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**Datasheet for the decision
of 11 May 2010**

Case Number: T 0065/08 - 3.3.05

Application Number: 97905799.9

Publication Number: 0881998

IPC: C04B 14/20

Language of the proceedings: EN

Title of invention:

Improved pearlescent pigment for exterior use

Patentee:

BASF Catalysts LLC

Opponent:

Eckart GmbH

Headword:

Pearlescent pigment/BASF CATALYSTS LLC

Relevant legal provisions:

EPC Art. 56
EPC R. 103(1)

Relevant legal provisions (EPC 1973):

-

Keyword:

"Inventive step (all requests): no - improvement foreseeable in view of prior art teaching"

"Reimbursement of appeal fee: no"

Decisions cited:

G 0009/91, T 1631/07

Catchword:

-



Case Number: T 0065/08 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 11 May 2010

Appellant:
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 20 November 2007
revoking European patent No. 0881998 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: G. Raths
Members: H. Engl
S. Hoffmann

Summary of Facts and Submissions

I. European patent EP-B-0 881 998 was granted with 13 claims, the independent claims thereof reading as follows:

"1. A titanium dioxide- or iron oxide- coated micaceous pearlescent pigment having a first coating thereon consisting essentially of hydrated aluminium oxide or a combination of hydrated cerium and aluminium oxides, and a coating of hydrolysed silane coupling agent on or intermingled with said first coating."

"11. A method of improving a metal oxide-coated micaceous pearlescent pigment which comprises combining a hydrolysed silane coupling agent with a titanium dioxide- or iron oxide-coated micaceous pearlescent pigment having a first coating thereon consisting essentially of hydrated aluminium oxide or a combination of hydrated aluminium and cerium oxide."

II. The patent was revoked in opposition proceedings on the grounds that the claims of the main request contravened Article 84 EPC and that the subject matter of the claims of the auxiliary request did not involve an inventive step in view of document D5 in combination with document D8.

III. *Inter alia*, the following documents were cited in opposition proceedings:

D3: US-A-5 472 491

D5: US-A-5 423 912

D7: US-A-5 223 034

- D8: DE-A-39 29 422
- A1: Experimental Report I filed with letter dated
1 November 2005
- A2: Experimental Report II filed with letter dated
24 August 2006
- A3: ASTM-D-5767-95
- A4: Experimental Results filed with letter dated
21 September 2007

- IV. The appeal is from the decision of the opposition division posted on 20 November 2007 to revoke the European patent.

- V. With the letter stating the grounds of appeal the appellant (patentee) filed a main request and auxiliary requests 1 to 5, as well as the following new documents:

- D12: OSi Specialties Inc., *"An Introduction to Organofunctional Silanes: Chemical Structure and Function"*, 1996, Tarrytown, NY, US, 1 page; and
- A5: Test Report "80°C water bath test", 2 pages.

- VI. The response of the opponent (respondent) was received with letter dated 8 August 2008.

With letter dated 20 May 2009, the appellant commented on the respondent's arguments. Revised claims in accordance with a main and auxiliary requests 1 to 4 were submitted with letter dated 13 April 2010. Auxiliary request 5 remained unamended.

- VII. Oral proceedings were held on 11 May 2010 during which the appellant presented new sets of claims as a main request and auxiliary requests 1 to 5.

VIII. The independent product claims of the said requests are worded as follows:

Main request

"1. A titanium dioxide- or iron oxide- coated micaceous pearlescent pigment having a first coating thereon consisting essentially of hydrated aluminium oxide or a combination of hydrated cerium and aluminium oxides, and a coating of hydrolysed silane coupling agent on or intermingled with said first coating wherein said silane coupling agent is selected from gamma-(2-aminoethyl) aminopropyl trimethoxysilane, aminopropyl trimethoxy silane, gamma-aminopropyl triethoxy silane, gamma-(2-aminoethyl) aminopropyl methyl dimethoxy silane, gamma-methacryloxypropyl trimethoxy silane, gamma-glycidoxypropyl trimethoxy silane, gamma-mercaptopropyl triethoxy silane, gamma-chloropropyl trimethoxy silane, octadecyldimethyl-[3-(trimethoxysilyl)-propyl] ammonium chloride, gamma-mercaptopropyl-methyl-dimethoxy silane, methyltrichloro silane, dimethyl-dichlorosilane, trimethylchlorosilane and gamma-iso-cyanatopropyl triethoxy silane."

First auxiliary request

"1. A titanium dioxide- or iron oxide-coated micaceous pearlescent pigment having a first coating thereon consisting essentially of hydrated aluminum oxide or a combination of hydrated cerium and aluminum oxides, and a coating of hydrolysed silane coupling agent on or intermingled with said first coating, wherein the

silane coupling agent is a mixture of at least two silane coupling agents."

Second auxiliary request

"1. A titanium dioxide- or iron oxide-coated micaceous pearlescent pigment having a first coating thereon consisting essentially of hydrated aluminum oxide or a combination of hydrated cerium and aluminum oxides, and a coating of hydrolysed silane coupling agent on or intermingled with said first coating, wherein the silane coupling agent is a mixture of a non-amino silane coupling agent and an amino silane coupling agent."

Third auxiliary request

Claim 1 of this request is identical to claim 1 of the main request.

Fourth auxiliary request

"1. A titanium dioxide- or iron oxide-coated micaceous pearlescent pigment having a first coating thereon consisting essentially of hydrated aluminum oxide or a combination of hydrated cerium and aluminum oxides, and a coating of hydrolysed silane coupling agent on or intermingled with said first coating, wherein said silane coupling agent is gamma-glycidoxypropyl trimethoxy silane in combination with an amino silane coupling agent."

Fifth auxiliary request

"1. A titanium dioxide- or iron oxide-coated micaceous pearlescent pigment having a first coating thereon consisting essentially of hydrated aluminum oxide or a combination of hydrated cerium and aluminum oxides, and a coating of hydrolysed silane coupling agent on or intermingled with said first coating, wherein said silane coupling agent is a gamma-glycidoxypropyl trimethoxy silane in combination with gamma amino propyl triethoxy silane."

IX. The appellant essentially argued as follows:

The objections under Article 84 and 83 EPC, now raised by the respondent, were inadmissible and should not be discussed during oral proceedings. In particular, the objection under Article 83 EPC was not previously raised in the grounds of opposition.

The claimed subject matter was novel, since D3 required the presence of silicon dioxide which was excluded by the claims. The difference between D5 and the claims of the main request was the presence of an additional layer on top of the first coating.

The closest prior art was represented by document D5, because it most resembled the claimed subject matter structurally and also dealt with the same type of problem, namely improving humidity and overall weatherability resistance.

Compared to D5, the product of the invention had clearly improved properties, as shown in the

experiments of the patent and in the additional experiments submitted with letter dated 21 September 2007 and in the statement of grounds of appeal.

The skilled person would not arrive at the claimed invention, even considering using the teaching of D3, because there was no incentive to dispense with the essential presence of silicon dioxide.

D8 would not lead toward the claimed invention, because it was not to be expected that the use of a silane coating on a hydrated aluminium oxide or cerium oxide would give good results (see D12).

The appellant referred to the tests reports (Distinctness of Image [DOI] tests: see A3) submitted during the opposition procedure (A2, A4) and the appeal procedure (A5). These tests showed a technical effect for the use of a mixture of two silanes. The existence of a technical effect (according to A2 and A4) had even been acknowledged by the opposition division, but only for the particular combination of silane coupling agents for which the test results had been presented. The appellant argued, however, that the tests covered a wide range of combinations of silanes and were thus representative for the whole scope of the claims.

The subject matter of auxiliary request 1 was limited to the use of a mixture of two silanes, yielding even more superior properties. Evidence therefore was found in the additional experiments submitted with letter dated 21 September 2007. The opposition division had admitted this advantageous technical effect, but had - wrongly - argued that it was proven only for certain

mixtures of silanes. As this argument was not discussed during the oral proceedings, the opposition division had committed a substantial procedural violation which justified a reimbursement of the appeal fee.

Having regard to the claims of the auxiliary requests 3 to 5, the appellant argued that the improvement in terms of DOI demonstrated in A4 and A5 for mixtures of two silane coupling agents were not suggested by the prior art.

X. The respondent essentially argued as follows:

The claims were unclear and contradictory in themselves, because they mentioned "*hydrolysed silane coupling agents*" which contained for example, alkoxy groups and were thus not hydrolysed. Both possibilities (hydrolysed and not hydrolysed) were however technically feasible. Because of this contradiction, the claimed subject matter could not be carried out by the person skilled in the art. The claims should therefore be rejected under Articles 83 and 84 EPC. This objection applied to all the requests.

The feature of claim 4 of the main request, specifying the amino silane coupling agent to be a non-amino silane coupling agent, had no basis in the original documents. Certain claims according to auxiliary requests 2 to 5 defined combinations of features which were not originally disclosed. These claims thus contravened Article 123(2) EPC.

Novelty:

Document D3 discloses a coated pearlescent pigment having excellent weathering resistance. The pigment prepared according to examples 2, 9 and 11 were novelty destroying for the claims of the main request, and auxiliary requests 1 to 4.

Inventive step:

Starting from D3, the skilled person would not hesitate to omit the inner layer of SiO₂, which has no contact with the surrounding environment, in an effort to produce cheap pigments having a simple layer system. Moreover, the claims of the opposed patent did not exclude the presence of further coating layers.

The claimed subject matter was also obvious having regard to D5 in combination with D3. The pearlescent pigments disclosed in D5 exhibited the same layer sequence as in the opposed patent, except for the coating with a silane coupling agent. However, the advantages of applying such a silane coupling agent on the pigment's surface were known from D3. Again, to simplify matters, the skilled person would omit the SiO₂ layer.

It was known from D8 that pearlescent pigments having a coating with a silane, such as an amino alkoxy silane or 3-glycydoxypropyl trimethoxy silane performed better in terms of humidity resistance and adhesion. The experimental results submitted by the appellant were not convincing, since essential process parameters were not disclosed. Coatings with 2 silanes did not perform

better than coating with only one silane. This showed that the combinations of aminosilane and non-aminosilane as claimed in the auxiliary requests were without inventive merit.

XI. Requests:

The appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of the sets of claims of the main request, or in the alternative, on the basis of the sets of claims filed as auxiliary requests 1 to 5, all filed during oral proceedings. In addition, the appellant requested to reimburse the appeal fee on the ground of a substantial procedural violation.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. Admissibility of late filed requests

1.1 The appellant filed new sets of claims as a main request and auxiliary requests 1 to 5 during the oral proceedings.

Despite this late filing in the sense of Article 13(1) and (3) RPBA, the board allowed these requests into the proceedings, for the following reasons.

Compared with the claims filed with letter of 13 April 2010 (*i.e.*, approximately one month before the date of the oral proceedings), the expression "*hydrolysed*

silane coupling agent" has been replaced, where appropriate, by the expression "*silane coupling agent*". This amendment aims at more clearly distinguishing between the silane coupling agent as such and the silane in its hydrolysed state and thus addressed an objection raised by the respondent. Furthermore, following an objection raised by the board, the unclear expression "*gamma-methacryloxypropyl methyl trimethoxy silane*" has been deleted in claim 1 of the main request and claim 1 of the third auxiliary request. New claim 1 of the third auxiliary request combines the features of claim 1 of the main request and claim 1 of the second auxiliary request, as previously filed.

1.2 None of these amendments are of a nature which the board or the respondent cannot reasonably be expected to deal with without adjournment of the oral proceedings (*cf.* Article 13(3) RPBA). Therefore, the board decided to allow the said requests despite their late filing.

2. Amendments (Article 123(2) and (3) EPC)

2.1 *Main request*

Claim 1 is based on claim 1 and the description, page 7, line 20 to page 8, line 2, as originally filed and published as WO-A-97/29059.

Dependent claims 2 to 10 are identical to claims 2 to 10 as originally filed. Claim 11 is based on original claim 14, with appropriate modifications in the back reference to claim 1. Claim 12 is based on original claims 22 and 23.

These amendments clearly limit the scope of the claims with respect to the claims as granted.

The board is satisfied that the requirements of Article 123(2) and (3) EPC are met.

- 2.2 Claim 1 of the first auxiliary request is based on original claims 1 and 9 (granted claims 1 and 7).
- 2.3 Claim 1 of the second auxiliary request is based on original claims 1 and 9 and the description, page 8, lines 11 to 13 (granted claims 1, 7 and 8).
- 2.4 Claim 1 of the third auxiliary request is based on original claim 1 and the description, page 7, lines 26 and 27.
- 2.5 Independently of the question whether the combination of a gamma-glycidoxypropyl trimethoxy silane with an amino silane (auxiliary request 4) respectively with amino propyl triethoxy silane (auxiliary request 5) is disclosed in the application as filed, these requests fail for other reasons (see points 5.13 to 5.16).
3. Objections under Article 83 EPC and Article 84 EPC
 - 3.1 The respondent raised the objection that the claims' language was directed to hydrolysed silane coupling agents, whereas the silanes actually recited in the claims are not hydrolysed.

This contradiction, if it is any at all, was already present in the application documents as originally filed, albeit not in an independent claim.

The board is in any event of the opinion that the skilled person would realise without difficulty that the various silanes are merely written in their non-hydrolysed form, which is customary in the art, but is brought to reaction with water to form at least partially the hydrolysed species which then deposits on the substrate. The opposition division reached the same conclusion in the contested decision (Reasons, point 2).

The objection under Article 84 EPC is therefore not well founded.

- 3.2 As regards Article 83 EPC, such an objection was neither raised and substantiated in the notice of opposition, nor introduced into the proceedings by the opposition division. It is also not a consequence of amendments of the claims. It cannot be taken into consideration without the approval of the patentee (appellant) (G 9/91, OJ EPO 1993, 408; Reasons, points 18 and 19). This approval was not given.

4. Novelty

4.1 *Main request*

- 4.1.1 The respondent regarded document D3 as novelty destroying.

D3 discloses a micaceous pearlescent pigment coated with a metal oxide, such as TiO_2 , iron oxide, chromium oxide, ZrO_2 , SnO_2 or ZnO (see column 2, lines 42 to 48). Thereon is deposited a layer of silica by precipitation from a sodium silicate solution, and in a second step, a layer of hydroxides and/or oxides of Ce, Al and Zr, and mixtures thereof. In a third step, a layer of a silane coupling agent (e.g. aminopropyl trimethoxy silane (AMMO), methacryloxypropyl trimethoxy silane (MEMO), or 3-glycidoxy propyl trimethoxy silane (GLYMO)) is deposited (see column 4, lines 7 to 38). The silanes are co-precipitated together with the remaining metal oxides and/or hydroxides from step 2. The object of the organofunctional group of the silane is to form bonds with the polymer of the water-borne surface coating composition and thus to improve the performance in water immersion tests and condensation water tests (see column 3, lines 59 to 61; columns 7 and 8, Table 2).

Therefore, the coated pigments disclosed in D3 differ from the subject matter claimed in the opposed patent by a coating layer of silicon dioxide (silica) between the metal oxide (TiO_2 , iron oxide, chromium oxide, ZrO_2 , SnO_2 or ZnO) layer formed immediately on the mica and the aluminium/cerium hydroxide/silane coupling agent layer. The coating layer systems according to examples 2 and 11 of D3 (identified by the appellant as novelty-destroying) all show this silica interlayer.

The claim language of the opposed patent ("*...having a first coating thereon...*") excludes a silica interlayer in such a position. Therefore, the claimed subject matter of all requests is novel in view of D3.

4.1.2 No further documents have been cited with respect to novelty of the claims of the main request. The requirements of Article 54 EPC are met.

4.2 *Auxiliary requests 1 to 5*

Novelty objections against the claims of the auxiliary requests have not been maintained by the respondent during oral proceedings.

The board, having examined the prior art on file, also comes to the conclusion that the claimed subject matter of these requests is novel, so that the requirements of Article 54 EPC are met.

5. Inventive step

Main request and auxiliary request 3

5.1 The patent in suit is concerned with titanium- or iron oxide-coated pearlescent micaceous pigments having further coatings of hydrated aluminium oxide or hydrated aluminum and cerium oxide. The patent is concerned with the problem of improving the humidity resistance and weatherability of these pigments (*cf.* paragraphs [0011] and [0012] of the opposed patent).

5.2 The board regards document D5 as representing the closest prior art.

D5 discloses an iron-oxide or titanium dioxide-coated pearlescent mica pigment which is overcoated with

cerium and aluminium hydroxides (see column 3, lines 63 to column 4, line 40; examples). Said overcoated pearlescent mica pigment has enhanced water resistance and weather stability. Therefore, D5 deals with the same technical problem of improving humidity and weather resistance and discloses structurally similar pigments as the patent in suit.

5.3 Starting from D5, the technical problem underlying the patent in suit may be defined as improving the humidity resistance and weatherability of titanium- or iron oxide-coated pearlescent micaceous pigments of the kind disclosed in D5.

5.4 As a solution to this problem, the opposed patent proposes a titanium dioxide- or iron oxide- coated micaceous pearlescent pigment according to claim 1 of the main request characterised in that a silane coupling agent is coated onto the pigment, said silane coupling agent being selected from the list of silanes recited in claim 1 of the main request.

5.5 It has to be decided whether the technical problem defined under point 5.3 has been solved.

Experimental reports A1, A2, A4 and A5 have been submitted. Report A1 relates to humidity performance of the treated pigments incorporated in paint films and shows that the film wrinkling property is improved by the silane coupling agents according to the invention. Report A2 shows that the distinctness-of-image (DOI) property (*cf.* ASTM Standard D5767-95 (document A3)) is improved with a first vinyl trimethoxy silane together with gamma amino propyl triethoxy silane. Data

presented in A4 suggest that combinations of two silane coating agents, in particular combinations of an amino silane and a non amino silane, result in superior properties of the pigment material. The experiments in test report A5 suggest a positive effect of applying various silane coupling agents, in particular gamma glycidoxypropyl trimethoxy silane in combination with gamma amino propyl triethoxy silane, when combined with hydrated metal oxide.

Having regard to these experimental reports A1, A2, A4 and A5, the board accepts that the above defined technical problem has been solved by the claimed subject matter.

5.6 It remains to be decided whether the claimed solution is obvious in view of the prior art.

5.6.1 The respondent essentially argued that in view of the advantages attributed to the silane coupling agent in D3 it would have been obvious to apply such a silane coating onto the pigments of D5. The use of silane coupling agents on pearlescent mica pigments was also known from D8.

5.6.2 Document D3 is concerned with titanium dioxide-coated pearlescent micaceous pigments having excellent weathering resistance. As already discussed under point 4.1, said micaceous pearlescent pigments are coated with a metal oxide, such as TiO_2 , iron oxide, chromium oxide, ZrO_2 , SnO_2 or ZnO , and have deposited thereon a layer of silica by precipitation from a sodium silicate solution, and in a second step, a layer of hydroxides and/or oxides of Ce, Al and Zr, and

mixtures thereof. In a third step, a layer of a silane coupling agent is deposited. In preferred embodiments, mixtures of two or three silanes are applied. Preferred silane coupling agents are 3-aminopropyl trimethoxy silane, methacryloxypropyl trimethoxy silane and 3-glycidoxypropyl trimethoxy silane (column 2, lines 42 to 48; column 4, lines 7 to 38; examples 2, 9 to 13).

Pigment samples so treated were incorporated into different water-borne surface coating systems and subjected to water immersion and condensation water tests (column 5; Table 1). Under the test conditions, the pigments having a silane coating according to D3 showed a significantly better swelling behaviour than prior art pigments according to EP-A-0 268 918 and EP-A-0 342 533 (see column 1, lines 18 to 29; Tables 1 and 2).

A post-treatment with silane coupling agents on the surface of a nacreous titanium dioxide-coated micaceous pigment having a coating of hydrated zirconium oxide is also known from document D7 (column 6, lines 19 to 57; examples 8, 9, 10). The silane coating is reported to improve the water resistance and weatherability (column 11, lines 4 to 40, column 12, Table 1). The silanes used according to D7 were glycidoxypropyl trimethoxy silane and gamma-(2-aminoethyl)-aminopropyl trimethoxy silane.

Furthermore, document D8 discloses coated micaceous pearlescent pigments the surfaces of which have been modified with silane coupling agents such as aminoalkoxysilanes and 3-glycidoxypropyl silane. According to D8, pearlescent pigments treated with a

silane coupling agent exhibit superior results in humidity and adhesion tests than untreated samples. Polymeric systems (lacquers, lattices, plastic materials) incorporating silane treated pigments showed better weatherability. See column 2, lines 29 to 44; column 3, lines 49 to 52; column 5, lines 15 to 19; examples 1 and 2.

5.6.3 The board concludes from documents D3, D7 and D8 that the use of silane coupling agents is well documented in the art as a means for improving the water resistance and for enhancing the bonding between the pigment and the polymer matrix, in particular if the pigment is intended to form part of a polymer-based lacquer system. Therefore, if the technical problem underlying the opposed patent was to improve the resistance against moisture (weatherability), a coating of a silane coupling agent is an *a priori* obvious measure for the skilled person. In the board's view the skilled person would in particular derive from the cited prior art the teaching that weatherability and humidity resistance of coated pearlescent pigments can be improved by applying a coating of a silane coupling agent.

5.6.4 The list of particular silane coupling agents recited in claim 1 comprises examples of the preferred silane coupling agents of the prior art (for example D3 and D7: glycidoxypropyl trimethoxy silane, gamma methacryloxy propyl trimethoxy silane; D3: 3-aminopropyl trimethoxy silane;). Therefore, no inventive step can be seen in applying silanes selected from this list.

5.6.5 The appellant argued, by referring to D12, that the skilled person would have expected that the

effectiveness of a silane coupling agent was highest in a silica surface. Therefore, it was not obvious that the use of a coating of a silane would give good results on a hydrated aluminium oxide or a hydrated cerium oxide. D8 was only about humidity resistance, whereas the claimed invention improved also weather resistance. According to D5, these properties were not directly related.

According to the appellant, it was not to be expected in view of D12 that a coating of a silane would give good results on a hydrated aluminium oxide or a hydrated cerium oxide (obviously because silanes were generally used as adhesion promoters on siliceous surfaces). This argument is however not convincing. It can be seen from D12 that the effectiveness of silanes on alumina is in the range of "Good" to "Excellent". Therefore, D12 does not support the existence of a prejudice against using silanes on alumina surfaces.

5.7 In conclusion, even if one accepts to the benefit of the appellant that the claimed pigments effectively solve the problem of improving the humidity resistance and weatherability, these improvements were readily foreseeable (*cf.* T 1631/07 of 2 December 2009, Reasons 3.7). The subject matter according to claim 1 of the main request does therefore not involve an inventive step.

The same applies to claim 1 of the third auxiliary request which has the same wording as claim 1 of the main request.

The requirements of Article 56 EPC are thus not met.

Auxiliary requests 1 and 2

- 5.8 The same reasoning as outlined under points 5.1 to 5.7 applies *mutatis mutandis* to the auxiliary requests 1 and 2.
- 5.9 As a solution to the problem defined under point 5.3 the opposed patent proposes a titanium dioxide- or iron oxide- coated micaceous pigment according to claim 1 of the first or second auxiliary request characterized in that the coupling agent is
- a mixture of at least two silane coupling agents (auxiliary request 1); or
 - a mixture of a non-amino silane coupling agent and an amino silane coupling agent (auxiliary request 2).
- 5.10 With regard to the question whether the technical problem is actually solved, it is referred to point 5.5. Experimental report A2 concerns the test results with two silane coupling agents, in particular with a non-amino and an amino silane.
- 5.11 The reasoning regarding obviousness under point 5.6 applies *mutatis mutandis* to auxiliary requests 1 and 2.

It is known from D3 (examples 9 to 13) to apply mixtures of two or more silane coupling agents in the course of the silane treatment. Therefore, the additional feature of claim 1 of auxiliary request 1 is known from D3. It is furthermore known from D3 (examples 10 to 13) that said mixture comprises a non-

amino silane coupling agent and an amino silane coupling agent, which renders the subject matter of claim 1 of the second auxiliary request obvious.

5.12 The board concludes that the subject matter of claim 1 of the auxiliary requests 1 and 2 does not involve an inventive step.

Auxiliary requests 4 and 5

5.13 The same reasoning as outlined under points 5.1 to 5.7 applies *mutatis mutandis* to the auxiliary requests 4 and 5.

5.14 As a solution to the problem defined under point 5.3 the opposed patent proposes a titanium dioxide- or iron oxide- coated micaceous pigment according to claim 1 of the fourth or fifth auxiliary request characterized in that the coupling agent is

- an amino silane coupling agent (auxiliary request 4); or
- gamma glycidoxy propyl trimethoxy silane in combination with gamma amino propyl triethoxy silane (auxiliary request 5).

5.15 With regard to the question whether the technical problem is actually solved, it is referred to point 5.5, in particular to test report A5.

5.16 The reasoning regarding obviousness under point 5.6 applies *mutatis mutandis* to auxiliary request 4 and 5.

The specific combination of silanes recited in claim 1 of the fourth auxiliary request, namely gamma-glycidyloxy propyl trimethoxy silane in combination with an amino silane coupling agent, is disclosed in D3, example 11.

The specific combination of silane coupling agents recited in claim 1 of the fifth auxiliary request, namely of gamma-glycidoxy propyl trimethoxy silane in combination with gamma amino propyl triethoxy silane differs from the silanes used in D3, example 11, only in that the aminosilane gamma-aminopropyl trimethoxysilane is replaced by gamma amino propyl triethoxy silane. This minor modification in one of the silane coupling agents does not involve an inventive step, because it is known to the skilled person that the selection of hydrolysable alkyl groups attached to the silicon atom has no decisive influence on the weatherproofing capability of the silane. Replacing methoxy by ethoxy groups (respectively methyl by ethyl groups) groups would in particular be obvious.

5.17 Therefore, the subject matter of auxiliary requests 4 and 5 does not involve an inventive step (Article 56 EPC).

5.18 As no allowable request is on file, the patent cannot be maintained and the appeal must be dismissed.

6. Reimbursement of the appeal fee

Pursuant to Rule 103(1)(a) EPC, it is a prerequisite for the reimbursement of the appeal fee that the Board of Appeal deems the appeal to be allowable.

Since this is not the case here, the appellant's request must be rejected.

Order

For these reasons it is decided that:

1. The appeal is dismissed.
2. The request for reimbursement of the appeal fee is rejected.

The Registrar

The Chairman

C. Vodz

G. Rath