to this problem, the patent in suit proposes a heat-hardenable paint composition as defined in claim 1 (see point II).

- 3.4 In view of the description, in particular the results in Table 3 of the patent in suit, the Board is satisfied that the problem as stated above is indeed

solved within the whole claimed area - which was never contested.

- 3.5 When trying to solve that problem, the person skilled in the art would have consulted document (D4) because this document not only concerns coatings for metal, namely automobile coatings, but also addresses the problems of acid resistance, weather resistance, heat resistance and yellowing resistance of such coatings. In particular, the experimental results in example 7 of document (D4) show that the acid etch resistance is improved if the crosslinking agent is partly replaced by 2,4,6-tris-(butoxycarbonylamino)-1,3,5-triazine (see Tables 8 and 9) and those in example 6 show that this replacement has no significant influence on the Yellow Index after heating (see Table 7). Moreover, the results in Table 4 of its example 4 demonstrate that the Yellow Index after weathering is slightly improved (i.e. in that it is more negative) if the amino resin crosslinking agent is partially replaced of by said triazine derivative.

Consequently, these results would have prompted the person skilled in the art in charge of solving the problem mentioned above to modify the compositions disclosed in document (D1) by replacing the isocyanate crosslinking agent by the triazine crosslinking agent disclosed in document (D4), namely by 2,4,6-tris-(butoxycarbonylamino)-1,3,5-triazine.

Once the person skilled in the art had selected the triazine derivative disclosed in document (D4) as a crosslinking agent, he would have to determine in which

relative amount it should be employed in the heat-hardenable coating compositions.

According to point 3 of the reasons of the decision under appeal, the skilled person would have realised that the triazine triscarbamate crosslinking agents disclosed in document (D4) were capped polyisocyanates and thus crosslinked the polyol by the same mechanism as the polyisocyanates employed in document (D1). Therefore, the skilled person would employ the triazine tris-carbamates in the relative amounts required in document (D1), namely in a molar ratio of hydroxyl groups of the polyol to groups of the formula HNCOOR of the triazine tris-carbamate ranging from 1:5 to 5:1 (see claim 1 of (D1)).

The Board agrees with this conclusion which remained uncontested by the parties during the appeal proceedings.

To solve the problem mentioned above, the skilled person would still have to determine the effective ratio of hydroxyl groups to groups of the formula HNCOOR within the wide range offered in (D1). As document (D1) does not indicate preferred ranges or values for said ratio, the skilled person would not ignore what is stated in document (D4), namely that it is desirable to crosslink at least one half of the hydroxy functionalities present in the polyol in order to "obtain coatings of good physical and resistance properties. It is preferred, however, that the mole ratio of the hydroxy groups to the sum of the crosslinking effective functionalities ... is in the

range of from 0.8:1 to 1.2:1." (see (D4), page 6, lines 49-54).

Consequently, the person skilled in the art in charge of providing alternative heat hardenable paint compositions from which films may be formed having excellent acid resistance, weather resistance, heat resistance and yellowing resistance would therefore modify the coating compositions disclosed in document (D1) by replacing the polyisocyanate crosslinking agents used there by the triazine tris-carbamates disclosed in document (D4), namely 2,4,6-tris-(butoxycarbonylamino)-1,3,5-triazine, in an amount so that the molar ratio of the hydroxyl groups of the polyol to the groups of the formula NHCOOR are in the range of from 0.8 : 1 to 1.2 : 1.

When doing this, he is directed towards a solution which is now object of claim 1 of the patent in suit. Therefore, the argument of the Appellants that the person skilled in the art would not have consulted document (D4), are not convincing (see point VII above). This is all the more true since acid catalysts which are mandatory according to claim 1 of document (D4) are also among those preferred in the patent in suit (see lines 4-6 of paragraph [0041]). Moreover, although not mandatory, the use of the amino resin crosslinking agent in many of the examples of document (D4) (see in particular claim 1 and example 2) is also recommended in the patent in suit (see page 5, line 19). Finally, the argument of the Appellants that the paint compositions in the examples of the patent in suit are heated under more severe conditions than required in (D4) is not relevant in the present

context; the subject-matter of claim 1 of the patent in suit does not specify a particular heating temperature or regime.

For all these reasons, the subject-matter of claim 1 of the patent in suit is not based on an inventive step.

3.6 Hence, the sole request of the Appellants is rejected.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

N. Maslin

A. J. Nuss