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**Datasheet for the decision
of 31 May 2022**

Case Number: T 1597/19 - 3.3.02

Application Number: 09718043.4

Publication Number: 2247677

IPC: C09D127/12, C09D163/00,
C09D175/02, C09D175/04,
F03D1/00

Language of the proceedings: EN

Title of invention:
COMPOSITES COMPRISING A MULTI-LAYER COATING SYSTEM

Patent Proprietor:
PPG Industries Ohio, Inc.

Opponent:
Akzo Nobel Coatings International B.V.

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (yes)

Decisions cited:

Catchword:



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Case Number: T 1597/19 - 3.3.02

D E C I S I O N
of Technical Board of Appeal 3.3.02
of 31 May 2022

Appellant: Akzo Nobel Coatings International B.V.
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Representative: Akzo Nobel IP Department
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Respondent: PPG Industries Ohio, Inc.
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 15 April 2019
rejecting the opposition filed against European
patent No. 2247677 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman M. O. Müller
Members: M. Maremonti
L. Bühler

Summary of Facts and Submissions

- I. The appeal by the opponent ("appellant") lies from the decision of the opposition division to reject the opposition against European patent No. 2 247 677 ("the patent").
- II. Independent claim 1 of the patent as granted recites as follows:
- "1. A composite comprising a multi-layer coating system applied to at least a portion thereof, comprising:*
- (1) a first coating layer deposited from a primer composition;*
- (2) a topcoat composition applied over at least a portion of the first coating layer in which the topcoat is deposited from*
- (2A) a film-forming composition comprising a fluorinated acrylic polymer; or*
- (2B) a film-forming composition comprising:*
- (a) a functional component comprising hydroxyl and/or amine groups wherein the functional component is selected from an acrylic polymer, a polyester polymer, a polyurethane polymer, a polyurea polymer and/or a polyether polymer; and*
- (b) a curing agent comprising isocyanate and/or anhydride functional groups;*
- and when the curing agent comprises isocyanate, the ratio of isocyanate to hydroxyl and/or amine groups is >1:1 and wherein the composite comprises a matrix material and a reinforcement material."*

Claims 2 to 11 define embodiments of the composite of claim 1. Claim 12 is directed to a method of repairing a wind blade by using a coating system as defined in claim 1. Claims 13 and 14 are directed to a method of coating a composite by using a coating system as defined in claim 1.

III. The opposition had been filed on the grounds under Article 100(a), (b) and (c) EPC. The following documents cited, *inter alia*, during the opposition proceedings, are referred to in this decision:

D1: WO 2006/076724 A2

D2: DOE/NASA/0131-1 NASA CR-167987, *Design and Fabrication of Composite Blades for Mod-1 Wind Turbine Generator*, November 1981

D3: MIL-P-23377F

D4: MIL-C-83286B

D6: WO 2006/055038 A1

D10: *Organic Coatings, Science and Technology*, 1999, pages 193 to 195

D11: US 2007/0190257 A1

IV. The opposition division came to, *inter alia*, the conclusion that:

- the claimed subject-matter involved an inventive step in view of document D2 taken as the closest prior art.

V. In its statement of grounds of appeal, the appellant contested the reasoning of the opposition division and argued that the claimed subject-matter lacked inventive step.

VI. In its reply to the statement of grounds of appeal, the patentee ("respondent") rebutted the appellant's objections. It corroborated its arguments by relying on the following newly filed items of evidence:

A018: Test Report

A019: LT255 Product Datasheet

A020: CRE-X21 Series Primers Datasheet

VII. On 25 September 2020, Hoffmann Eitle S.L.U. filed third-party observations. Since the appellant did not refer to these observations in the appeal proceedings, there is no reason for the board to consider these observations in the present decision.

VIII. The parties were summoned to oral proceedings in accordance with their requests. In preparation for the oral proceedings, the board issued a communication pursuant to Article 15(1) RPBA 2020 in which it expressed its preliminary opinion that the claimed subject-matter involved an inventive step in view of either D2 or D6 taken as the closest prior art.

IX. In a subsequent communication, the board informed the parties that the oral proceedings would be held by videoconference.

X. Oral proceedings before the board were held on 31 May 2022 by videoconference.

XI. Final requests relevant to the present decision

The appellant requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

The respondent requested that the appeal be dismissed and that the patent be maintained as granted (main request).

XII. The appellant's submissions relevant to the present decision are summarised as follows. Further details are given in the reasons below.

- The subject-matter of claim 1, in so far as alternative (2B) for the topcoat composition was considered, did not involve an inventive step in view of either D2 or D6 taken as the closest prior art.

XIII. The respondent's submissions relevant to the present decision are summarised as follows.

- The subject-matter of claim 1 differed from the composites disclosed in documents D2 or D6 at least in that the ratio of isocyanate to hydroxyl groups in the topcoat composition was required to be higher than 1:1.
- The examples of the patent demonstrated that this distinguishing feature allowed improving the rain erosion performance of the coating.
- Therefore, the objective technical problem was to provide composites comprising a multi-layer coating system with improved rain erosion performance.
- Neither D10 nor D11 prompted the skilled person to select a ratio falling within the claimed range when aiming to improve the rain erosion performance. D10 taught to use ratios higher than 1:1, but only to improve properties not linked to the coating's resistance to rain erosion. Furthermore, no "one-way street situation" existed which could have justified considering the improved rain erosion performance shown in the patent as a mere bonus effect. Moreover, document D11 showed that coatings with ratios lower than 1:1 were also used.

- Thus, it had to be concluded that the subject-matter of claim 1 as granted involved an inventive step.

Reasons for the Decision

Main request - the patent as granted - ground for opposition under Article 100(a) EPC - inventive step under Article 56 EPC

1. Claim 1 as granted (wording under point II above) covers several alternative composites. The appellant only attacked the alternative of a *"composite comprising a multi-layer coating system applied to at least a portion thereof, comprising:*
 - (1) a first coating layer deposited from a primer composition;*
 - (2) a topcoat composition applied over at least a portion of the first coating layer in which the topcoat is deposited from*
 - (2B) a film-forming composition comprising:*
 - (a) a functional component comprising hydroxyl and/or amine groups wherein the functional component is selected from an acrylic polymer, a polyester polymer, a polyurethane polymer, a polyurea polymer and/or a polyether polymer; and*
 - (b) a curing agent comprising isocyanate functional groups; [wherein]*
- the ratio of isocyanate to hydroxyl and/or amine groups is >1:1 and wherein the composite comprises a matrix material and a reinforcement material"* (text in square brackets added by the board).

2. Document D2 as the closest prior art

2.1 In line with the appealed decision (page 8, point 7.2), both parties indicated document D2 as a possible starting point for the assessment of inventive step. In view of the issues addressed and the coating system disclosed, the board sees no reasons to take another stance.

2.2 D2 (page 6, point 3.2; page 8, point 3.3; figure 4 on page 54) discloses a multi-layer coating system applied to wind blades made of reinforced composite material. The coating system is defined in D2 (page 12, point 3.8) as consisting of one coat of MIL-P-2337 epoxy primer and a mist/full coat of MIL-C-83286 urethane in white. The epoxy primer MIL-P-2337 is defined in D3 as comprising an epoxy resin and a polyamide or amine resin as the curing agent (D3, page 5, point 3.4). The epoxy primer of D2 thus corresponds to the first coating layer (1) of claim 1. The coat MIL-C-83286 is defined in D4 as consisting of a polyester resin and an aliphatic isocyanate (D4, page 5, point 3.5). The polyester resin must contain hydroxyl groups since otherwise no reaction with the isocyanate would be possible. Hence, the polyester resin corresponds to component (2B) (a) and the aliphatic isocyanate to component (2B) (b) of claim 1.

3. Distinguishing features

It was common ground that the subject-matter of claim 1 (when alternative (2B) for the topcoat composition is considered) differs from the coated composite of D2 in that the ratio of isocyanate (coming from the aliphatic isocyanate of D2) to hydroxyl groups (coming from the polyester resin of D2) (NCO:OH ratio in the following) is greater than 1:1. This ratio is not specified in D2 or D4.

4. Objective technical problem

4.1 The appellant referred to the examples reported in the patent, which were directed to show improved rain erosion performance of the tested composites as deriving from the claimed NCO:OH ratio. It argued that no comparison with the composite of D2 was possible since D2 was silent on the used NCO:OH ratio. Moreover, the examples of the patent could not demonstrate any improvement of the claimed coating system for rain erosion performance, let alone an improvement associated with the claimed NCO:OH ratio. It could not be ruled out that other differences, especially in the film thickness, contributed to the trends of the rain erosion performance observed in the reported results. The appellant pointed to paragraph [0081] of the patent, according to which only a broad range of possible film thicknesses was disclosed, going from 76.2 to 254 microns. The thickness used in the experiments assessing the rain erosion performance was not stated in the patent. It was well known to the skilled person that the thickness of the topcoat layer affected the resistance to rain erosion to a high extent. This fact had been confirmed by the respondent in its letter dated 6 April 2021, page 3, third paragraph. This was why prior-art documents always precisely stated what thickness was used in the examples. The appellant referred to D1 (page 26, line 2), D2 (page 12, point 3.8), D4 (page 15) and D6 (examples 1 and 2, pages 33 and 35).

Therefore, the patent, by not stating what thickness had been used in the examples, lacked a crucial piece of information. Hence, the reported results did not plausibly demonstrate any technical effect of the claimed NCO:OH ratio. As a consequence, the objective technical problem had to be seen in the provision of

alternative composites comprising a multi-layer system displaying rain erosion performance.

- 4.2 The board finds the appellant's arguments unconvincing. According to examples 1 to 3 of the patent (pages 11 and 12), a primer and a topcoat are applied on aluminium foils. The topcoat comprises as components (2B) (b) and (2B) (a) according to claim 1, the isocyanate compound DESMODUR N-3300A and the polyurethane SELEMIX 7-543, respectively (paragraph [0082] of the patent). The NCO:OH ratios resulting from these two compounds in examples 1 to 3 are 1.1:1, 1.3:1 and 1.7:1, respectively (paragraph [0082] of the patent). The resistance to rain erosion was measured by assessing the whirling arm rating (see paragraph [0080] of the patent). As can be deduced from table 2 of the patent, by decreasing the NCO:OH ratio, the whirling arm rating and thus the rain erosion performance decreases. In view of this clear trend, it must be assumed that by decreasing the NCO:OH ratio even further to a value below the lower limit of claim 1, i.e. below a ratio of 1:1, the rain erosion performance would deteriorate even further. This implies in turn that the selection of NCO:OH ratios within the claimed range, i.e. above 1:1, leads to a rain erosion performance that is improved compared to a performance obtained with values below the ratio of 1:1, and thus outside the claimed range. The board sees no reasons to doubt that the trend of rain erosion performance shown in the patent is attributable solely to the difference in the NCO:OH ratio used. No evidence is present that e.g. different thicknesses were used in the examples of the patent as alleged by the appellant. Rather, the board concurs with the respondent that carrying out experiments aiming to assess the effect of the NCO:OH ratio on the resistance to rain erosion by using different topcoat thicknesses would not make any

technical sense. Thus, it must be assumed that the same topcoat thickness was used in examples 1 to 3. The board further concurs with the respondent that the range for the topcoat thickness as disclosed in paragraph [0081] of the patent (lines 35 to 36) has to be understood as an indication of typical topcoat thicknesses to be used and not, as alleged by the appellant, as an indication that different thicknesses were used in examples 1 to 3.

4.3 For these reasons, the board, in line with the respondent's submissions, considers the objective technical problem to lie in the provision of composites comprising a multi-layer coating system with improved rain erosion performance.

5. Obviousness of the claimed solution

5.1 The appellant argued that NCO:OH ratios falling within the claimed range, i.e. greater than 1:1, belonged to common general knowledge. It especially referred to document D10 disclosing the advantages of using NCO:OH ratios higher than 1:1. A ratio of 2:1 was disclosed for aircraft finishes. Even if rain erosion performance was not mentioned in D10, the improvement of this property at most represented a bonus effect that the skilled person would have automatically achieved by selecting the NCO:OH ratio in the claimed range according to the teaching of D10. Also, document D11 disclosed NCO:OH ratios higher than 1:1. Thus, the skilled person would have been prompted to select an NCO:OH ratio falling in the claimed range for the topcoat of D2 in the expectation of obtaining a composite displaying improved rain erosion performance.

5.2 The board disagrees.

- 5.2.1 Document D10 (point 10.4, pages 193 to 194) represents a very general disclosure concerning urethane coatings, especially obtained from the reaction of polyesters or acrylic resins with polyisocyanate. According to D10 (page 194, first full paragraph), the NCO:OH ratio is an important variable in these urethane coatings and **"it is often found that a ratio of the order of 1.1:1 gives better film performance than a 1:1 ratio"** (emphasis added by the board). Considering the expression "it is often found" alone, it is evident to the skilled person that, according to D10, the mentioned NCO:OH ratio of 1.1:1 does not apply to all existing urethane coatings. In other words, no one-way street situation is disclosed in D10 which would have led the skilled person to automatically select, for the coating system of D2, an NCO:OH ratio necessarily falling within the claimed range. Solely for this reason, the appellant's argument based on a bonus effect has to be rejected.
- 5.2.2 Moreover, the rain erosion performance of the urethane coatings is not addressed in D10, let alone any improvement being linked to values of the NCO:OH ratio above 1:1. In fact, the only properties stated in D10 to be improved are the solvent resistance and, as regards aircraft finishes, the pot life. As pointed out by the respondent, these properties are not related to the coating's rain erosion performance.
- 5.2.3 Therefore, the skilled person aiming to solve the technical problem mentioned above would not have found in D10 any suggestion that an NCO:OH ratio falling in the claimed range would have improved the rain erosion performance.
- 5.2.4 Document D11 (paragraphs [0002], [0007] to [0011], [0032] and [0086]) discloses coating compositions to be applied to various substrates, *inter alia*, polyester

reinforced fibre glass, the compositions comprising a hydroxyl-containing acrylic polymer and an organic isocyanate. The NCO:OH ratio is said to range from 0.7:1 to 2:1 and preferably from 1:1 to 1.5:1. In the examples (paragraphs [0105] to [0108] and [0115] to [0118]), NCO:OH ratios of 0.7:1, 1.4:1 and 1.3:1 are used. Even if NCO:OH ratios as required by claim 1 are disclosed in D11, they are not linked to the rain erosion performance of the coated substrate. In fact, this property is not mentioned in D11. Therefore, neither would D11 have prompted the skilled person to select an NCO:OH ratio as claimed when aiming to solve the posed technical problem.

- 5.3 In view of the above, the board concludes that the subject-matter of claim 1 involves an inventive step when starting from document D2 as the closest prior art.
6. The parties also argued about inventive step when starting from document D6, taken as the closest prior art. D6 (page 4 under "Summary") discloses a composite comprising a multi-layer coating system.
- 6.1 In its communication issued in preparation for the oral proceedings, the board noted that the subject-matter of claim 1 differs from the multi-coating system of D6 in that the topcoat is deposited from composition 2B, comprising the functional component (a) "*selected from an acrylic polymer, a polyester polymer, a polyurethane polymer, a polyurea polymer and/or a polyether polymer*" and in that "*the ratio of isocyanate to hydroxyl and/or amine groups is >1:1*". In fact, according to D6 (page 4 under "Summary"), the functional component reacted with an isocyanate-terminated polyurethane prepolymer is selected from polyaspartic esters, ketimines or aldimines. The NCO:OH ratio as defined in claim 1 is

not mentioned in D6. This finding of the board was not disputed by the appellant.

6.2 Therefore, D6 is more distant than D2 from the claimed subject-matter. Even if D6 (page 1 under "Background", pages 31 to 32) aims to provide coatings resistant to, *inter alia*, rain erosion, it is silent on any influence of the NCO:OH ratio on such a property.

6.3 It follows that the board's observations mentioned above on inventive step when starting from D2 apply *mutatis mutandis* also when starting from D6. The skilled person would not have been prompted by D10 or D11 to use an NCO:OH ratio as claimed when aiming to improve the coating's rain erosion performance.

6.4 The board had expressed this opinion in the communication issued in preparation for the oral proceedings. The appellant did not reply, either in writing or at the oral proceedings.

6.5 Therefore, the board concludes that the subject-matter of claim 1 involves an inventive step also when starting from D6 as the closest prior art (Article 56 EPC).

7. Since the subject-matter of claim 1 involves an inventive step, the subject-matter of claims 2 to 11, dependent on claim 1, and claims 12 to 14, defining methods in which the coating system of claim 1 is used, also involves an inventive step (Article 56 EPC).

Conclusions

8. For the reasons set out above, the ground for opposition under Article 100(a) EPC invoked by the appellant does not prejudice the maintenance of the patent as granted. Therefore, the main request of the respondent is allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



N. Maslin

M. O. Müller

Decision electronically authenticated