Internal distribution code:
(A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

Datasheet for the decision of 16 June 2015

Case Number: T 1307/12 - 3.3.03

Application Number: 02752368.7

Publication Number: 1414874

IPC: C08F210/02, C08F218/08, C04B24/26

Language of the proceedings: EN

Title of invention:
HIGH SOLIDS ETHYLENE-VINYL ACETATE LATEX

Patent Proprietor:
Akzo Nobel N.V.

Opponent:
Wacker Chemie AG

Headword:

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Novelty - main request (yes)
Inventive step - main request (yes)

Decisions cited:

Catchword:

Beschwerdekammern
Boards of Appeal
Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 1307/12 - 3.3.03

DECISION
of Technical Board of Appeal 3.3.03
of 16 June 2015

Appellant:
(Opponent)

Wacker Chemie AG
Hanns-Seidel-Platz 4
81737 München (DE)

Representative:

Schuderer, Michael
Wacker Chemie AG
Zentralbereich Patente, Marken und Lizenzen
Hanns-Seidel-Platz 4
81737 München (DE)

Respondent:
(Patent Proprietor)

Akzo Nobel N.V.
Velperweg 76
6824 BM Arnhem (NL)

Representative:

Akzo Nobel N.V.
Legal & IP
Velperweg 76
6824 BM Arnhem (NL)

Decision under appeal:

Decision of the Opposition Division of the European Patent Office posted on 13 April 2012 rejecting the opposition filed against European patent No. 1414874 pursuant to Article 101(2) EPC.

Composition of the Board:

Chairman M. C. Gordon
Members: O. Dury
R. Cramer

Summary of Facts and Submissions

I. The appeal by the opponent lies against the decision of the opposition division rejecting the opposition against European patent No. 1 414 874.

II. The granted patent was based on 11 claims, of which the claims relevant for the present decision read

1. A polymer composition comprising an ethylene-vinyl acetate polymer dispersion stabilized with polyvinyl alcohol, wherein said dispersion has a solids level of greater than 65 percent by weight, the amount of polyvinyl alcohol is from 4 to 10 percent, based on the weight of the polymer solids, and wherein said dispersion is surfactant free and has a bimodal particle size distribution.

2. A process for forming an ethylene-vinyl acetate polymer dispersion comprising polymerizing a monomer mixture comprising vinyl acetate and ethylene in a batch process, in the presence of a stabilizing system consisting of polyvinyl alcohol, the amount of polyvinyl alcohol being from 4 to 10 percent, based on the weight of the polymer solids to form an ethylene-vinyl acetate polymer dispersion, wherein said copolymer dispersion is surfactant free and has a solids level of greater than 65 percent by weight, and a viscosity of less than 5000 mPa.s when measured at 65 percent solids at 25° C.

5. The process of claim 2 wherein all monomer is added prior to commencing the reaction.

8. A process for producing a redispersible polymer powder comprising drying the polymer dispersion obtainable by any of the claims 2 to 7.

9. The use of the dispersion obtained by claim 2 and/ or the redispersible powder obtained by claim 8 in adhesives, coatings and cementitious formulations.

10. Adhesive, cement additive or cementitious, gypsum based, gypsum-free or cement-free mortar containing the redispersible powder obtained by claim 8.

11. Self-levelling floor screed, ceramic tile adhesive, packaging and converting adhesive or coating containing the dispersion obtained by claim 2.

Claims 3, 4, 6 and 7 were dependent on claim 2.

III. An opposition against the patent was filed, in which it was requested that the patent be revoked on the grounds of Art. 100 (a) EPC (lack of novelty and lack of inventive step).

IV. The following documents have been *inter alia* cited in the opposition proceedings:

D1: EP-A-1 174 446
D2: EP-A-1 067 147
D4: Data sheet concerning particle size measurement (22 March 2010)i respect of a

repetition by the appellant of example 7 of D1

V. In its decision, the opposition division held that

- the ground for opposition pursuant to Art. 100(b) EPC was not admitted to the proceedings;
- the subject-matter of the granted claims was novel over both the description and example 7 of D1. In that respect, example 7 of D1 lacked information so that it could not be reworked exactly. The values of Dw, Dn and Dw/Dn reported in D4 differed from those disclosed in D1, meaning that the dispersions of D1 and D4 were not the same;
- an inventive step could be acknowledged starting from D2 as closest prior art.

VI. The opponent (appellant) lodged an appeal against the above decision and requested that the patent be revoked. Together with the statement of grounds of appeal, the following documents were *inter alia* submitted

D7: Chargenprozess, Wikipedia
D9: Details of the reproduction of example 7 of D1 resulting in the data of D4

With letter of 11 May 2015 further arguments and the following documents were submitted

D10: EP-A-0 890 625
D11: Evaluation of Table 7 of D2

VII. By letter dated 19 February 2013 the patent proprietor (respondent) requested that the appeal be dismissed.

With letter of 15 April 2015 further arguments and six auxiliary requests were submitted.

VIII. After having summoned the parties to oral proceedings, the Board issued a communication setting out its preliminary view of the case. With respect to inventive step the Board indicated *inter alia* that

- it could have to be discussed whether example 6 of D2, which is a comparative example of D2, can effectively constitute the closest prior art as argued by the appellant; and
- it could have to be established how the subject-matter of granted claim 1 was distinguished from the high solids dispersions prepared in D2, in particular examples 1-3.

IX. During the oral proceedings held on 16 June 2015 in the presence of both parties

- the appellant withdrew its objections pursuant Art. 100(b) EPC / Art. 83 EPC which had been submitted in writing;
- the respondent, questioned by the Board, had no objection that D10 be admitted to the proceedings.

X. The appellant's arguments as relevant for the main request may be summarised as follows:

Novelty

a) Example 7 of D1 anticipated the subject-matter of granted claim 1. Although D1 did not explicitly disclose dispersions having bimodal particle size distribution, the dispersion prepared in example 7 could only be bimodal in view of the difference in Dn and Dw obtained. It was also shown in D4 and D9 that replicating example 7 of D1 led to a bimodal dispersion having very different Dn and Dw values. The differences in Dw and Dn values between D1 and D4/D9 were due to the determination method employed and to the variabilities inherent to polymer chemistry.

b) All the features of granted claim 2 were mentioned in the description of D1 e.g. in paragraphs 17, 29, 30 and 35. Regarding the feature "batch process", considering that granted claim 5 indicated that granted claim 1 was not limited to processes wherein all monomers were added from the start, a process according either to the examples of D1 or to the first embodiment of paragraph 30 of D1 fell within the terms of "batch process" as employed in the patent in suit.

c) Therefore, D1 anticipated granted claims 1 and 2.

Inventive step

d) Regarding granted claim 1, the problem to be solved in view of the closest prior art D2 was to provide alternative high solids ethylene-vinyl acetate dispersions that were stabilised using only polyvinyl alcohol, i.e. without additional surfactants, and which exhibited relatively low viscosity at high solids contents.

The ethylene-vinyl acetate dispersions prepared using only polyvinyl alcohol as stabiliser in examples 1-3 of D2 had a solids content of ≥ 65 wt.%. Although the amount of polyvinyl alcohol was not disclosed for examples 1-3 of D2, it was derivable from D2 that in example 6 the same polymers were prepared as in example 1.

Considering Table 6 of D2, it was derivable that product A-400/Ex. 6 of D2 was prepared using 5% polyvinyl alcohol based on the vinyl acetate monomers, which corresponded to 4% polyvinyl alcohol based on ethylene-vinyl acetate component containing 20% ethylene. In that respect, D10 disclosed that product A-400 contained 20% ethylene. Consequently, the ethylene content of the product prepared in examples 1-3 was 20%. Therefore, the dispersions according to granted claim 1 only differed from those of examples 1-3 of D2 in that they had a bimodal particle size distribution. In that respect, that feature was not precisely defined in the patent in suit but had to be read in the light of Fig. 1 as meaning the presence of two distinct peaks at 0.2-0.5 µm and 3-6 µm.

The problem to be solved identified above was already solved in e.g. example 6 of D2. It had not been shown that said problem was only solved when the dispersions had a bimodal particle size distribution.

e) As argued during the oral proceedings, the only distinguishing feature of granted claim 1 over example 3 of D2 was that the specific polyvinyl alcohol amount mentioned in granted claim 1 was not explicitly disclosed in D2. Considering that the bimodality shown in Table 2 of D2 was caused by the use of a seed emulsion and not by the amount of polyvinyl alcohol used, it was obvious to solve the above problem by merely varying the polyvinyl alcohol amount, in particular in the range defined in granted claim 1. As explained above, it was further derivable from D2 that all experiments, including example 3, were performed using about 4% polyvinyl alcohol based on the weight of the polymer solids.

f) Regarding granted claim 2, the problem to be solved in view of D2 was to provide an alternative process for the preparation of high solids ethylene-vinyl acetate dispersions that were stabilised using only polyvinyl alcohol, i.e. without additional surfactants, and which exhibit relatively low viscosity at high solids contents.

It was shown in Table 7 of D2 and in D11 (encircled point) that a dispersion having a viscosity < 5000 mPa.s at solids content slightly below 65% could be prepared following a process according to example 6 of D2. It was therefore to be expected that dispersions having slightly higher solids contents fulfilled the viscosity requirement specified in granted claim 2. Therefore, the above problem was already solved in D2, using either a batch or a continuous process.

Starting from a batch process according to example 6 and with reference to Table 7 of D2, as shown in D11, it was obvious to arrive at the subject-matter of granted claim 2. In that respect, to provide an alternative, the skilled person would always try to use a batch process instead of a continuous process because they were easier to carry out.

g) For these reasons, the subject-matter of granted claims 1 and 2 was not inventive.

XI. The respondent's arguments as relevant for the main request may be summarised as follows:

Novelty

a) D1 failed to disclose dispersions having a bimodal particle size distribution. That the dispersion prepared in example 7 exhibited different Dn and Dw values did not inevitably mean that it was bimodal.

Considering that the dispersion prepared in D4/D9 exhibited Dw, Dn and Dw/Dn values that differed from those disclosed in example 7 of D1 it could not be concluded that the dispersion prepared in D4/D9 was the same as that of example 7 of D1. The discrepancies were so large that they could not be assumed to result solely from the determination method used.

Furthermore, the disclosure of example 7 of D1 e.g. in respect of the amount of ethylene and initiator used or of the nature of the final step performed was ambiguous. D9 was also not clear in those respects. Under those circumstances, not only was it questionable whether example 7 of D1 could even be fairly reproduced but D9 could not be considered to represent a fair replication thereof.

b) As disclosed in paragraph 17 of the patent in suit and in D7, in a "batch process" all the monomers are present in the reactor from the start. Since that was not the case in the examples of D1, they could not anticipate granted claim 2. Besides, the specific combination of features of granted claim 2 could only be arrived at after performing a series of choices within the description of D2.

c) Therefore, granted claims 1 and 2 were novel over D1.

Inventive step

d) For each of granted claims 1 and 2 the formulation of the problem to be solved over the closest prior art D2 proposed by the appellant was adhered to.

e) During the oral proceedings it was agreed that Table 2 of D2 showed that the dispersion prepared in example 3 of D2 had a bimodal particle size distribution. Therefore, the dispersion according to granted claim 1 differed from that of said example 3 in the specific amount of polyvinyl alcohol.

In that respect, it was not derivable from D2 which amount of polyvinyl alcohol was used in the examples, also not when considering D10. Considering that polyvinyl alcohol had a major impact on the polymerisation process, the effect of modifying the amount of polyvinyl alcohol could not be predicted. Under these circumstances, it was not obvious that bimodal dispersions would be obtained by employing, in a process according to example 3 of D2, an amount of polyvinyl alcohol as defined in granted claim 1. In any case, D2 contained no information in that respect and would not have led the skilled person to the subject-matter of granted claim 1.

f) Regarding granted claim 2, there was no reason to consider example 6 of D2, which was a comparative example dealing with a batch process, as the starting point for the assessment of the inventive step. D2 was directed to continuous processes and taught away from using a batch process.

The emulsion prepared in example 6 of D2 had a solids content of 61.8% and it was shown in example 7 of D2 that removing water from that emulsion led to a drastic increase in viscosity, well above the range defined in granted claim 2.

Regarding example 8 of D2, only the products obtained by a continuous process fulfilled the viscosity requirement defined in granted claim 2. The example of Table 7 of D2 specifically addressed by the appellant in D11 had a viscosity slightly lower than 5000 mPa.s but measured at a solids content of less than 65%. The extrapolation of said example to higher solids content showed that a viscosity higher than 5000 mPa.s would be obtained at 65% solids. Besides, it was unclear how the dispersions shown in Table 7 of D2 were obtained, in particular if those indicated as "A-400 (low MW PVOH grades)" were representative of a dispersion obtained according to example 6 of D2.

Consequently, the skilled person would have had no motivation to solve the above problem by modifying the examples of D2 so as to arrive at a process according to granted claim 2.

g) For those reasons, the subject-matter of granted claims 1 and 2 was inventive.

XII. The appellant (opponent) requested that the decision under appeal be set aside and that the European patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed, or alternatively that the decision under appeal be set aside and the patent be maintained in amended form according to any of auxiliary requests 1 to 6 filed with the letter of 15 April 2015.

Reasons for the Decision

Main request (patent as granted)

1. The ethylene-vinyl acetate polymer dispersions are defined using different technical features in the polymer composition according to claim 1 (solids level, polyvinyl alcohol amount, surfactant free, bimodal particle size distribution) and in the process according to claim 2 (solids level, polyvinyl alcohol amount, surfactant free, viscosity at 65% solids at 25°C). In particular, claims 1 and 2 contain no reference to each other. As a consequence, the assessment of novelty and inventive step will be made separately for each of claims 1 and 2.

2. Novelty

2.1 The only novelty objection raised against claim 1 was in respect of example 7 of D1, which was carried out following the preparation process of example 1 of D1.

2.1.1 The polymer composition according to claim 1 is *inter alia* characterised in that it comprises an ethylene-vinyl acetate dispersion which has a bimodal particle size distribution.

In that respect, the patent in suit contains no definition regarding the meaning to be given to the expression "bimodal particle size distribution”. Nor have the parties provided any information that would either define or limit the sense of that term. Under such circumstances, that term should be read in its broadest sense i.e. as meaning that the particle size distribution shows two different modes i.e. in which two distinct local maxima (peaks) appear, as confirmed by the respondent during the oral proceedings before the Board e.g. in respect of Table 2 of D2.

During the proceedings, the appellant argued that, on the basis of Fig. 1 of the patent in suit relating to the product of example 1, the term “bimodal particle size distribution” should be read as being limited to distributions having two peaks at between 0.2-0.5 µm and 3-6 µm, respectively. However, although Fig. 1 confirms that the dispersion so exemplified is bimodal, it was not shown that there would be a discrepancy and/or an inconsistency between Fig. 1 and the term "bimodal" in claim 1 which would necessitate deviating from the clear and unambiguous linguistic reading of the term in granted claim 1. Therefore, in the present case, there is no reason to use the description to give a narrower sense to the term “bimodal particle size distribution” than that usually accepted in the art, namely a distribution with two maxima.

2.1.2 D1 contains no information in respect of dispersions having a bimodal particle size distribution, in particular not in respect of example 7.

2.1.3 Considering the properties of the dispersion prepared in example 7 in terms of solids content, weight average particle size (Dw) and number average particle size (Dn) disclosed in Table 1 of D1, the appellant argued that the values of Dn and Dw were so different from each other that the dispersion obtained in example 7 was necessarily bimodal, as shown in D4 and D9.

However, the question to be answered here is not if a dispersion having Dw and Dn according to example 7 of D1 might have a bimodal particle size distribution, but rather if it can be concluded from the information provided in D1 that said dispersion could only have been bimodal. In that respect, it is agreed with the conclusion in section 3.2 of the contested decision that it was not shown that significantly different values of Dn and Dw necessarily mean that a bimodal particle size distribution exists: those parameters merely constitute two different ways of characterising the average particle size of the dispersion. No evidence was submitted either to support the appellant's argumentation or to refute the opposition division's conclusion. It was not contested that it is shown by D4/D9, which were intended to be a reproduction of example 7 of D1 (however, see section 2.1.4 below), that a bimodal dispersion may exhibit significantly different values of Dn and Dw. However, D4/D9 do not constitute proof that any dispersion having significantly different values Dn and Dw mandatorily has a bimodal particle size distribution. Under such circumstances, the appellant's argument has to be rejected.

2.1.4 In order to demonstrate that the dispersion of example 7 of D1 did indeed exhibit a bimodal particle size distribution, the details of the preparation process underlying the data of D4 was provided (D9 using a scaling factor of 0.95).

However, the dispersion disclosed in example 7 of D1 exhibits different characteristics to that prepared in D4/D9, e.g. in terms of solids content (D1: 70.2; D9, pages 2-3: 72.9), Dw (D1: 2100 nm; D9, page 2: 2672 nm) and Dn (D1: 155 nm; D9, page 2: 362 nm). Not only the values of each of Dw and Dn are different, but also the ratio of Dw/Dn of the dispersion of example 7 (13.6) is significantly higher than that obtained in D9 (7.4), which demonstrates different polydispersities (which quantifies distribution width). The appellant's argument according to which those discrepancies were the consequence of the determination method used and of the variability inherent to polymer chemistry is not supported by any evidence. Besides, considering the significant differences observed, it is not persuasive.

It is further agreed with the respondent that the disclosure of example 7 of D1 is ambiguous in various aspects e.g.

- the composition of the ethylene-vinyl acetate prepared (e.g. ethylene:vinylacetate amounts) is not indicated so that it is not possible to determine exactly what was done;
- the amount of ethylene used in the dosage stage (see D1: page 6, line 17): it is not clear whether the amount of 40 kg indicated is the total amount of ethylene used (together with the ethylene present from the start: page 6, line 9 of D1) or

whether it is only the amount of ethylene added during the dosage step. Although the technical expert of the appellant explained during the oral proceedings before the Board that in view of the process used the 40 kg could only mean the total amount, no evidence was provided to demonstrate that the other interpretation would mandatorily be wrong;

- there is no indication how much/long the initiators (peroxide and ascorbic acid) are added (D1: page 6, lines 11-12). Nor are the details of the reaction termination and postpolymerisation given (D1: page 6, lines 17-20). Although the appellant explained in its statement of grounds of appeal (page 14/28) that standard methods were known in that respect, there is no information in that sense in D2. Besides, even those explanations leave place for variation (e.g. it is indicated that the initiators are "typically" added "at least" until the end of the monomer addition).

Therefore, there exist a number of uncertainties in the disclosure of example 7 of D1, which means that it is questionable if that example may be reworked in a reproducible manner.

Considering those uncertainties, it is also not possible to conclude whether or not the process steps adopted in D9 e.g. in respect of the ethylene dosage, the initiators feed and/or the final stage are the same as those effectively used in example 7 of D1. In that respect, it has not been demonstrated by the appellant that modifications of those steps would not affect the properties of the dispersion, in particular in respect of bimodality. Nor was any evidence provided to refute the conclusions already drawn by the opposition division's in that respect (section 3.3 of the decision).

On the basis of those considerations, it cannot be concluded that the evidence on file supports the appellant's position that the dispersion prepared in example 7 of D1 mandatorily has a bimodal particle size distribution as defined in claim 1.

2.1.5 Therefore, it cannot be concluded that the implicit disclosure of example 7 of D1 anticipates the subject-matter of claim 1.

2.2 The process according to granted claim 2 is characterised *inter alia* by the combination of the following features:

a) it is a batch process;
b) the process is for forming an ethylene-vinyl acetate dispersion;
c) polyvinyl alcohol is used as stabiliser in an amount of 4 to 10 percent, based on the weight of the polymer solids;
d) the solids level is greater than 65 wt.%;
e) the viscosity when measured at 65 percent solids at 25°C is less than 5000 mPa.s.

2.2.1 Regarding feature a), the meaning of "batch process" was disputed by the parties, in particular regarding whether or not that term encompasses embodiments in which all the monomers used to prepare the polymer had to be present in the reactor from the start or if they could be added e.g. in part in the course of the process.

In that respect, the appellant filed D7, which is an exert of Wikipedia concerning "Chargenprozess", which is the German term for "batch process" as confirmed in the second and third paragraphs on page 1 of D7. Therefore, D7 is held to represent the common general knowledge i.e. what the skilled person would have understood by the term "batch process". Accordingly, it is indicated that in a batch process, all the reactants are charged in the reactor from the start (D7: page 1, paragraph starting with "*Batchprozess* (englisch *batch*: "Stapel") ist ..." and paragraph "Zeitlicher Ablauf / vollständige Befüllung"). No other evidence was relied upon, in particular by the appellant, showing that the term "batch process" also encompasses embodiments in which the monomers are fed to the reactor in the course of the process.

It is true that granted claim 5 is directed to a preferred embodiment of the process of claim 2 and is characterised in that "all monomer is added prior to commencing the reaction". Considering the above reading of "batch process", claim 5 is either redundant or casts doubts as to the reading of "batch process", in particular whether or not a "batch process" encompasses embodiments in which the monomers may not be all present from the start. However, according to paragraph 17 of the patent, the polymerisation process of the patent "is a batch process, involving a single reactor with all monomer added prior to commencing the reaction". Therefore, that reading is in line with the general understanding of that term as given in D7. Furthermore, it provides a definition of that term in the sense of the patent read in its whole, thereby confirming how that term in claim 2 was to be read in the context of the patent.

Therefore, in the present circumstances of the case, the term "batch process" is read as imposing the requirement that all monomers have to be present in the reactor before starting the reaction.

2.2.2 The appellant argued that D1 disclosed all the technical features of claim 2.

In that respect, D1 deals with a process for forming ethylene-vinyl ester dispersions in the presence of a stabilising system consisting of polyvinyl alcohol without addition of other surfactants, the dispersions having a solids content higher than 65% an a Brookfield viscosity of less than 10000 mPa.s (claim 1).

2.2.3 Although D1 does not explicitly discloses "batch processes" according to above feature a), it is indicated in paragraph 30 of D1, that the monomers may be included in their entirety in the initial charge, metered in in their entirety, or included partly in the initial charge. Following the conclusion drawn in section 2.2.1, the first of those embodiments corresponds to a "batch process" according to granted claim 2.

2.2.4 Regarding feature b), although ethylene-vinyl acetate comonomers belong to the list of preferred embodiments (page 4, line 1; examples) the general disclosure of D1 is not limited to those polymers and is directed to a larger group, namely ethylene-vinylester dispersions (claim 1; paragraph 18), optionally comprising other comonomers (claims 2-3; paragraphs 20-22). Therefore, ethylene-vinyl acetate dispersions are disclosed in D1 as an element within a list of several alternatives.

2.2.5 In respect of above feature c), D1 teaches that polyvinyl alcohol is used in an amount of 1 to 20 wt.%

based on the total weight of monomers (paragraph 29). There is, however, no indication in D1 that polyvinyl alcohol is to be used in an amount of 4 to 10 percent, based on the weight of the polymer solids.

2.2.6 According to paragraph 35 of D1, the dispersions prepared therein may have a solids content of >60 wt.%, pref. >65 wt.%, most pref. >70wt.% and have a viscosity of <10000 mPa.s, pref. <5000 mPa.s. Therefore, a dispersion fulfilling the requirements according to above features d) and e) is not specifically disclosed in said paragraph 35 and may only be arrived at after making at least two selections in respect of solids content and viscosity level.

2.2.7 In view of the above, the combination of features according to granted claim 2 is not directly and unambiguously disclosed in the claims and/or in the description of D1 but may only be arrived at after performing a series of selections of features disclosed individually in the description of D1, namely ethylene-vinyl acetate dispersion, batch process, amount of polyvinyl alcohol, solids level and a specific viscosity level at 65% solids.

2.2.8 The process used in the examples of D1, in particular in example 7, comprises dosing part of the monomers during the polymerisation process (D1: page 6, lines 15-17). Consequently, said process is not a "batch process" in the sense of the patent in suit (see above section 2.2.1). Therefore, at least for that reason, the examples of D1, including example 7, do not anticipate the subject-matter of granted claim 2.

It was further not shown that modifying example 7 following the teaching of paragraph 35 of D1, i.e. into a process in which the monomers are included in their entirety in the initial charge, could be performed using the same amounts of reactants and reaction conditions as used in example 7 and would mandatorily lead to a dispersion satisfying the solids content and viscosity requirements specified in granted claim 2.

2.3 The subject-matter of claims 1 and 2 of patent in suit is consequently novel over D1.

2.4 In the absence of any other novelty objections raised by the appellant against the patent in suit, the main request meets the requirements of Art. 54 EPC.

3. Inventive step

3.1 Closest prior art

3.1.1 As agreed by the parties, D1 is prior art under Art. 54(3) EPC and may not be considered for the assessment of the inventive step.

3.1.2 Both parties as well as the opposition division considered D2 as the closest prior art.

D2 discloses a process for producing a vinyl acetate/ethylene aqueous based emulsion containing polymerized vinyl acetate/ethylene resin particles, wherein said polymerized resin particles contain from 65% to 95% vinyl acetate by weight, from about 5-35% ethylene by weight and 0 to 10% of a comonomer by weight, the improvement for producing a high solids vinyl acetate/ethylene based emulsion which comprises:

- effecting polymerization in at least two backmixed reaction vessels in series comprised of a primary vessel reaction vessel and a secondary reaction vessel wherein the reactants and products are continuously and sequentially introduced and removed respectively; and

- effecting polymerization in the presence of a stabilizing system consisting essentially of low molecular weight poly(vinyl alcohol) having a degree of polymerization of from 50 to 3000 and having a molar hydrolysis value of from 87 to 99% (claim 1).

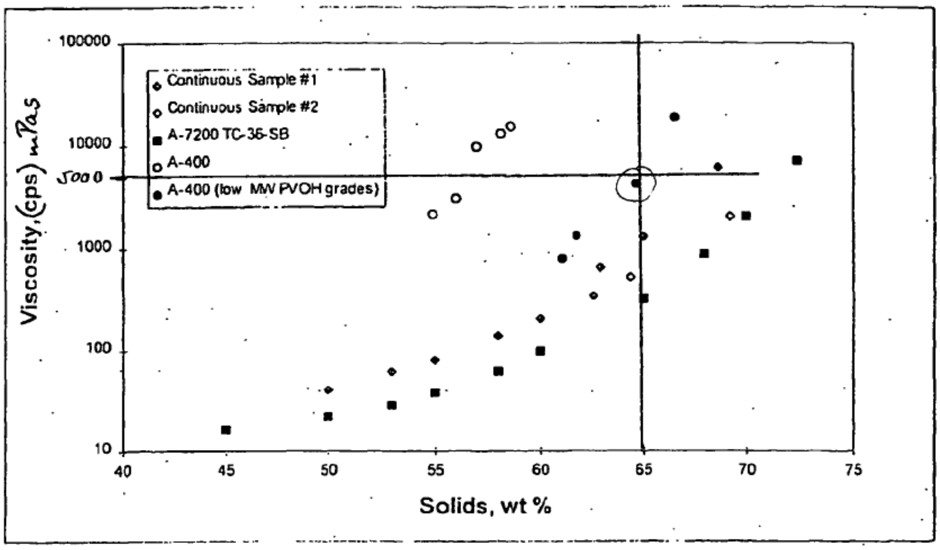
It is further unambiguously disclosed throughout the whole disclosure of D2 that the core of that invention resides in using a continuous process (claims 1 and 9; Fig. 1; paragraphs 16, 20, 23, 25, 28; examples 1-3) and to do so in order to improve the usual batch process according to the prior art (paragraphs 17, 30 and 54-56; comparative examples 5-8).

Each of examples 6-8 of D2 is a comparative example dealing with a dispersion prepared using a batch process. The dispersion of example 6 has a viscosity of 1320 cps (which is identical with 1320 mPa.s) at 61.8% solids and 25°C (see paragraphs 50 and 39) and, after having removed water therefrom of 18,850 cps at 66.6 % solids (comparative example 7; paragraph 51).

In example 8, a comparison of the particle size of several emulsions was made in order to determine if there was a correlation to viscosity and emulsion solids (D2: paragraph 52). According to paragraph 53 of D2, Table 7, which is reproduced below as evaluated by the appellant in D11, shows characteristic viscosity-solids relationships for various emulsions.

Table 7

Viscosity-Solids Relationships for Batch and Continuous VAE's



In said figure of Table 7

- Continuous sample #1 and #2 correspond to dispersions prepared according to the teaching of D2;
- A-7200 TC-36-SB corresponds to a commercial ethylene-vinyl acetate dispersion produced at high solids level (Airflex 7200 at 72% solids);
- A-400 corresponds to a commercial ethylene-vinyl acetate dispersion produced at standard solids level (Airflex 400 at 55% solids);
- A-400 (low MW PVOH grades) appears to correspond to an ethylene-vinyl acetate dispersion produced using a batch process and a combination of two low molecular weight polyvinyl alcohol (Airvol 203 and 107) as used in example 6 of D2 (see paragraph 55 of D2);

It is derivable from said Table 7 (taking into account that the scale on the y-axis/viscosity is logarithmic) that none of the dispersions prepared using a batch process solved the problem aimed at in D2, which was to prepare dispersions having a viscosity of <3000 cps at 65% solids (D2: paragraph 15; claim 7).

3.1.3 The data point of Table 7 that was encircled by the appellant in D11 (figure shown above) exhibits a viscosity below 5000 cps at a solids content below 65% (above figure: encircled point next to the point of intersection of the horizontal and vertical lines drawn by the appellant). The question arose whether the data of that experimental series provided evidence for a dispersion satisfying the viscosity requirement specified in granted claim 2 i.e. a viscosity of less than 5000 mPa.s at solids level >65 wt.%. In that respect, in the Board's view, no conclusion can be drawn from the above Table 7: the figure is so small that a deviation of half a millimeter in drawing either of the two lines could lead to different conclusions. Besides, in the absence of any raw data concerning said encircled point and the next one of the same series "400 (low MW PVOH grades)" at about 66-67% solids, no conclusion can be drawn regarding a linear extrapolation between those datapoints. That exercise is in particular complicated by the fact that the viscosity axis is logarithmic and because Table 7 of D2 shows a sharp increase in viscosity above 65% solids for the dispersion "400 (low MW PVOH grades)". Therefore, the appellant has not demonstrated that D2 discloses, explicitly or implicitly, that a dispersion satisfying the viscosity requirement specified in granted claim 2 may be prepared using a batch process according to the "400 (low MW PVOH grades)" series, given for comparison.

There is also no information whether or not the dispersions prepared in the comparative examples of D2 have a bimodal particle size distribution.

In the Board's view, the selection by the appellant of a dispersion disclosed in D2 and prepared using a batch process (e.g. comparative example 6 or the encircled datapoint of above Fig. 7) as closest prior art may not be arrived at by considerations arising from the prior art itself, but only by relying on technical similarities between the claimed invention and the features of D2, i.e. with knowledge of the claimed invention (hindsight).

Under those circumstances, none of the comparative examples of D2, in particular not comparative example 6, can be considered as representing the closest prior art, that conclusion being valid, as explained above, for both granted claims 1 and 2.

3.1.4 Examples 1-3 of D2 deal with the preparation of ethylene-vinyl acetate dispersions using a continuous process according to the teaching of D2. Said dispersions exhibit viscosities of 505 cps at 64.1% solids, 1985 cps at 69.2% solids and 690 cps at 65.5% solids, respectively (paragraphs 40, 41 and 42 of D2). Regarding said example 1 it is further credible, considering its viscosity at 64.1% solids, the problem addressed in D2 and the shape of the curves of Table 7 shown above concerning the "continuous" data that said dispersion would exhibit a viscosity of less than 3000 cps, i.e. less than 5000 mPa.s at 65% solids as specified in granted claim 2 and aimed at in the patent in suit (paragraphs 1 and 22).

Therefore, each of examples 1-3 of D2 is an appropriate starting point for the analysis of the inventive step of each of granted claims 1-2.

However, the respondent further confirmed during the oral proceedings before the Board that Table 2 of D2 effectively shows that the dispersion prepared in example 3 of D2 has a bimodal particle size distribution since it exhibits two maxima. In contrast thereto, it was neither argued by the parties, in particular the appellant, that Table 1 of D2 shows that the dispersion prepared in example 1 had a bimodal particle size distribution, nor does said curve exhibit two maxima. Considering that the dispersion of example 2 of D2 is disclosed as being obtained by removing water from the dispersion of example 1 (paragraph 41), there is no reason to expect that it has a bimodal particle size distribution. Therefore, example 3 of D2 is the most promising starting point to be considered in respect of granted claim 1, which is specifically directed to bimodal dispersions.

3.2 Problem to be solved in view of the closest prior art

According to paragraphs 1 and 6-7 of the patent in suit the problem to be solved is to provide high solids (i.e. greater than 65 percent solids) ethylene-vinyl acetate dispersions using polyvinyl alcohol as the stabilising system and without additional surfactants. In the absence of any comparison between the patent in suit and D2, either in respect of the dispersions or the process according, respectively, to granted claims 1 and 2, the problem to be solved can only be defined as residing in the provision of an alternative dispersion and/or an alternative process to those of D2.

3.3 Solution

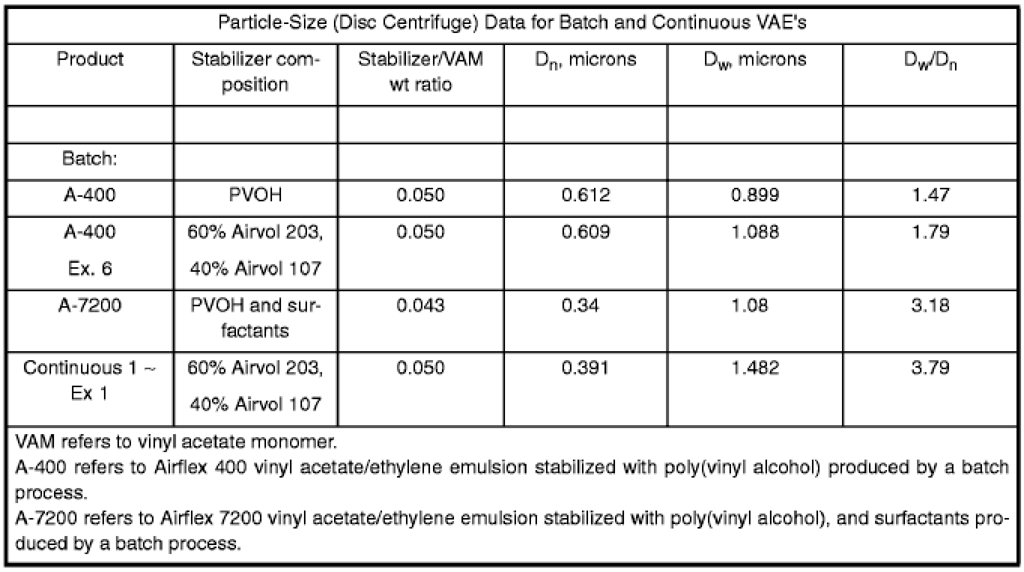
3.3.1 The solution claimed in the patent resides in a composition according to granted claim 1 and/or in a process according to granted claim 2.

3.3.2 The features of granted claim 1 concerning the ethylene-vinyl acetate dispersion, polyvinyl alcohol as dispersant, the solids level, and "surfactant free" are all explicitly disclosed in example 3 of D2 (paragraph 42). As explained above (section 3.1.4 in respect of Table 2 of D2), the bimodality of the dispersion prepared in example 3 of D2 is implicitly disclosed in Table 2 of D2. Therefore, the composition according to granted claim 1 only differs from the dispersion prepared in example 3 of D2 in that the amount of polyvinyl alcohol must be from 4 to 10 percent, based on the weight of the polymer solids, which is not explicitly disclosed in D2.

In that respect, the appellant argued that it was derivable from D2 that all examples were performed using the same amount of polyvinyl alcohol and that Table 6 of D2 in combination with D10 showed that 4 percent polyvinyl alcohol, based on the weight of the polymer solids, was used.

However, Table 6 of D2 reads as follows:

Table 6



Particle-Size (Disc Centrifuge) Data for Batch and Continuous VAE's					
Product	Stabilizer composition	Stabilizer/VAM wt ratio	D_n, microns	D_w, microns	D_w/D_n
Batch:					
A-400	PVOH	0.050	0.612	0.899	1.47
A-400 Ex. 6	60% Airvol 203, 40% Airvol 107	0.050	0.609	1.088	1.79
A-7200	PVOH and surfactants	0.043	0.34	1.08	3.18
Continuous 1 ~ Ex 1	60% Airvol 203, 40% Airvol 107	0.050	0.391	1.482	3.79

VAM refers to vinyl acetate monomer.
A-400 refers to Airflex 400 vinyl acetate/ethylene emulsion stabilized with poly(vinyl alcohol) produced by a batch process.
A-7200 refers to Airflex 7200 vinyl acetate/ethylene emulsion stabilized with poly(vinyl alcohol), and surfactants produced by a batch process.

Whereas "Continuous 1" is an example illustrative of D2, all other examples are for comparison. A-400 and A-7200 are commercial products (D2: paragraph 53) and A-400 Ex. 6 appears to represent comparative example 6 of D2 i.e. a conventional batch process carried out on the same polymer reactant composition as in example 1 of D2, namely a mixture of two low molecular weight polyvinyl alcohol Airvol 203 and 107 (D2: paragraphs 49 and 53).

Although it may be derived from D2 (paragraph 53) in combination with D10 (Table 2, examples 8 and 12 and page 6, lines 33-38) that in Table 6 "A-400" and "A-7200" represent ethylene-vinyl acetate dispersions comprising "about" 80 wt.% vinyl acetate and 20 wt.% ethylene (D10: page 7, lines 5, 19 and 26), there is no evidence on file regarding the composition of the ethylene-vinyl acetate dispersions prepared either in example "A-400 Ex. 6" or in any of examples 1-3. Under such circumstances, it cannot be concluded that the ethylene-vinyl acetate dispersions prepared in examples 1-3 of D2 mandatorily contain 80 wt.% vinyl acetate and 20 wt.% ethylene, as argued by the appellant. In that respect, the burden of the proof rested on the appellant which burden, in the light of evidence on file, was in the present case not discharged. That conclusion is in particular reinforced by the fact that the appellant has at no point of the proceedings, in particular not during the oral proceedings before the Board, submitted that example 3 of D2 would be novelty destroying for granted claim 1, which would have been the case had it been demonstrated that it was carried out with an amount of 4 per cent polyvinyl alcohol based on the weight of the polymer solids. Under such circumstances, it was not demonstrated which amount of polyvinyl alcohol, based on % solids, is present in the dispersion prepared in example 3 of D2.

For those reasons, the subject-matter of granted claim 1 differs from the polymer composition according to example 3 of D2 in that polyvinyl alcohol is present in an amount of 4 to 10 per cent based on the weight of the polymer solids.

3.3.3 The process according to granted claim 2 differs from that according to any of examples 1-3 of D2 at least in that it is a batch process and not a continuous process. Besides, the amount of polyvinyl alcohol based on % solids is, as explained in section 3.3.2, neither explicitly nor implicitly disclosed.

3.4 Success of the solution

Example 1 of the patent in suit concerns a composition according to granted claim 1 and examples 1-10 and 14-15 deal with processes according to granted claim 2. Therefore, the problem identified above is credibly solved, which was not contested by the appellant.

3.5 Obviousness

3.5.1 The question to be answered is if the skilled person desiring to solve the above identified problem would, in view of the prior art, have modified the disclosure of the closest prior art in such a way as to arrive at the claimed subject matter.

Regarding granted claim 1

3.5.2 According to D2, the ethylene-vinyl acetate dispersion prepared in example 3 is prepared by removing continuously the dispersion first prepared in a primary reactor, charging it to a secondary reactor to carry out the final polymerisation and finally continuously feeding the dispersion of the secondary reactor to a degasser (paragraph 36-38; Fig.1). The only information regarding the amount of polyvinyl alcohol in respect of example 3 of D2 is that "The poly(vinyl alcohol) blend was added to maintain a stabilizer level of approximately 5 % by weight based upon vinyl acetate introduced to the primary reactor" (page 5, lines 36-37). There is no evidence on file regarding how that amount translates in terms of "percent, based on the weight of the polymer solids" as defined in claim 1. There is in particular no hint in D2 that would have motivated the skilled person to use an amount of polyvinyl alcohol so as to arrive at the range defined in granted claim 1.

Besides, it is neither derivable from D2 nor is there any evidence on file that the bimodality shown in Table 2 for the dispersion prepared in example 3 of D2 would mandatorily be maintained should an amount of polyvinyl alcohol as defined in granted claim 1 be used. In that respect, the teaching of paragraph 23 of the patent in suit and the associated argument submitted by the respondent during the oral proceedings before the Board, according to which the bimodality is strongly process dependent, was not disproven by the appellant. The appellant's argument according to which the bimodality is primarily obtained because of the use of a seed emulsion (D2: claim 9 b)) is not supported by any evidence. In that respect, according to the teaching of D2, the seed emulsion is used to provide a broad particle size distribution (paragraph 24). Further considering that Tables 1 and 3 of D2, both relating to dispersions prepared using a seed emulsion, show that use of a seed emulsion even in similar processes does not mandatorily lead to dispersions having a bimodal particle size distribution, the appellant's argument is not persuasive.

Therefore, in the circumstances of the present case, it is concluded that the skilled person would have had no motivation to solve the above problem by modifying the amount of polyvinyl alcohol used in example 3 of D2 so as to arrive at the subject-matter of granted claim 1.

Regarding granted claim 2

3.5.3 As explained in section 3.1 above, D2 is directed to finding an alternative to batch processes (D2: paragraph 17) and even teaches away from using batch processes without additional surfactants (D2: paragraphs 56; comparative examples 6-7). Besides, it was not shown that D2 discloses any batch process which permit the preparation of ethylene-vinyl acetate dispersions satisfying the viscosity requirement defined in granted claim 2 i.e. a viscosity of less than 5000 mPa.s at 65% solids.

The same considerations as in section 3.5.2 also apply in respect of the amount of polyvinyl alcohol.

For those reasons, the skilled person would have had no motivation to solve the above problem by modifying the continuous process used in any of examples 1-3 of D2 so as to arrive at the subject-matter of granted claim 2, i.e. to modify the continuous process to a batch process and simultaneously use an amount of polyvinyl alcohol of 4 to 10 percent based on the weight of the polymer solids.

3.5.4 For those reasons, the subject-matter of granted claims 1 and 2 is inventive.

Considering that granted claims 3-7 are dependent on claim 2 and that no further objection was raised in respect of any of granted claims 8-11, the subject-matter of those claims is also inventive.

3.5.5 The main request of the respondent (patent proprietor) being allowable, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

Beschwerdekammern des Europäischen Patentamts
Boards of Appeal of the European Patent Office
Chambres de recours de l'Office européen des brevets

B. ter Heijden M. C. Gordon

Decision electronically authenticated