

**Internal distribution code:**

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

**Datasheet for the decision  
of 21 October 2014**

**Case Number:** T 1539/11 - 3.3.06

**Application Number:** 97914915.0

**Publication Number:** 0892673

**IPC:** B01J20/02, B01J20/26,  
B65D81/26, B01J20/28, B01D53/26

**Language of the proceedings:** EN

**Title of invention:**  
DESICCANT ENTRAINED POLYMER

**Patent Proprietor:**  
CSP Technologies, Inc.

**Opponent:**  
Airsec S.A.

**Headword:**  
Desiccant entrained polymer/CSP

**Relevant legal provisions:**  
EPC Art. 100(c), 100(b), 100(a), 111(1)

**Keyword:**  
Amendments - extension beyond the content of the application  
as filed (no)  
Sufficiency of disclosure - (yes)  
Novelty - (yes)  
Remittal to the department of first instance - (yes)

**Decisions cited:**  
T 0608/07

**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 1539/11 - 3.3.06

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.06**  
**of 21 October 2014**

**Appellant:**  
(Patent Proprietor)

CSP Technologies, Inc.  
1030 Riverfront Center  
P.O. Box 710  
Amsterdam  
New York 12010 (US)

**Representative:**

Maiwald Patentanwalts GmbH  
Elisenhof  
Elisenstrasse 3  
80335 München (DE)

**Respondent:**  
(Opponent)

Airsec S.A  
6 rue Louise Michel  
F-94600 CHOISY LE ROI (FR)

**Representative:**

Hoffmann Eitle  
Patent- und Rechtsanwälte PartmbB  
Arabellastraße 30  
81925 München (DE)

**Decision under appeal:**

**Decision of the Opposition Division of the  
European Patent Office posted on 25 May 2011  
revoking European patent No. 0892673 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman**

B. Czech

**Members:**

G. Santavicca

S. Fernández de Córdoba

## Summary of Facts and Submissions

- I. The appeal lies from the decision of the opposition division revoking the European patent No. 0 892 673.
- II. Independent Claims 1, 28 and 38 as granted respectively read as follows:

*"1. A process for producing a moisture absorbing desiccant entrained polymer, said process comprising: causing a polymer to assume a molten state, said polymer acting as a moisture barrier in a solidified state;  
blending a desiccating agent into the polymer so that the desiccating agent is distributed within the polymer,  
blending a channeling agent into the polymer so that the channeling agent is distributed within the polymer thereby creating a blended mixture wherein the channeling agent consists of a material that transmits moisture at a rate greater than the polymer; and solidifying the mixture so that the channeling agent forms passages in the solidified mixture through which moisture is communicable to desiccating agent entrained within the solidified mixture."*

*"28. A composition comprising:  
(a) a substantially moisture impermeable polymer;  
(b) a channeling agent consisting of a material that transmits moisture at a rate greater than the substantially moisture permeable polymer; and  
(c) a desiccating agent;  
wherein:  
the desiccating agent has a greater affinity toward the channeling agent than towards the polymer; and*

*the channeling agent forms passages for moisture transmission through the composition."*

*"38. Container comprising the composition of any one of Claims 28 to 37 and a moisture sensitive item housed in the container."*

Dependent claims 2 to 27 and 29 to 37 are directed, respectively, to more preferred embodiments of the method according to Claim 1 and of the composition according to claim 29.

III. The patent had been opposed in its entirety on the grounds of Articles 100(a), (b) and (c) EPC.

The evidence cited during the opposition procedure includes the following documents:

- D14: WO 96/33108 A1;
- D15: EP 0 599 690 A1;
- D16: US 5,389,709 A;
- D18: US 5,288,532;
- D22: Declaration of Jean-Pierre Giraud dated 6/7/05;
- D24: Moisture uptake rate comparison of desiccant entrained polymers obtained according to the opposed patent and reference D14;
- D25: Documentation and test results - Moisture vapour transmission rates (MVTR);
- D26: Supplementary experimental data on the channel structure and properties of the compositions according to the opposed patent and D14;
- D27: Polymer Testing 5:27-36 (1985);
- D29: ASTM "Standard Test Method for Water Vapour Transmission Rate Through Plastic Film...", Designation F 1249-90 (Reapproved 1995);
- D34: Experimental Report on the reproduction of Sample no. 7 of Example 1 as disclosed in D18;

- D35: Experimental Data submitted with the Patent Proprietor's letter of 1 October 2010;
- D36: Declaration by Professor Fredrickson of 27 September 2010;
- D37: EP 1 159 340 B1;
- D38: Supplementary Experimental Data, submitted with the Patent Proprietor's letter of 14 March 2011;
- D39: Supplemental Declaration of Professor Fredrickson of 10 March 2011.
- IV. The Opposition Division decided *inter alia*:
- a) to admit documents D35, D36, D38 and D39 into the proceedings;
  - b) that the patent as granted did not extend beyond the content of the application as filed;
  - c) that the subject-matter of Claim 28 as granted was novel over documents D14, D15, D16 and D18. In respect of D14, it was held that the priority claimed was enjoyed for some specific embodiments of the claimed subject-matter, so that D14 was prior art under Article 54(2) EPC to the extent that the priority was not validly claimed and prior art under Article 54(3) EPC to the extent that the priority was validly claimed; and
  - d) that the subject-matter of the claims as granted was not sufficiently disclosed.
- V. In its statement setting out the grounds of appeal, the Appellant maintained the claims as granted (Main Request) and submitted amended sets of claims as First to Eighth Auxiliary Requests, arguing the invention was sufficiently disclosed.
- VI. With its reply, the Respondent filed a reprinted copy of D34 and maintained objections under Article 100(a),

(b) and (c) EPC against the patent as granted and also raised objections against the auxiliary claims requests. The Respondent also held that Claim 28 as granted was not entitled to priority to its full extent and that D14 was thus prior art under Article 54(3) EPC to the extent the priority date was valid, and prior art under Article 54(2) EPC to the extent the priority date was not valid.

- VII. In its reply, the Appellant rebutted the objections raised by the Respondent.
- VIII. With letter of 19 September 2014, the Respondent submitted a further document (FICPI, Memorandum on claiming multiple priorities), expanded on the issue of priority and provided further arguments regarding the issues of added subject-matter, insufficient disclosure and lack of novelty.
- IX. Oral proceedings were held on 21 October 2014. The issues debated were the construction of Claim 28, added subject-matter, sufficiency of disclosure and novelty, with a strong focus on Claim 28.
- X. The Appellant (Patent Proprietor) requested that the decision under appeal be set aside and that the patent be maintained as granted (Main Request) or, in the alternative, on the basis of the claims according to one of the First to Eighth Auxiliary Requests filed with the statement of grounds of appeal.
- The Respondent (Opponent) requested that the appeal be dismissed.
- XI. The arguments of the Respondent of relevance for the decision can be summarised as follows:

*Construction of Claim 28*

- a) The claim language was not clear, in particular as regards the extent of formation of the channels throughout the composition as well as their extension through the composition. It was not clear from the wording that channels had to be present all across the composition and necessarily connected opposed surfaces, in particular as the term "*through*" in Claim 28 was different from the term "*throughout*" mentioned in the description of the patent in suit. Nevertheless, the Respondent indicated at the oral proceedings that for permitting the assessment of the other pending issues it was willing to agree that, as shown in Figures 1 to 3 of the patent in suit, the term "*through*" used in Claim 28 meant that channels were present throughout the composition and contacted connected opposed external surfaces thereof, and that the term "*greater affinity*" implied some form of contact or close proximity between desiccating and channeling agents.

*Added subject-matter (Article 100(c) EPC, first clause)*

- b) Considering the meaning of "*through*" as accepted at the oral proceedings, there remained two objections under Article 100(c) EPC against Claim 28: One regarding the undefined shape of the claimed composition and another one considering that the feature "*channeling agent consisting of a material*" was not disclosed in the application as filed.
- More particularly, the application as filed did not contain any claims directed to a composition



of undefined shape. Original Claims 40 and 41 concerned a desiccating enclosure and an insert, i.e. two shaped objects.

Moreover, according to the application as filed the "material" was preferably made up of more than one compound ("polyglycols" on page 20, line 15). Thus, the term "channeling agent" could not consist only of one material, since there was no *verbatim* original disclosure of "consisting of". To the extent that it referred to a composition of undefined shape and to channeling agent "consisting of a material", claim 28 extended beyond the disclosure of the application as originally filed.

#### *Insufficiency of the disclosure*

- c) It was undisputed that the patent specification was silent with respect to methods for detecting the (formation of) channels as defined, i.e. on how a composition with such channels could be distinguished from a composition not containing them.

The common general knowledge invoked by the Appellant could not supplement this lack of disclosure, let alone the common general knowledge of a person skilled in packaging material that transmitted moisture, as the patent in suit concerned a desiccant designed to adsorb moisture, which was a technical field different from that of moisture transmitting packaging.

As to the materials of the composition, namely polymer, desiccant and channeling agent, the patent in suit disclosed several amount ranges thereof, which however were contradictory, thus of no help for the skilled person. As a case in

point, starch was mentioned in Paragraph [0030] as a desiccant agent but polysaccharides were mentioned in Paragraph [0047] as channeling agents. As concerns functional guidance, the terms "*hydrophilic*" and "*polar*" had a relative meaning. "*Affinity*" as mentioned in Claim 28 was not a clear concept, even if it were accepted that polarity played a role.

The disclosure of particular compositions, illustrated in Paragraph [0048] of the patent in suit, such as those with 40-70 wt.% desiccant, was in contradiction with the general disclosure in Paragraph [0033] of the patent in suit (e.g. 60 wt.% of desiccant with respect to the polymer). In other words, the specific composition of Paragraph [0048] could contain a desiccant loading from 75 up to 400%.

As regards the determination of the presence of channels, several methods were invoked, including scanning or transmission electron microscopy (SEM, TEM), dye penetration, moisture uptake and moisture vapour transmission rate (MVTR), as referred to in D22, D24, D26, D27 and D34. Contradictions were however apparent from the test results provided, all showing that the results depended to a great extent on the method used. D22 was supposed to show channel formation but did not make clear which determination method should be used. Since it used a control comprising two components only (polymer and desiccant agent), D22 could not prove that channels would be present in the composition made of three components (polymer, desiccant agent, channeling agent). As regards the jump in moisture absorption supposed to prove the formation of channels, neither the patent in suit nor D22 provided sufficient information on how to

assess it. Also, the explanation in Point 15 of D22 did not make clear what could be taken as an indication of channel formation. Thus, the difference in the results in D22 might merely have depended on higher transmission capability. D24 concerned moisture uptake but focused on percent of total capacity instead of absolute capacities.

D26 showed that there were a large number of methods to detect the formation of channels. Although TEM was said to be suitable for detecting the channel morphology claimed, spheres of latex were used in the model system chosen. Thus, it was not clear how this method could be used to detect channels. If dye penetration was quick and simple, why was it not used instead of TEM or MVTR? In respect of MVTR, one of the methods referred to in D26, it was not made clear in D26 when an MVTR increase was to be considered as an indication for significant channel formation.

D37, a patent belonging to the same technical field as the patent in suit, disclosed the use of SEM and, in Paragraph [0062], of swelling/weight loss analysis (thus moisture uptake) for determining the presence of channels in Films 1 to 3. Paragraph [0067] showed the use of Dynamic Scanning Calorimetry (DSC) to determine phase separation. Hence, it was not apparent from D37 that MVTR was the method that would have been contemplated for assessing whether the structure of Claim 28 was made. It was by no means apparent that the MVTR method was helpful in cases where moisture had to be kept in the desiccant. Nor was it apparent why the skilled person would have contemplated using the MVTR method to determine the formation of channels considering that the

language of the claim was not related to properties such as the passage of moisture from one side to the other but to the accessibility of desiccant by the surrounding moisture. Thus, the MVTR method was not a suitable method for determining the presence of channels.

Also, Declaration D36 (Professor Fredrickson), provided to show that a person skilled in the art would be drawn to use the MVTR test, did not however prove that MVTR was the appropriate method.

If MVTR were nevertheless taken, it would itself lead to contradictory results, as apparent from the data submitted with D35.

In particular the film from Formulation 2126 of D35, containing 68 wt% of polyethylene, was said to contain no channels, which result was in contradiction with the result for Film 2 of D37, which contained 68 wt% of propylene, and was said to contain channels. Formulation 2119 (containing 41% by weight of polyethylene) was said to contain no channels, whilst the patent in suit disclosed (Paragraph [0022]) that polyolefins were materials specifically suitable for the claimed structure. So a comparison between the results of D35 and D37 showed that the choice of the method to confirm the presence of channels in a specific composition was left to the skilled person, without any guidance on how to determine when channels were actually formed. From the allegedly sigmoid curves and the data provided in D35 it was not clear on which factors the increase in moisture absorption in the MVTR test was dependent. As a case in Point: transmission rate increased from 0.3 to 1.1 and to 6 when passing from Composition X2125 to Composition X2131 and then to Composition X2119,

although the same amount (9 wt%) of PEG was present.

The argument that a significant and discontinuous increase in moisture transmission could be regarded as indicating the presence of channels had no basis in the application as filed. Thus, even considering the test results obtained using MVTR, it would not be apparent which increase/rise in MVTR could be taken as a clear indication of channel formation.

It was case law (T 608/07) that if several methods could be used, which led to different results, the disclosure was insufficient.

The core of the line of the Respondent was that even when using the preferred embodiments of Paragraph [0048] of the patent in suit, it was not sufficiently disclosed how to confirm the presence of channels. In particular, how to find a value X (e.g. of vapour transmission) that could be taken as an indication of channel formation. Hence, even for the preferred examples of the patent in suit, it was not possible to detect whether a specific composition contained channels as claimed.

Therefore, the contradictions in the patent in suit itself, in the declarations and in the experimental data, in particular the contradiction with D37, hindered the skilled person from reproducing the invention without undue burden.

*Lack of novelty*

- d) D14 (pages 3, lines 1-5, and 9, lines 3-18, in particular line 14) disclosed a composition as defined in Claim 28 at issue, which contained 5% by weight of starch in polypropylene containing 10% by weight of desiccant. According to the

patent in suit, starch was a channeling agent. Hence, the sole question was whether channels were actually formed by the inclusion of 5% by weight of starch. The answer was yes, as D14 mentioned that the addition of 5% by weight of starch significantly increased the absorption rate by a factor of 2, compared to polypropylene containing 20% by weight desiccant and no starch. This significant increase was clear evidence of the presence of channels. The evidence provided by the Appellant to show that no channels were formed was not convincing, for the following reasons: D24 did not show an increase by a factor of 2, as disclosed in D14, so that D14 and D24 were not comparable. If considered comparable, D24 nevertheless confirmed (lowest two curves) an increase in adsorption, despite the fact that no starch was used, as disclosed in D14, but PVOH. Likewise, the results reported in D26 could not be taken as an indication of moisture uptake if, when starch was present, the uptake did not change by a factor of 2 as disclosed by D14. Also, it was not clear why the dye penetration was an indication of channel formation. The dye might simply migrate, by diffusion, hence even without channels. Furthermore, no experimental data concerning starch as channeling agent were available. Hence, D26 was not convincing. The results mentioned in D14 were indicative of channel formation, i.e. passages through which moisture was communicated to the desiccant, otherwise it was not apparent on which basis it might be held that D14 did not disclose the formation of channels. D14 named the same inventor as the patent in suit and pertained to Capitol Vial Inc, which related to the Patent Proprietor.

Even considering that the MVTR test according to D25 was more suitable than the other methods for showing the formation of channels, this did not mean that MVTR was the only suitable method. Instead, all methods were suitable for ascertaining the presence of channels of the compositions of D14.

Since D14 disclosed that its compositions could be injection moulded, the disclosure of D14 took away also the novelty of the process of Claim 1.

- e) D15 (Table 1) described in its Example 6 a composition for adsorbing moisture comprising, besides polymer (PS) and desiccant (gel powder) also cotton fibres as "preformed" channels. Cotton was a polysaccharide, and hence a suitable channeling agent according to the patent in suit. Cotton fibres implicitly fulfilled the function of transmitting moisture. It could not be excluded that (two or more) fibres reached the surfaces. Claim 28 did not contain any requirement of fully accessibility to the desiccant. Thus, D15 took away the novelty of the composition of Claim 28 as well as of the process according to Claim 1.
  
- f) Example 24 of D16 described a composition comprising ethylene vinyl alcohol (EVOH) (32% ethylene, 99.9% saponified), which according to the patent in suit was a channeling agent, and an anhydrous salt, which according to the patent in suit was a desiccant. These materials were blended with polypropylene (hydrophobic polymer) and with S-EVOH (89% ethylene, 91% saponified) polymer, and then formed into a film. After a certain time, this film presented phase separated irregular matter, not further explained in D16. Since

according to D37 (e.g. Paragraphs [0014] and [0068]) phase separation meant channel formation, such a channel formation must also take place in D16, otherwise contradictions arose. D16 thus took away the novelty of the composition of Claim 28.

- g) Sample 7 of D18 (Table A) was a composition containing 5% polyethylene oxide ("polyox"), 6% starch (as absorbent) and 89% of EVA (ethylene vinyl acetate). It absorbed twice as much liquid smoke as Sample 2 (5% polyox and 95% EVA). As shown in D34, the polyox formed channels and the starch particles were close to the polyox channels. Since according to the patent in suit starch was a desiccant, the assertion of the Appellant that the composition of Sample 7 of D18 did not form channels cast doubts on why in the patent in suit starch led to the formation of channels. The performance of Samples 2, 5 and 7 of D18 showed that Sample 7 had to contain channels. D18, which also disclosed that the sample was extruded (column 8, lines 52 ff; column 9, line 32ff) took away the novelty of the subject-matters of *inter alia* Claims 1 and 28.

XII. The arguments of the Appellant of relevance for the decision can be summarised as follows:

*Construction of Claim 28*

- a) The claimed composition was made up of hydrophobic polymer, desiccant and channeling agent, which was hydrophilic. These materials of different polarity were miscible in the melt but underwent phase separation upon solidifying and built an inter-penetrating network which trapped and stored the



desiccant agent and the channeling agent, which transmitted moisture at a greater rate than the polymer. The system was "percolating", permitted moisture to pass through as fast as possible for it to reach the desiccant agent. This implied that the passageways/the channeling agent reached the surface of the solidified polymer matrix, otherwise no communication to the desiccant in the composition would be possible. Moreover, the passages of channelling agent were in contact with the desiccant agent, as the consequence of the requirement that the desiccating agent had to have greater affinity for the channeling agent than for the polymer.

These meanings of the terms of Claim 28 were in accordance with the disclosure in Figures 1 to 3 and Paragraph [0050] (column 16, lines 14-19) of the patent in suit. The terms "*through the composition*" and "*greater affinity*" thus meant that channels were formed "*throughout*" the composition, connecting and opening into opposing surfaces thereof, and being "*in contact*" with the channeling agent as shown in Figures 1-3.

*Added subject-matter (Article 100(c) EPC, first clause)*

- b) As also found in the decision under appeal, several passages of the application as filed justified the claiming of a composition of undefined shape.

The second objection, raised with regard to "*consisting of a material*", appeared to be more of a semantic matter, as the application as originally filed disclosed that the channeling agent could be a single material (pages 20, lines 13-14). Thus, the composition defined in Claim 28

was directly and unambiguously disclosed in the application as filed.

*Sufficiency of the disclosure*

- c) The decision under appeal did not correctly reflect the common general knowledge and was legally wrong in several aspects, such as the allegedly missing information concerning a limit value and the channel detection method, and also in concluding that the skilled person did not know whether he was working inside or outside the scope of the claim. This was an issue under clarity but not under sufficiency.

If an insufficiency of disclosure were held to arise from a "grey area", i.e. an area of ambiguity between clarity and sufficiency, on which there was contradictory case law, a referral to the Enlarged Board should be considered by the Board, as suggested by the Appellant in writing. First of all, the claims were to be read on the basis of the common general knowledge. Claim 28 concerned a blend of three components and defined what they did in the composition.

The composition to be tested was not complex, it was made up of polymer, desiccant and channeling agent, all of which were specified in passages of the original description (Paragraphs [0046] (polymer) and [0028] to [0030] (desiccating agent)). By gradually varying the concentration of e.g the channeling agent, the skilled person could determine when the channels were formed. As to the alleged contradiction between the disclosure in Paragraphs [0048] and [0033] of the patent in suit, a loading of desiccant of 400% of the base

polymer was illogic and would be ruled out by the skilled person. That an error was present in Paragraph [0033] had been found also in the US patent litigation proceedings.

The preparation of a composition of three components for which sufficient guidance had been given in the patent specification did not amount to an undue burden for the skilled person: The base polymer was disclosed as such and in respect of its function; the channeling agent was to be miscible with the base polymer only in the molten state, whilst upon cooling it phase separated to form channels (as disclosed in Paragraphs [0039] and [0047] of the patent in suit); and, a specific embodiment to start with was disclosed in Paragraph [0048].

D22 showed that the preferred embodiments could be reproduced and its function tested.

As concerns the weight ranges, given that three components were used, a balance had to be found. Paragraph [0033] only gave a functional guidance, such as that with too much desiccant the product became brittle. Thus, the concept disclosed therein was clear.

D36 too showed that the skilled person would have no problem in carrying out the invention.

The function of the composition as regards moisture transmission, e.g. that the channels were passages to transmit moisture to the desiccating agent, was disclosed and could be confirmed by routine experiments known to the skilled person. As confirmed by D36, the skilled person using common general knowledge would consider different test methods, *inter alia*, moisture vapour transmission rate (MVTR), which was a basic industry standard, hence one of the first choices

for testing the function of the prepared material. Comparative tests D35 showed that the effects were clearly achieved. D38 supplemented D36. D34 only dealt with two-dimensional issues. SEM was suitable for a first check but not always as an absolute proof. D35 made it clear that an increase of the desiccant amount led to an increase of the capacity, that an increase of the channeling agent led to the formation of more channels, and that the increase of desiccant led to a non linear increase of capacity, which was however normal behaviour.

The objection that the MVTR method was not suitable, because vapour transmission was different from vapour absorption, was not convincing. Firstly, the Appellant had never said that MVTR was the only suitable method for determining the presence of channels and their function. The skilled person would choose any one of them, for instance, considering that the claim mentioned "*moisture transmission*", the MVTR test. The aim was to measure whether the desiccant was accessible for the moisture. MVTR was an indirect method to see what structure had been formed. An uptake method was also suitable. MVTR was suitable because it was an industrial standard, carried out under standard conditions, thus providing comparable results.

As regards the argument that the result depended on the method chosen, whatever method was used, a composition with three components would, of course, behave differently than a simpler composition. However, even if a grey area of incertitude arose thereby, the invention was reworkable without undue burden, by gradually changing the composition to discern the effect

thereof, such as a drastic change in properties, a jump, e.g. the one measurable with routine testing of concentration rows, wherein the onset of the curve indicated the formation of channels.

As concerns experiment X2119 and its alleged contradictions with the most preferred embodiments of the patent in suit, the material used were not the same (polyethylene in X2119 and polypropylene in the preferred embodiments). However, by testing different polyolefin materials additional information necessary for performing the invention could be gathered without undue burden.

As to the alleged lack of functional guidance, even if every method gave a different result, a balance could still be found between different methods, e.g. those of D22 and D26. Again, only a reasonable amount of trial and error was necessary, as only the presence of channels was to be ascertained.

Therefore, the Appellant had done whatever was necessary to show that the guidance given in the patent in suit in combination with common general knowledge enabled the skilled person as required by Article 83 EPC. No convincing evidence to the contrary had been submitted by the Respondent, on whom the burden of proof lay, who had merely cast doubts on the evidence of the Appellant, without providing clear evidence itself, let alone any reproduction tentative.

The claimed invention was sufficiently disclosed.

#### *Novelty*

- d) D14 did not disclose a composition comprising channels as claimed. The invoked example of D14 concerned a composition containing 5% by weight of

starch in polypropylene containing 10% by weight desiccant. The objection of the Respondent was based on the statement that, because of the addition of starch, the rate of adsorption was increased by a factor 2 over a composition containing polypropylene and 20% by weight desiccant. However, it had been shown in items of evidence D25, D26, D24 and D39 that no channels were formed in the composition disclosed by D14. In particular: D25 (second and penultimate compositions) showed that the composition of D14 was not percolating, i.e. included no channels, because the MVTR only increased from 0.310 (only PP and desiccant) to 0.667 when 5% by weight of poly-vinyl-alcohol (PVOH) was added, hence without any over-additive effect. This was even more apparent from the first curve in D24, which showed a huge improvement. The lowest two curves of D24 showed simple additive effect resulting from the inclusion of 5% by weight of PVOH, as disclosed by D14, hence no channels as claimed. Thus, D24 was neither in contradiction with the patent in suit nor with D14, which did not directly and unambiguously disclose any channel formation. D26 (Compositions X-2074 and X2085, and Figures 13/14) showed completely darkened areas, meaning that the composition disclosed by D14 did not have channels. D35 and D39 confirmed the absence of channels in the compositions disclosed by D14. Therefore, the objection that the composition of D14 contained channels was purely speculative, as the formation of channels was not the inevitable result of using starch or PVOH. D14 contained no more than the disclosure of a composition containing 5% by weight starch, however without channels, as shown by the fluorescent dye

penetration tests of D26. That the inventor of D14 was the same inventor of the patent in suit played no role, as a composition with channels might have been invented after the invention of a composition without channels. Thus, D14 was not novelty destroying for Claim 28. Since D14 did not directly and unambiguously disclosed a structure as claimed, and since the channel formation was to result from the steps used in the process of Claim 1, this process was also new.

- e) As to D15, the cotton fibres illustrated in its Example 6 had a maximum length of 2 mm, whilst the polymer material had a thickness of 3 mm, implying that the fibres did not form passages through the composition, suitable to carry moisture from the environment to the desiccant. Also, the very low amount of fibres, 1%, compared to 30% by weight silica powder, was not sufficient to form an adequate number of channels, even if the fibres were longer. The results in Table 2 of D15 were no evidence of channel formation. Furthermore, the materials for the fibres disclosed in D15 (page 2, lines 37-38) were not always suitable for quickly transmitting moisture. The somewhat ambiguous disclosure of D15 was not novelty destroying either, neither of the composition of Claim 28, nor of the process of Claim 1, as the required formation of passages in the composition through which moisture was communicable to desiccant agent entrained within the solidified composition was not directly and unambiguously disclosed.
- f) In D16, Example 24, the disclosed "phase separated irregular matters" could be anything. The composition of Example 24, a solitary example

within the context of D16, only contained 11.5% of ethylene vinyl alcohol (EVOH) and 1.9% of desiccant, the rest being polypropylene (PP). There was no disclosure in D16 of the formation of channels, let alone of channels suitable for transporting moisture. Indeed, the objective of D16 was merely to improve appearance. Therefore, D16 did not unambiguously disclose a composition containing channels as claimed.

- g) Sample 7 of Example 1 of D18 was a composition which contained 5% polyethylene oxide (polyox) and 6% starch. D34 was not conclusive evidence of channel formation in this composition of D18. Indeed, D38 (composition X2134) and D35 (composition X2134) showed that a liquid smoke test result as disclosed in D18 was not conclusive evidence as regards the presence of channels. Also, Sample 21 (Table C) of D18 (not containing starch) performed better than Sample 7. The best performing sample of D18 was Sample 4, not containing starch. D18 did not unambiguously disclose the composition of Claim 28. As to the process of Claim 1, D18 did not implicitly disclose a process which formed channels as claimed, as channel formation was not the inevitable result of using the process of D18. So D18 was not novelty destroying.

*Remittal*

- h) The case should be remitted to the Opposition Division for the examination of inventive step, before taking any decision against the Appellant.



## **Reasons for the Decision**

*Main Request (Patent as granted)*

*Claim construction*

1. Claim 28 concerns a "*composition comprising*" three materials:
  - "*a substantially moisture impermeable polymer*";
  - "*a material that transmits moisture at a rate greater than the substantially moisture permeable polymer*"; and
  - "*a desiccating agent*".
  
- 1.1 As regards the functions and properties of these materials within the composition, Claim 28 requires
  - that "*the desiccating agent has a greater affinity toward the channeling agent*", i.e. towards said "*material that transmits moisture at a rate greater than the substantially moisture impermeable polymer*", "*than towards the polymer*", and
  - that said "*material ...*" is not only suitable as channeling agent, but actually "*forms passages for moisture transmission through the composition*".
  
- 1.2 It is not in dispute that the features "*substantially moisture impermeable*" and "*desiccating agent*" have generally accepted meanings also referred to in more detail in the following passages of the patent in suit: Column 1, lines 31 -33 and 40-45; Column 6, lines 17-23; Paragraphs [0027] to [0030].

- 1.3 The "*greater affinity*" between desiccating agent and channeling agent is generally explained in the patent in suit (Paragraph [0032], in particular Column 10, lines 21-23): The desiccating agent is "*attracted to and more compatible with the channeling agent than with the polymer base*". Hence, the desiccating agent is preferentially concentrated in or near the channeling agent material in the finished composition, rather than being randomly, i.e. uniformly distributed throughout the polymer component.
  
- 1.4 The features according to which the channeling agent "*forms passages for moisture transmission through the composition*" require the actual formation of a plurality of passages, which must be suitable for moisture transmission and run "*through the composition*". This implicitly requires a sufficient amount of channeling agent forming a significant number of "*passages*" or channels well dispersed throughout the composition.
  - 1.4.1 The "*passages*" are nothing more than veins or bridges of channeling material that are suitable to transport moisture therethrough, from the exterior of the composition to the desiccant agent to its interior, as generally explained in the patent in suit (Paragraphs [0022], [0031] and [0032]).
  
  - 1.4.2 The function of "*moisture transmission*" has the generally known meaning, and is addressed in more detail in Paragraph [0022] of the patent in suit (in particular column 7, lines 46-56).
  
  - 1.4.3 As regards the "*passages ... through the composition*", the Board accepts the view of the Opposition Division and considers that the first meaning of "*through*" that

would come to the mind of the skilled person is "from end to end, side to side". The corresponding understanding of "*through the composition*" is also in accordance with the description of the patent in suit, see e.g. Column 8, lines 37-45: "... *channels or passages **through** the polymer. The channels are **open** at the surface of the polymer structures ...*" (emphasis added).

1.5 Thus, in the Board's judgement, the skilled person would understand that, in the context of Claim 28 read in the light of the description, the expressions "*greater affinity*" and "*through the composition*" mean that there must be a more or less pronounced contact between channeling agent and desiccating agent, and that a significant number of passages should run through the composition, such as to connect opposing surfaces thereof and to provide access for moisture to desiccant agent in its interior.

1.6 Correspondingly, Claim 1, which specifically requires a step of "*solidifying the mixture (in which the channeling agent is distributed within the polymer) so that the channeling agent forms passages in the solidified mixture through which moisture is communicable to desiccating agent entrained within the solidified mixture*" is to be construed as defining a process which inevitably produces a composition with all the features of Claim 28.

*Alleged extension beyond the content of the application as filed*

2. The Respondent maintained two objections against the composition of Claim 28, more particularly  
i) one regarding the undefined shape of the

"*composition*",

ii) the other against the feature "*the channeling agent consisting of a material*" (emphasis added).

2.1 In the assessment of objection i), the Board identified the following relevant parts of the application as filed (published as WO 97/32663 A1):

2.1.1 In the description:

- (a) "*polymer structures*", sentence bridging pages 10 and 11;
- (b) "*plastic structure*", page 13, line 23;
- (c) "*either thermally form, extrude or injection mold*", page 13, line 25;
- (d) "*desired shape*", page 16, lines 3-14, particularly lines 3 and 12;
- (e) "*the structures of the present inventions*", page 20, lines 2-3; and
- (f) "*converted pellets*", "*the formed pellets*", page 21, lines 18-19.

In the claims:

- (g) The process of Claim 1, which does not mention any specific shape resulting therefrom.

2.1.2 For the Board, it follows from the foregoing that insofar as Claim 28 at issue is directed to an implicitly solid composition of no specific shape, it is fairly based on the disclosure of the application as filed.

2.2 As regards the objection ii), the Board considered

2.2.1 the passage of the application as originally filed (page 20, lines 10-14) reading "... *the channeling agent used in the present invention can be generally*

**any hydrophilic material which is** miscible, or can be made miscible, with the polymer base matrix upon melt mixing ... In general, the preferred hydrophilic material **is a polar compound ...**" (emphasis added); and

- 2.2.2 the fact that the expression "*the preferred material ... has been found to be polyglycols*" (page 20, line 15) follows the above passage.
- 2.2.3 In the Board's judgement, these passages directly and unambiguously disclose that the channeling agent can "*consist*" of a material, which material may also be a single compound .
- 2.3 Claim 28 being fairly based on the application as filed, its subject-matter does not extend beyond the content of the application as originally filed.
- 2.4 Thus, the ground of opposition under Article 100(c) EPC (first clause) invoked by the Respondent does not prejudice maintenance of the granted patent.

#### *Sufficiency of disclosure*

- 3. According to the decision under appeal, the patent was insufficient because no method was specified therein which could be used for assessing whether or not a specific composition contained channels. In particular, the patent did not disclose a parameter to be measured, a method to be used to measure this parameter and the limit value to be compared with the value observed for the parameter, permitting to decide whether or not channels were present in the analysed sample. More particularly, if there were several methods known to the skilled person, as invoked by the Appellant, e.g. the allegedly preferred MVTR test, they would in any

case not deliver unambiguous results with respect to channel formation for the whole scope of Claim 28. That the different test methods invoked may lead to contradictory results was apparent e.g. from a comparison between D35 and D37. In the appeal proceedings, the Respondent maintained these objections.

- 3.1 Claim 28 as granted, as construed in Points 1.3 to 1.5, *supra*, concerns a composition of a substantially moisture impermeable polymer, a channeling agent material that transmits moisture at a rate greater than the substantially moisture permeable polymer, and a desiccating agent, wherein the desiccating agent is concentrated in or near to the channeling agent material which forms a significant number of passages running through the composition, i.e. from one surface to the other, thereby providing access for moisture to interior desiccant agent.
  
- 3.2 In the Board's judgement, the patent in suit sufficiently discloses materials and methods permitting to prepare compositions according to Claim 28 by carrying out a process according to Claim 1.
  - 3.2.1 In particular, as regards suitable materials that may be used in the preparation of the composition, enough guidance is provided in the patent in suit:
    - (a) Various suitable polymers are indicated in Paragraph [0046], which mentions *inter alia* the two most preferred polymers polyethylene and polypropylene.
    - (b) Suitable desiccant types are described in Paragraphs [0027] to [0031], and preferred desiccants are also mentioned in Column 9, lines 50-55.

- (c) Suitable channeling agents and their essential properties are described in Paragraph [0047], which also comprises additional indications on how to put the preferred ones to use.

3.2.2 The functions and/or properties that the materials need to have in a composition according to Claim 28 at issue, are also described in sufficient detail in the patent in suit, as follows:

- (a) Ad "*substantially moisture impermeable*": According to Column 16, lines 42-48; and the sentence bridging Columns 16 and 17, the polymer in question should be hydrophobic to act as a moisture barrier, although it may not be completely impermeable to moisture. It is clearly disclosed (and this was not contested) that polyethylene, and, more particularly, polypropylene are suitable for fulfilling this function.
- (b) Ad "*moisture transmission at a rate greater than the substantially moisture impermeable polymer*": The channeling agent should be hydrophilic and should have a relatively fast rate of moisture transmission, compared to the one of the hydrophobic polymer, so that it can act as "*moisture bridge*" through the hydrophobic polymer (Column 10, lines 35-39). The channeling agent must transmit moisture to the desiccant agent, which then retains said transmitted moisture (Column 10, lines 39-45; Column 16, lines 39-52).
- (c) Ad "*greater affinity*": The desiccant should be more compatible with, and possibly attracted by, the channeling agent (Paragraph [0032]), rather than with/by the polymer base. Hence, the desiccant should generally be more miscible, more dispersible, with(in) the channeling agent than

with(in) the base polymer. One way to achieve this expressly disclosed in the patent in suit (Paragraph [0032]) is selecting the materials according to their polarity. Thus, "*greater affinity*" implies that the desiccating agent will be located as close as possible to or even in contact with the channeling agent in the solidified composition, e.g. because of the higher compatibility between channeling agent and desiccant, so that the channeling agent can truly act as moisture bridge having a relatively fast transmission rate of moisture across the polymer (Paragraph [0032]).

- (d) Ad "*passages formation*": To be able to form passages within the hydrophobic polymer, upon cooling or segregation of the melt mixture, the channeling agent and the polymer base should "*not separate out into distinct levels or phases, one above the other, but should instead establish veined domains of channeling agent that extend across the polymer base thereby establishing channels or passages through the polymer*", i.e. up to and "*open at the surface of the polymer structures*" (Column 8, lines 37-45). This can be achieved with a polymer and a channeling agent which are highly miscible upon melting (Paragraph [0047], in particular Column 15, lines 6-13). The initially formed mixture of polymer, channeling agent and desiccant should thus separate, e.g. upon cooling, into different phases distributed within the composition.

3.2.3 As to the process for the preparation of the claimed composition, the description contains sufficient guidance in respect of preferred relative amounts of



polymer, channeling agent and desiccant (loading), of methods and apparatuses suitable for this purpose:

3.2.4 Paragraphs [0024], [0031] and [0058] to [0060] describe the steps of methods suitable for obtaining the claimed compositions, namely :

- (a) intimate mixing of all materials, even before melting them, if the materials are in solid, e.g. powdery, form (Column 8, lines 10-22);
- (b) melting the composition to achieve a thorough dispersion of all components;
- (c) solidifying (cooling and/or molding) the composition to form the passages (Column 12, lines 39-49; Column 15, lines 8-12 and 53-58; Column 16, lines 14-19 and 31-35);
- (d) suitable apparatuses and conditions for solidifying the mixture are mentioned in Paragraph [0049].

3.2.5 Preferred compositions are described in Paragraph [0048] of the patent in suit, which *inter alia* exemplifies a composition made up most preferably of 60 wt% of molecular sieves as desiccant, 30 wt% of polypropylene and 10 wt% of polyglycol as the channeling agent.

According to declaration D22, a mixture of these ingredients could be formed into a composition according to the invention without difficulties (Pages 3,4).

The argument of the Respondent that D22 did not disclose a method for detecting the presence of channels in the tested samples is not convincing. Point 14 of D22 describes a moisture adsorption test used to measure how quickly the desiccant adsorbed moisture. As

described in Paragraph [0032] of the patent in suit, the rate of transmission of the moisture across the polymer is related to the extent the channeling agent forms bridges between the desiccant particles, i.e. channels. The two samples tested in D22 differ only in the presence or absence (control) of a channeling agent and in the correspondingly varied amount of polymer. According to Point 15 of D22 the sample with channeling agent reached moisture saturation after 160 hours, whilst the sample without channeling agent did not even reach moisture saturation after 600 hours. For the Board, D22 thus makes it credible that the channeling agent inherently must have formed a significant number of passages permitting the substantially quicker moisture saturation.

The respondent merely cast doubts in this respect, but provided no counter evidence (such as SEM, TEM, Dye Penetration results) showing that the composition reproduced in D22 did not contain channels.

3.2.6 The Respondent's insufficiency objection based on the alleged contradiction between the preferred compositional ranges according to Paragraph [0048] and the more general indications in this respect in Paragraph [0033] is not convincing either for the following reasons:

- (a) The sentence "*maximum desiccant load of approximately sixty percent by weight with respect to the polymer base*" in Paragraph [0033] is wrong or at least ambiguous. Said ambiguity is due to the fact that said load does not refer to the total content of the components in the composition, is not defined as ratio desiccant/

polymer, and the expression "*with respect to*" is not (always) synonymous of "of".

- (b) The ambiguity is worsened in the following sentences of Paragraph [0033], which refer to a preferred desiccant load of 45-50 wt% and a preferred polypropylene content of 40 wt%. With polypropylene being 40 wt%, and a desiccant load of 60% or less in respect of polypropylene (i.e. at most 24%wt of the composition), the balance amount of channeling agent would have to be comparable or even higher than that of the hydrophobic polymer, so that no moisture barrier would likely be formed thereby.
- (c) The alleged contradiction between Paragraphs [0033] and [0047] is, however, immediately resolved if the loading in Paragraph [0033] is given the usual meaning of a content indicated in percent, i.e. expressed as percent of the total composition.
- (d) Moreover, the possibility of a load of desiccant of 400%, based on the amount of polymer only, as allegedly disclosed in Paragraph [0048] (when combining the mentioned maximum value of 80% desiccant and with the minimum value of 20% polypropylene) would exclude any presence of channeling agent, and would thus be ruled out by the skilled person.

Thus, the skilled person could detect and resolve the alleged contradiction without undue burden.

3.3 For the Board, it follows from the foregoing that the preparation of compositions as defined in Claim 28 is sufficiently disclosed and can be reliably carried out.

4. It remains to be assessed whether the skilled person was able to ascertain whether or not a given composition comprising the three essential ingredients and prepared following the guidance given in the patent in suit indeed contained channels as required by Claim 28 at issue.

4.1 Claim 28 requires the actual formation of a plurality of passages, which must be suitable for transmitting moisture, and which should run "*through the composition*". This implies that a sufficient (although not specified quantitatively) amount of channeling agent must be included. However, Claim 28 does not quantitatively define any limiting value for the moisture transmission and, hence, for any corresponding amount, fineness and degree of dispersion of the channels in the polymer matrix material, or for the moisture absorption efficiency of the channeled composition.

For the Board, considering also the general description of the compositions according to the invention given in Paragraph [0016] of the patent ("*channels through a desiccant entrained polymer*") and in Column 15, lines 11-13 ("*finely channeled, uniform structure*") Claim 28 merely defines a (sponge-like) morphology as illustrated schematically by Figures 1 to 4 of the patent, of the composition made up of the (functionally) defined materials, without implying any limiting size and density of the channels, or absorption efficiency of the (spongeous) structure.

4.1.1 Although the minimum amount of channeling agent is not defined in Claim 28, it has not been shown that the skilled person considering the guidance provided by the patent would not be able to provide various compositions falling within the terms of Claim 28 by varying preferred types and relative amounts of polymer, channeling agent and desiccant mentioned.

The Board instead accepts that:

- the experiments described in D35; see in particular page 1: "in order to demonstrate the limited number of experimental work necessary to establish whether a three-component composition containing the components listed in Claim 1 of the patent as granted and of the Auxiliary Requests as filed in these proceedings contain passages "*through which moisture is communicable to desiccating agent entrained within the solidified mixture*"; the concentration series illustrated in page 2; and the results of the MVTR test in Tables 1 to 3); together with the explanations in
- declaration D36; see Points 13 to 22; in particular Point 17 ( "a routine means in the fields of chemistry ... to determine the effect of quantity changes of one component in a composition (e.g. channeling agent) is the preparation of concentration series") and Point 22; and,
- D26 and declaration D39 (confirming that MVTR was not the only test available to ascertain the presence of a significant number of channels in the composition), convincingly establish that the skilled could reproduce compositions as claimed.

4.1.2 Hence, the objection based on a missing definition of a limiting parameter value is not convincing.

- 4.2 The Board acknowledges that neither Claim 28 nor the description define any methods for assessing whether, which and how many passages for moisture transmission are actually formed and whether and how they run through the composition. However, for the Board, this does not as such mean that the disclosure of the patent is insufficient.
- 4.2.1 Quite to the contrary, the Board is convinced that the skilled person aiming to prepare a composition comprising the essential ingredients and having the morphology defined in Claim 28 and schematically illustrated in Figures 1 to 4, would immediately consider an at least qualitative characterization of the morphology by means of methods usual in the polymer blend art.
- 4.2.2 In this respect, among the methods invoked, scanning electro microscopy (SEM) (as described in D27), transmission electron microscopy (TEM) and dye penetration (as described in experimental report D26) are methods available to the skilled person which are suitable for making visible a channelled structure, if present.
- 4.2.3 The Board accepts that documents D34 and D37, both submitted by the Respondent, constitute further evidence therefor. Whether SEM is as suitable as TEM depends on the number of SEM sections (in perpendicular orientations and magnification) provided, as apparent from a comparison between D34 (one section only) and D37, which instead shows, in its Example 3 and Figures 22 a, b, c and d, that more SEM sections may need to be considered to confirm the formation of a spongy structure.

For the Board, the disclosure of D37 confirms that no limiting value is necessary for comparison when using SEM.

Of course, the skilled person might use a combination of both SEM and TEM for a more complete characterization. This does not mean that two suitable test methods give different results as regards the presence of moisture transporting channels extending through the inspected material. Their results are rather complementary.

- 4.2.4 Once the spongy structure of Claim 28 has been qualitatively ascertained, the skilled person might of course consider some quantitative characterization to establish the moisture absorption efficiency of the structures formed from different compositions, or to compare them with prior art.

Since the aimed for function of the claimed compositions is the adsorption and retention of moisture from the environment (see Paragraph [0001] of the patent in suit, last sentence), the Board is convinced that the skilled person would immediately be drawn to a moisture uptake test as a first suitable test.

This is in line with D22 (see Point 14), and with D37 (paragraph [0063] mentions percent swelling) as well. The fact that in D37, the choice of a swelling and weight loss test was made, i.e. of a test which not only assesses how much liquid is adsorbed but also how much of the adsorbed liquid is thereafter desorbed, is not in contradiction with D22 but occasioned by the presence of an agent in the compositions of D37 which adsorbs (when produced) and releases (in use) chemical substances (see Paragraph [0017] of D37).

- 4.2.5 For the Board, considering that the channels running through the composition of the claims at issue must ensure moisture transmission, MVTR too is a suitable test for determining and comparing adsorption and transmission efficiency of compositions as claimed, especially because it is a generally recognised standardized method, which permits to quantitatively compare the rate of moisture adsorption and transmission of different compositions.
- 4.3 Therefore, the Board is convinced that the composition of Claim 28 can reliably be prepared without undue burden on the basis of the guidance given in the patent specification and that the presence of moisture transporting channels running through it can also be verified reliably by methods usual in the art of polymer morphology determination, such as SEM and TEM.
- 4.4 Further insufficiency arguments of the Respondent:
- 4.4.1 For the Board, the question whether the skilled person will always be able to unambiguously distinguish a composition containing throughgoing channels as defined in Claim 28 at issue from a composition not containing them or containing only a very small amount of them is an issue of clarity (Article 84 EPC) rather than an issue of sufficiency of the disclosure.

Even assuming for the sake of argument that a problem of this type would arise in the case of structures prepared using a relatively low amount of the channeling agent, it has not been shown that such problem would actually "permeate the whole claim" and hence "deprive the skilled person of the promise of the



invention" (see e.g. decision T 0608/07 of 27 April 2009, Point 2.5.2 of the reasons).

More particularly, the Respondent did not show that the skilled person, facing such an situation, would not know, despite the guidance given in the patent in suit, how to vary the components, their amounts and the preparation method used to thereby ensure channel formation.

Instead, the Appellant showed, by means of D22 (*supra*) and D26 that the preferred compositions of the patent in suit could be reproduced and, hence, that there is no ambiguity pervading the entire scope of Claim 28.

Referring to D35 (Compositions on page 2) and D36 (e.g. Point 17), it showed that the skilled person would be drawn to routine measures involving no undue burden, such as concentration series, for determining a necessary change of the relative amount of a component in the composition (e.g. the channeling agent) and for determining, using an appropriate available method, whether channels are actually formed (D36, Points 19 ff.)

4.4.2 The argument that the polyethylene-comprising formulation X-2126 described in D35 does not form channels, as opposed to the composition of Film 2 of D37, comprising, instead, polypropylene in the same amount (see D37, page 9, lines 34-40, and Paragraph [0069]), although according to the patent in suit polyethylene is as suitable as polypropylene, is not convincing either in view of the following considerations:

The patent in suit does not say that polyethylene and polypropylene may be used interchangeably in exactly the same amounts, independently from the amounts of the

other two components. Polyethylene and polypropylene, albeit being both polyolefins, have different structure, and thus different physical-chemical properties. A different behaviour, especially in the decomposition of blends by phase separation, is thus to be expected and justifies the need for different proportions of materials.

- 4.4.3 The further tests in D35 (Tables 2 and 3, showing an improved moisture transmission rate for compositions with increased amounts of desiccant agent) clearly show that a sudden increase of moisture transmission, i.e. of channels formation, also with polyethylene as polymer base, could be detected, even though at different minimum amounts of channeling agent. Instead, the less sudden increase shown in Table 1 of D35 for compositions X2125, X2119 and X2131, all containing the same, apparently insufficient, amount of channeling agent and an increasing amount of desiccant merely appears to depend on the increasing level of the desiccant agent incorporated, i.e. only appears to reflect an increased moisture adsorption capacity, rather than an increased moisture transmission.

The Respondent did not provide evidence showing that the skilled person would not be able to adapt, by varying them, the preferred amounts disclosed in Paragraph [0048] of the patent in suit in connection with the use of polypropylene to compositions comprising polyethylene, in order to achieve the sought-for phase separation leading to channels formation upon cooling the composition.

- 4.5 Hence, in the Board's judgement, the ground of opposition under Article 100(b) EPC does not prejudice maintenance of the patent as granted either.

*Novelty*

5. The Respondent raised novelty objections based on documents D14, D15, D16 and D18.
6. Document D14
  - 6.1 D14 (Claim 1) concerns a container having desiccating capabilities which *inter alia* comprises an insert formed from desiccant entrained thermoplastic. Said thermoplastic may be polypropylene or polyethylene (page 5, lines 9-13). The desiccant entrained thermoplastic preferably has at least forty percent desiccant to thermoplastic by weight (Claim 2) and comprises a polar organic compound that enhances the absorption capabilities of said desiccant (Claim 11). The addition of starch, as the polar organic compound, to the desiccant loaded thermoplastic "will greatly increase the rate of absorption". The addition of polyvinyl alcohol (PVOH) "has similar boosting effects upon the absorption rate of the desiccant loaded thermoplastic" (page 9, lines 13-18). In particular, the addition of 5% by weight of starch to polypropylene bearing 10% by weight desiccant is stated to absorb moisture at twice the rate of polypropylene bearing 20% by weight desiccant and no starch.
  - 6.2 It is not in dispute that D14 discloses a substantially moisture impermeable polymer (polypropylene), loaded with a desiccating agent and comprising also a material (starch) suitable to absorb and, as such, transmit moisture at a rate greater than the polypropylene. Nor is it in dispute that the specific composition mentioned in D14 (page 9, lines 14 to 16) comprises 85.7% by weight of polypropylene, 9.5% by weight of

desiccant and 4.8% by weight of starch (Letter of the Respondent dated 19 September 2014, Point 2.4.1, second Paragraph).

6.3 It is, however, in dispute whether the achievable increase in moisture absorption rate mentioned in D14 necessarily corresponds to the significant increase in moisture uptake rate which the Appellant considers as an indication of the presence of channels (see in this respect D26, pages 14 and 15). Thus, it is in dispute whether starch acts as a channeling agent within the meaning of Claim 28, i.e. whether addition of 5% by weight of starch actually results in channel formation through the thermoplastic structure, or simply contributes in some other way to making the total composition so obtained more efficient in moisture adsorption capacity.

6.4 D14 is silent as regards the method used in preparing said compositions. D14 mentions injection-molding of the final articles, but not melt-blending the components followed by phase-separation of polymer and polar compound. Hence, a step of *"solidifying the mixture so that the channeling agent forms passages in the solidified mixture through which moisture is communicable to desiccating agent entrained within the solidified mixture"* is not expressly disclosed in D14. Moreover, D14 does not disclose the function supposed to be fulfilled by starch or PVOH, i.e. based on which physical/chemical mechanism are supposed to boost the moisture absorption rate.

Hence, D14 being i.e. silent on the formation of channels through the composition, it does not directly and unambiguously disclose the process of Claim 1 and the composition of Claim 28.

6.5 The Respondent considered that starch as a polysaccharide consisting of glucose, having three hydroxyl groups, would inevitably form sufficient hydrophilic channels extending through the the composition.

This argument is however not convincing. Paragraph [0047] (e.g. column 15, lines 2-4 and 30-31) of the patent in suit *inter alia* discloses, as generally suitable material to be used as channeling agent, "*a polar compound having at least several hydroxyl groups*" and "*polysaccharide based compounds such as glucose, fructose, and their alcohols, and mannitol*". This disclosure appears, however, to refer to compounds, and not expressly to polymers such as starch. In fact, starches are specifically mentioned as possible components in Paragraph [0030] (Column 9, lines 40) of the patent in suit, but as desiccants and not as channel forming agents.

6.6 Moreover, it is specifically mentioned in the patent in suit (Column 15, lines 14-17, in Paragraph [0047]) that PVOH cannot be used alone and generally requires the use of a plasticizer to insure good miscibility with the polymer. Since no plasticizer is mentioned in D14, the question arose whether PVOH is a suitable channeling agent, apt to form a significant number of passages running through the composition.

6.7 On the one hand, the Respondent did not reproduce a composition as mentioned in D14, let alone test it to see whether channels were actually formed, arguing that it was reasonable to assume that channels would inevitably be formed in compositions as disclosed in D14. Hence, the Respondent did not show that channel formation is the inevitable result of e.g. injection

moulding the compositions disclosed by D14 (page 3, second full paragraph). Therefore, the argument that the results mentioned in D14 in relation to starch and PVOH were evidence of channel formation is not convincing.

6.8 On the other hand, the Appellant submitted several items of evidence to show that the composition according to D14 does not contain "*passages*" (channels hereinafter) formed by a "*channeling agent*", as defined in Claim 28:

6.8.1 D24 *inter alia* shows that in terms of the results of a moisture uptake rate test, a composition comprising 85%PP/5%PVOH/10%MS (molecular sieve)

- performs slightly better than a composition containing 80%PP/20%MS or 90%PP/10%MS,
- but not better than a composition comprising 50%PP/50%MS, which evidently does not contain any channels, and
- performs about five times poorer than a composition according to the invention, i.e. containing channels, and comprising 40%PP/10%PVOH/50%MS.

Hence, D24 does not show a sudden increase in moisture transmission for compositions according to D14 which would be indicative of channel formation.

6.8.2 D25 *inter alia* shows, using moisture vapour transmission rate (MVTR) tests according to ASTM F-1249 Protocol, that a composition comprising 85%PP/5%PVOH/10%MS performs

- twice as good (0.667 vs 0.310 g/m<sup>2</sup>/day) as a composition containing 90%PP/10%MS, but
- not better than a composition comprising 50%PP/50%MS (1,752 g/m<sup>2</sup>/day), which evidently does not contain channels, and

- about ninety times poorer with respect to a composition according to the invention, i.e. containing channels, comprising 40%PP/10%PVOH/50%MS (59.836 g/m<sup>2</sup>/day).

Hence, the Board accepts that it can be gathered from from D25 that compositions according to D14 are not as percolating as the claimed ones, i.e. do not have a spongy structure as shown in the figures of the patent in suit.

- 6.8.3 D26 (Figures 13/14) *inter alia* describes that Composition X2085 (85% PP/5%PVOH/10%MS) showed completely darkened areas in dye penetration testing, indicating that the composition disclosed by D14 did not comprise channels. These results confirm that the dye does not simply migrate through the polymer, hence that the corresponding argument of the opponent is not convincing either.
- 6.8.4 D35 (page 4, last Paragraph) and D39 (e.g. Point 4) further corroborates the conclusions drawn based on D25 and D26, i.e. regarding the absence of channels in the compositions mentioned by D14.
- 6.9 In view of these results the Board, considering in particular the similar performance of a composition not containing any channelling agent, and hence no channels, as compared to the composition according to D14, concludes that it has not convincingly been shown that in D14 the formation of channels was the inevitable result of using starch or PVOH in the amounts specified in combination with the specified amounts of desiccant agent.
- 6.10 Hence, in the Board's judgement D14 does not directly and unambiguously disclose a composition having a morphology according to Claim 28 as granted or a

process according to Claim 1 comprising a step of solidifying the composition in order to obtain such a morphology.

6.11 This finding is not affected by questions relating to the validity of the priority dates claimed by the patent in suit and D14, respectively.

7. Document D15

7.1 D15 (Claim 1) discloses compositions made of plastics having high capacity of moisture absorption and comprising 50-80% by weight of thermoplastic or thermosetting polymer, 20-50% by weight of a desiccating agent, 2-8% by weight of elastomer and 1-4% by weight of synthetic, vegetal or animal fibres having a length comprised between 0.5 and 4 mm.

7.2 Example 6 of D15 (Table 1) describes a composition comprising 60% by weight of polystyrene (a moisture impermeable polymer according to Paragraph [0046] of the patent in suit), 30 % by weight of silica gel powder (a desiccant according to Paragraph [0030] of the patent in suit) and 1% by weight of cotton fibres, having a maximum length of 2 mm.

This composition is formed into a plaque having a thickness of 3 mm, which is then left under an environment at 80% of residual moisture in order to measure the moisture absorption, the results of which are detailed in Table 2.

7.3 According to the Respondent, cotton, which is made of cellulose, a polymer of glucose units, whereby glucose contains hydroxyl groups, is hydrophilic. Since it is in form of fibres, it provides preformed hydrophilic



channels within the composition of D15. This was also apparent from the remarkable capacity of absorbing moisture mentioned on page 3, lines 43-44 (based on the results of Table 2 of D15). The Respondent did not, however, provide corroborating evidence in this respect.

7.4 However, if only because the maximum length of the fibres is at most 2 mm, whilst the thickness of the composition is 3 mm, the composition illustrated by D15 cannot have channels extending through the composition. Moreover, it is questionable whether a significant number of moisture transporting channels could be formed with only 1% by weight of such fibres.

7.4.1 Moreover, D15 does not expressly mention any specific function supposed to be fulfilled by the incorporation of the fibre component. In fact, according to D15, the fibres need not even be hydrophilic, as apparent from page 2, lines 37-38, where acrylic, polyester and polyamide synthetic fibres are also mentioned as suitable materials.

7.4.2 The process of manufacturing of the compositions according to D15 comprises forming a homogeneous mixture of the components, followed by further transformation, e.g. by extrusion. No measure is disclosed to ensure that the fibres remain in elongated form within the heated composition, such that they could potentially form channels within the extruded composition. Thus, a process step of solidifying the composition in order to obtain a morphology with a significant number of moisture transporting channels through the composition is not disclosed.

Also, D15 does not mention a possible affinity between

silica gel and cotton fibres, which was not proven either by suitable evidence. So it is not apparent either whether the silica gel would preferentially tend to contact the cotton fibres.

Furthermore, the fibres of D15 do not appear to qualify as a channeling agent capable forming a polymeric "*blended mixture*" in the sense of claim 1, suitable to produce upon solidification the morphology required by claims 1 and 28.

7.4.3 Therefore, in the Board's judgement, D15 does not directly and unambiguously disclose a composition as defined in Claim 28 or a process according to Claim 1.

8. Document D16

8.1 D16 discloses *inter alia* compositions comprising Components (A), (B), (C1) and (D), wherein (A) is a polyolefin, (B) is EVOH (more particularly a saponified product of an ethylene vinyl acetate copolymer having ethylene content of 20-65 mol% and saponification degree of the vinyl acetate component of at least 96%); (C1) is an inorganic material which may be a water-absorptive material; and (D) is S-EVOH (a saponified product of an ethylene-vinyl acetate copolymer having an ethylene content of 68 to 98 mol% and a saponification degree of the vinyl acetate component of at least 20%).

8.2 According to D16 (Column 2, lines 41 to 48, and lines 56 to 66), the components of these compositions are sufficiently compatible so that the composition is "co-extrusion moldable into articles having neat appearance".

- 8.3 Component C1 is used for providing a high-grade appearance to molded articles, such as paper-like and pearl luster (D16: Column 3, lines 16-18 and 62-67). Where water absorptive material, i.e. a desiccant, is used as C1, it also "minimizes deterioration of the gas barrier property of EVOH by action of water, because it absorbs moisture invading from the outside" (D16: Column 4, lines 25 to 31).
- 8.4 More particularly, Example 24 of D16, invoked by the Respondent, describes a film obtained by extruding (according to the method described in Example 1 D16) a blend comprising anhydrous sodium monohydrogen phosphate as Component (C1), EVOH (32% ethylene, saponification degree of vinyl acetate of 99.9%) as Component (B), polypropylene as Component (A) and S-EVOH as Component (D)). This obtained which was "uniform and showed good compatibility but generated, upon long-period formation operation, a few small phase-separated irregular matters".
- 8.4.1 Said "few small phase-separated irregular matters" of Example 24 which are invoked by the Respondent as evidence for the formation of channels within the composition of D16.
- 8.4.2 In D16, there is, however, no mention of any purposive formation of moisture transporting passages formed by a channelling agent. On the contrary, the authors of D16 repeatedly stress emphasize the importance of a good compatibility between the components of the composition (see e.g. D16: Column 1, lines 11 to 18; Column 2, lines 40 to 48; Column 4, lines 32 to 39). Example 1, describing the extrusion technique used, expressly

mentions that "phase separated irregular matters" may be "caused by poor compatibility".

8.4.3 Hence, said few small phase-separated irregular matters mentioned in Example 24 of D16, but not further described, let alone as regards their number, shape or extension, are seen as a slight defect of the film obtained and not as a desirable feature.

8.5 In the Board's judgement, the mere fact that the film of Example 24 comprises components (polypropylene, EVOH and sodium monohydrogenphosphate) respectively qualifying, in principle, as moisture impermeable polymer, channelling agent and desiccant agent), and contains the above-mentioned few small phase-separated matters, does not, therefore, amount to a direct and unambiguous, at least implicit disclosure of a composition according to Claim 28.

9. Document D18

9.1 Sample 7 of Example 1 of D18 (Table A), invoked as being novelty-destroying by the Respondent, is a monolayer film formed of 89% ethylene vinyl acetate (EVA), 5% poly(ethylene oxide) ("Polyox") and 6% starch (starch-linear & low density polyethylene blend, with starch comprising 40 wt% of the total mixture), which is tested to determine the liquid smoke absorbency.

Sample 7 is thus made of material comprising EVA, polyox and starch, i.e. components arguably being suitable as moisture impermeable polymer, channeling agent and desiccant, i.e. as the three components of a composition according to Claim 28.

- 9.2 According to D18 (Column 12, lines 21-31), blending polyox in sufficient quantity with EVA improves the liquid smoke absorbency of the film, compared to the film without the particular absorbent. Sample 4 (comprising 20% polyox and 80% EVA) had the best liquid smoke absorption (3.9 wt%). Sample 1 (containing only EVA) had the worst liquid smoke absorption (0.5wt%). Although "starch by itself (well known absorbent) provided very little smoke absorbency", when it was blended with the polyox resin, as in Sample 7, a much higher smoke absorbency (2.1 wt%) was obtained.
- 9.3 Sample 7 was invoked because of its performance in liquid smoke absorbency, as shown by the result in Table A of D18, which allegedly implied the presence of channels as required by Claim 28 at issue. To show the presence of channel-like structures in the composition of Sample 7 of Example 1 of D18, the Respondent referred also to experimental report D34.
- 9.3.1 D34, relied upon by the Respondent, describes a reproduction of Sample 7 of Example 1 of D18 with materials as similar as possible to those mentioned in D18. The presence of channels was assessed by SEM analysis, which was carried out by cutting the sample parallel to the drawing direction. The SEM picture on page 2 of D34 is supposed to show starch material and the allegedly channel-like structures formed by the Polyox.
- 9.3.2 However, the Board only gathers from said SEM picture that starch and Polyox, as far as visually identifiable, are not in contact. Also, the two elongated sections identified as channel-like structures do not appear to necessarily run through the composition, from one side to the other. It is not

clear which surface is upper and which one lower. It is not apparent whether the other areas of smaller cross-section (stated to be Polyox) go through the material from one surface to the other.

Hence, for the Board, D34 does not convincingly establish that the composition of Sample 7 of Example 1 of D18 implicitly comprises channels as required by Claim 28.

9.4 The Appellant also provided evidence, in particular D35 and D36, to support its view that a material according to Sample 7 of Example 1 of D18 does not comprise channels as defined in Claim 28.

9.4.1 D35 describes *inter alia* the reproduction of films according to Samples 2 (Formulation X-2164), 3 (Formulation X-2183), 5 (formulation X-2186) and 7 (Formulation X-2134) of Example 1 of D18. Starting materials similar to those described in D18 were used. According to the results of the liquid smoke test carried out (pages 6 to 9 of D35; Tables 4 and 5 and 6), Sample 7 of Example 1 of D18 did not gain weight as predicted in D18 (Table A). According to D35, it was Formulation X-2186 corresponding to Sample 5 of D18 (only containing starch and EVA) that gained the most weight.

In view of these results the Board does not accept that said Sample 7 film must implicitly comprise channels for enhancing liquid smoke absorption as alleged by the Respondent.

9.4.2 In D36, Professor Fredrickson reviewed the test results reported in D25, D26, D34 and D35. As regards the latter two (see Part III, Points 27 to 32), upon

considering that the third dimension of the SEM picture is not visible, he indicates why the elongated structures identified as channel-like structures by the Respondent do not represent channels as defined in Claim 28, running through the composition, in the three dimensions.

Also, he considered that a total amount of 7 wt.% of starch and polyox was too little for forming a continuous phase throughout the structure. This explained the results obtained in the tests of D35. Thus, D36 (points 31, 32) concludes that the film described as Sample 7 in Example 1 of D18 lacked a "co-continuous morphology" with passages which could effectively communicate moisture to the desiccant.

9.5 Therefore, considering the disclosure of D18, the test results D34 and D35, and Declaration D36, the Board comes to the conclusion that it has not been convincingly proven that Sample 7 of Example 1 of D18 must inherently comprise a channel structure as defined in Claim 28.

9.6 Since D18 does not disclose a step of solidifying the polymeric mixture so that the channeling agent forms passages in the solidified mixture through which moisture is communicable to desiccating agent entrained within the solidified mixture, and since it has not been shown that this would inevitably happen when reproducing Sample 7 using the process described in D18, the objection of lack of novelty against Claim 1 is also not founded.

10. As apparent from the foregoing analysis, none of documents D14, D15, D16 and D18 directly and

unambiguously discloses a composition according to Claim 28 or a process according to Claim 1.

11. The patent as granted is thus not objectionable for lack of novelty (Article 100(a) EPC).

*Remittal*

12. The decision under appeal only deals with the issues of added subject-matter, insufficiency of the disclosure and novelty. Inventive step had not been addressed at the oral proceedings before the opposition division. Considering also that the Appellant requested the remittal of the case if the decision under appeal were to be set aside, and that the Respondent did not object to this course of action, the Board considers it appropriate to remit the case to the department of first instance pursuant Article 111(1) EPC.

**Order**

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

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution.



The Registrar:

The Chairman:



D. Magliano

B. Czech

Decision electronically authenticated