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**Datasheet for the decision
of 19 March 2013**

Case Number: T 0553/11 - 3.3.09

Application Number: 00102987.5

Publication Number: 1029886

IPC: C08J 3/12

Language of the proceedings: EN

Title of invention:

Water-absorbent resin powder and its production process and use

Patent Proprietor:

NIPPON SHOKUBAI CO., LTD.

Opponent:

BASF SE

Headword:

-

Relevant legal provisions:

EPC Art. 100(b), 56

Keyword:

"Sufficiency of disclosure - no (main request), yes (first auxiliary request)"

"Inventive step - yes (first auxiliary request)"

Decisions cited:

T 0129/88, T 0487/89, T 0681/01, T 1008/02, T 1404/05,
T 0773/06

Catchword:

Embodiments that are covered by the scope of a claim on its ordinary reading are not to be regarded as excluded merely because it can be deduced from the description that they are not workable (point 2.3 of the Reasons).



Case Number: T 0553/11 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 19 March 2013

Appellant: BASF SE
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 21 December 2010
rejecting the opposition filed against European
patent No. 1029886 pursuant to Article 101(2)
EPC.

Composition of the Board:

Chairman: W. Sieber
Members: M. O. Müller
K. Garnett

Summary of Facts and Submissions

- I. This decision concerns the appeal by the opponent against the decision of the opposition division to reject the opposition against European patent No. 1 029 886.
- II. The opponent requested revocation of the patent in its entirety on the grounds that the claimed subject-matter was neither novel nor inventive (Article 100(a) EPC) and that the patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC).

The documents submitted during the opposition proceedings included:

- D1: "Modern Superabsorbent Polymer Technology",
F. L. Buchholz, A. T. Graham (ed.), Wiley-VCH,
ISBN 0-471-19411-5, 1997, pages 72 to 74, 93, 95,
97 to 103, 131, 254 and 257;
- D2: Experimental report of BASF AG, entitled
"Nacharbeitung der Beispiele von EP 1 029 886 A2
("E03)"; and
- D3: Experimental report of BASF AG, entitled
"Bearbeiten von Verkaufsmustern mit dem Highspeed
Homogenizer ED7 der Firma Nihonseiki Kaisha Ltd.,
Japan (analog EP 1 029 886 A2)".

III. The opposition division's decision, announced orally on 19 November 2010 and issued in writing on 21 December 2010 was based on the claims as granted, which contained two independent claims 1 and 10 that read as follows:

"1. A pulverized water-absorbent resin powder of irregular shape, of which the neighbourhood of the surface is crosslinked, of which the average particle diameter is in a range of from 150 to 600 μm , wherein the content of fine powders having a particle diameter of not larger than 150 μm is not higher than 10 weight % of the whole water-absorbent resin powder, and which has a bulk density (measured according to JIS K-3362) of not lower than 0.74 (g/ml) and a water absorption capacity of not lower than 23 (g/g) for 0.9 weight % physiological saline under a load of 0.7 psi (4.83 kPa) measured over a period of 60 minutes, said water-absorbent resin powder being a crosslinked polymer the main component of which is a polymer obtained by polymerizing and crosslinking monomers wherein the main component is acrylic acid and/or its salt."

"10. A production process for a pulverized water-absorbent resin powder of irregular shape, which comprises the step of obtaining water-absorbent crosslinked polymer particles by way of an aqueous solution polymerization step, with the process being characterized by further comprising the step of pulverizing the crosslinked polymer, an optional step of drying before and/or after the pulverizing step, the step of grinding the resultant crosslinked polymer particles until the bulk density (measured according to

JIS K-3362) thereof increases to not lower than 0.72 (g/ml), and the step of crosslinking the neighbourhood of the surface of the water-absorbent resin powder after the grinding step, wherein said water-absorbent resin powder has an average particle diameter in a range of from 150 to 600 µm, the content of fine powders having a particle diameter of not larger than 150 µm being not higher than 10 weight % of the whole water-absorbent resin powder."

IV. In its decision, the opposition division reasoned essentially as follows:

The invention underlying the opposed patent was sufficiently disclosed. No complete evidence had been provided by the opponent showing that the working examples of the contested patent were not reproducible. The patent contained a large number of examples and comparative examples and provided sufficient information for alternatives and modifications in the description.

Novelty in view of D1 was acknowledged, as this document did not disclose a powder having a bulk density of not lower than 0.74 g/ml or a production process which comprised a step of grinding crosslinked polymer particles until the bulk density thereof increased to not lower than 0.72 g/ml.

Inventive step was also acknowledged. D1 formed the closest prior art. As shown by table 2 of the opposed patent, the effect of the bulk density required by claims 1 and 10 was an improved liquid permeability and water absorption capacity. The problem thus was to

enhance liquid permeability under load while maintaining the water absorbency at a conventional level. D1 did not disclose or render it obvious that water-absorbent crosslinked polymer particles had to be subjected to a grinding step after a pulverization step so as to increase the bulk density of the particles to values above 0.72 g/ml in order to enhance the liquid permeability. Therefore, the solution to the problem posed was not obvious.

- V. On 21 February 2011, the opponent (hereinafter: "the appellant") filed a notice of appeal against the above decision and paid the prescribed fee on the same day. A statement setting out the grounds of appeal was filed on 23 April 2011 together with copies of the documents filed during opposition proceedings and:

D9: "Modern Superabsorbent Polymer Technology",
F. L. Buchholz, A. T. Graham (ed.), Wiley-VCH,
ISBN 0-471-19411-5, 1997, page 198.

- VI. With its letter of 17 November 2011, the patent proprietor (hereinafter: "the respondent") filed its response to the appeal together with first to tenth auxiliary requests and:

D10: EP 1 232 191 B1;

D11: EP 1 814 923 B1;

D12: "Superabsorbent Polymer", Kyoritsu Publishing Co.,
Ltd, ISBN 4-320-04228-X C 3343, 1987, pages 66 and
67 (in Japanese language, partial translation

submitted by the respondent with letter of 9 January 2012); and

D13: EP 0 874 002 A2.

VII. By its communication dated 24 July 2012, the board summoned the parties to oral proceedings and issued its preliminary opinion.

With regard to sufficiency of disclosure of the main request (granted claims), the following issues were addressed by the board:

- As to the appellant's argument that powders having a bulk density of at least 0.74 g/ml and consisting of non-smoothened particles were covered by claim 1, it appeared to be crucial whether enough information was available to prepare such powders.

- As to the appellant's experiments described in D2 and D3, the question arose whether these experiments established that simply carrying out the process steps required by claim 10, including grinding, was sufficient to obtain a density as required by claims 1 and 10. If this was not the case, some additional measure would be necessary in order to obtain bulk densities as claimed. It would then be crucial with regard to sufficiency of disclosure whether enough information as to this additional measure was present in the opposed patent or formed part of common general knowledge.

- As to the water absorption capacity in claim 1, it appeared to be relevant whether an upper limit implicitly arose out of the further parameters contained in this claim.

Concerning inventive step, D1 seemed to constitute the closest prior art, from which the claimed subject-matter appeared to differ *inter alia* in terms of the bulk density. On the basis of the examples and comparative examples of the opposed patent, the objective technical problem appeared to be *inter alia* the achievement of improved liquid permeability at acceptable water absorbance. A crucial question therefore appeared to be whether the skilled person, starting from D1 and being confronted with this problem, and also in view of D7 to D9, would have selected a density as required in claims 1 and 10.

VIII. On 19 March 2013, oral proceedings were held before the board. After discussing sufficiency of disclosure in respect of the main request (claims as granted, see point III above), the respondent withdrew all auxiliary requests previously submitted in writing and filed a new first auxiliary request. The appellant requested that this first auxiliary request be not admitted into the proceedings.

The claims of the first auxiliary request differ from those of the main request by the deletion of product claims 1 to 9 and the adaptation of the numbers and dependencies of the remaining granted process claims 10 to 16.

IX. The appellant's arguments can be summarised as follows:

(a) Main request

The invention underlying the main request was insufficiently disclosed.

Firstly, claim 1 covered powders with non-ground and thus non-smoothened particle surfaces. It was acknowledged in the opposed patent itself that such particles which at the same time met the requirements of claim 1 could not be produced. Therefore, claim 1 covered non-workable embodiments. The respondent's argument, that powders with non-smoothened particle surfaces were excluded from claim 1 by virtue of the disclosure in the patent that these particles could not be prepared, was not correct. If embodiments that the skilled person was not able to carry out were to be automatically excluded from the claims, Article 83 EPC would become meaningless.

Secondly, the experiments described in D2 showed that carrying out the process steps as defined in claim 1 was not sufficient to obtain powders with the bulk density required by this claim. A further technical measure was thus necessary in order to achieve the required bulk density. As no teaching was present in the patent as regards such a further technical measure, the skilled person would not know how to obtain powders with the required bulk density and thus the invention as defined in claim 1 was insufficiently disclosed. The appellant in this respect did not however

dispute that bulk density was increased by a grinding step and that the bulk density of the starting material had to be above a certain value in order to achieve the required bulk density after grinding. The appellant also acknowledged that in D2 the bulk density of the starting material before grinding may have been below the starting values of the materials used in the examples of the opposed patent. The appellant argued, however, that claim 10 was not restricted to a specific bulk density before grinding and thus covered non-workable embodiments.

Thirdly, D3 described experiments where two commercially available samples were ground and bulk densities below the lower limit of claim 1 were obtained. In the same way as D2, these experiments proved that the process steps of claim 1, and in particular grinding, were not sufficient to obtain the bulk densities required by this claim.

Finally, claim 1 contained an open-ended range for the water absorption capacity and thus covered powders with non-achievably high water absorption capacities. As confirmed by T 1008/02, this led to insufficiency of disclosure. In this respect, the board's statement that with decreasing bulk density, water absorption capacity increased, was in contradiction to the examples of the opposed patent.

(b) First auxiliary request

The first auxiliary request should not be admitted into the proceedings. It could not have come as a surprise to the respondent that the main request was not allowed; hence the first auxiliary request could have been filed earlier. The appellant did not, however, dispute the board's observation that the first auxiliary request did not raise any new issues that the appellant was not able to deal with.

No further objections under Article 100(b) EPC were raised in addition to those already raised against the main request.

The subject-matter of the first auxiliary request lacked an inventive step in view of the closest prior art document D1. This document mentioned the problem of particle attrition and it would have been obvious to solve this problem by way of removing angular portions of the particles by means of grinding. Furthermore, the surface crosslinking in D1 already improved the liquid permeability and hence this problem had already been solved in D1.

The subject-matter of the first auxiliary request also lacked an inventive step in view of D7 in conjunction with D8 as well as D9 as these documents proved that surface crosslinked polymers with a bulk density as required by claim 1 had been commercially available before the priority date of the opposed patent.

X. The respondent's arguments can be summarised as follows:

(a) Main request

The invention underlying the main request was sufficiently disclosed.

The appellant's argument that claim 1 covered powders with non-smoothened particle surfaces was not valid. More specifically, the parameters contained in claim 1 inherently restricted the claim to powders with smoothened particle surfaces. The description of the patent stated that the pulverized particles had to be ground and thus smoothened in order to obtain the parameters of claim 1. Hence, also the particles of claim 1 had to have smoothened surfaces. No insufficiency with regard to non-smoothened particles could therefore arise.

The appellant's argument based on D2 was also not relevant as D2 did not rework example 1 of the patent exactly and hence did not prove that this example did not lead to the required bulk density.

Also the appellant's argument based on D3 had to fail. More specifically, contrary to the process of claim 10, the commercial samples used by the appellant in D3 had already been surface cross-linked before the grinding step. Hence, D3 could not provide any evidence that the process of claim 10 was insufficiently disclosed.

Finally, the appellant's argument as to the missing upper limit in claim 1 was not correct. The skilled person would understand that this claim did not cover any unlimited water absorption capacity. Furthermore the particle size and also the bulk density required by claim 1 imposed a technical upper limit on the water absorption capacity.

(b) First auxiliary request

The first auxiliary request should be admitted into the proceedings as the claims of this request were identical to claims 10 to 16 of the main request.

Inventive step had to be acknowledged for the first auxiliary request. The subject-matter of claim 1 differed from the closest prior art document D1 in terms of the bulk density. The objective technical problem was the provision of powders with enhanced liquid permeability under load. Neither D1 nor any of the further documents provided any motivation such that in order to increase the liquid permeability under load, the bulk density had to be as required by claim 1.

XI. During the oral proceedings, the board made the following additional observations:

The grinding step could increase the bulk density only to a certain extent. It was thus self evident that in order to achieve a bulk density after grinding as required by claim 10 of the main request, the bulk

density before grinding had to be above a certain value. D2 did however not contain any information as regards this bulk density before the grinding step. Thus it did not establish any insufficiency of disclosure.

It was true that claim 1 of the main request did not contain any explicit upper limit for the water absorption capacity. However, if the bulk density of the claimed powder were decreased, this would lead to a looser packing of the powder and thus to a higher water absorption capacity. Therefore, because of the lower limit of the bulk density, claim 1 implicitly contained an upper limit for the water absorption capacity.

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

XIII. The respondent requested that the appeal be dismissed, alternatively that the decision under appeal be set aside and the patent be maintained on the basis of the first auxiliary request filed during the oral proceedings of 19 March 2013.

Reasons for the Decision

1. The appeal is admissible.

Main request (claims as granted)

2. *Sufficiency of disclosure*

2.1 Claim 1 refers to a pulverised water-absorbent resin powder which is characterised *inter alia* by having:

- a bulk density of not lower than 0.74 g/ml;
- an average particle diameter of 150 to 600 µm;
- a content of fine powders not higher than 10 wt%;
- and
- a water absorption capacity of not lower than 23 g/g (for the detailed wording of claim 1, see point III above).

2.1.1 According to the opposed patent, such a powder is obtained by a process which has the steps of first pulverising the particles and then grinding them, and it is this grinding step that is needed in order to obtain powders according to claim 1 having the required bulk density (page 6, lines 54 to 57 and independent process claim 10). More specifically, by way of the grinding step, the surfaces of the particles are smoothed by eliminating angular and pointed portions (page 6, lines 52 to 54) and as a result of the particle surfaces becoming smoothed ("rounded"), the required bulk density is obtained: *"Because the polymer particles become more rounded into a uniform shape by the grinding according to the present invention, the bulk density of the ground polymer is higher than that of the unground polymer, and is preferably not lower*

than 0.72 g/ml, ... still more preferably 0.74~0.90 g/ml..." (page 7, lines 14 to 17).

2.1.2 Independent product claim 1 does not however contain the feature of the particle surfaces being ground and thus smoothed. This claim therefore also covers non-smoothened particles having - *inter alia* - a bulk density not lower than 0.74 g/ml.

2.1.3 As was not disputed by the respondent, there is no teaching in the patent as to how to prepare such non-smoothened particles; nor does such a teaching form part of the skilled person's common general knowledge. Therefore, on the basis of the patent and common general knowledge, the skilled person is not able to prepare non-smoothened particles according to claim 1 having the required bulk density. This part of the invention is thus insufficiently disclosed.

2.2 The respondent argued during the oral proceedings that by virtue of the parameters present in claim 1, ie the bulk density, the average particle diameter, the content of fine particles, and the water absorption capacity, the powders of claim 1 were inherently restricted to those with smoothed particle surfaces. No insufficiency with regard to powders having non-smoothened particle surfaces could therefore arise, since such powders would not be covered by claim 1.

The board does not agree with the respondent's argument.

Firstly, such an inherent restriction is not derivable from the opposed patent in the context of the bulk density. All that the patent discloses in this respect

is that the inventive process contains the step of grinding and that by virtue of the resulting smoothed particle surfaces, a bulk density as required by claim 1 is obtained (see point 2.1.1 above). This disclosure does however not permit the reverse conclusion to be drawn, namely that all powders having the required bulk density inherently have smoothed particle surfaces.

In fact, the only evidence available in this respect points to the opposite conclusion, namely that particles with the bulk density of claim 1 do not necessarily have smoothed surfaces. More specifically, D13 (example 4) discloses polymer particles with a bulk density within the range required by claim 1 (0.79 g/ml) that are "rock-like" and thus have a surface as shown in figure 2 of D13 (see page 4, line 10). As is apparent from this figure, this surface is non-smoothened.

Secondly, no reasons were provided by the respondent why the further parameters of claim 1, ie the average particle diameter, the content of fine particles and the water absorption capacity, inherently restrict the claimed powders to those having smoothed particle surfaces.

There is thus no reason to believe that the parameters of claim 1 inherently restrict the claimed powder such that its particles have smoothed surfaces.

2.3 According to a second line of argument put forward by the respondent, claim 1 was inherently restricted to particles having been ground and thus having smoothed

surfaces since it was essential according to the description of the patent that the pulverized particles were subjected to a grinding step in order to obtain the bulk density of claim 1. This argument in fact is different from the respondent's first argument (point 2.2 above) in that it is now the description of the opposed patent rather than the parameters in the claim which is said to restrict the claim to powders with smoothed particle surfaces.

2.3.1 The board acknowledges that it can be deduced from the description of the opposed patent that the process disclosed in the patent only allows for the preparation of powders with smoothened particle surfaces (see point 2.1.1 above). It is also true that according to the description, it is thus not possible to prepare powders via this process that have non-smoothened particle surfaces having a bulk density of not less than 0.72 g/ml.

2.3.2 The respondent's conclusion from this, namely that these powders are therefore excluded from claim 1, cannot however be accepted. This argument could only succeed if one were to accept that the description of the patent in this case restricts the scope of the claim on to its normal and ordinary reading.

2.3.3 There is however no legal basis for such an approach. More specifically, the relevant legal provisions in the EPC dealing with this issue are Articles 84 and 69 EPC (and its protocol), the latter provisions in particular being intended to assist the patent proprietor in contending for an interpretation of a claim that is less rather than more restricted than its wording

warrants. Therefore, if in proceedings before the European Patent Office the proprietor wishes to argue for a narrow scope of a claim, this should be on the basis of the ordinary wording of the claim, and not on the basis of something appearing only in the description (T 1404/05 of 24 May 2007, not published in OJ EPO, points 3.4 and 3.6). See also T 681/01 of 28 November 2006 (not published in OJ EPO, point 2.1.1), where the board emphasized that the normal rule of claim construction is that the terms used in a claim should be given their ordinary meaning in the context of the claim in which they appear. The description may not be used to rewrite the claim and redefine the technical features required by the claim in a way not warranted by the wording of the claim itself. In particular the description cannot be relied on to exclude subject-matter from the claim which the ordinary meaning of the terms used would include as part of what is claimed.

- 2.3.4 The respondent's argument that the description inherently restricts claim 1 to powders with smoothed particle surfaces is also not accepted for the following further reason: The respondent's argument implies that embodiments covered by the scope of claim 1, namely powders with non-smoothed particle surfaces having *inter alia* a density of not less than 0.72 g/ml, are excluded from the claim because it can be deduced from the description that these powders cannot be prepared by the process disclosed in the description. This would lead to the absurd situation that because it can be deduced from the description that a claim is not enabled, the claim cannot be attacked under Articles 83 or 100(b) EPC.

2.3.5 In summary, embodiments that are covered by the scope of a claim on its ordinary reading are not to be regarded as excluded merely because it can be deduced from the description that they are not workable.

2.4 Therefore, claim 1 in the present case covers powders with non-smoothened particle surfaces. As the skilled person would not be able to obtain such powders on the basis of the teaching in the patent or his common general knowledge, this part of the invention is insufficiently disclosed. Hence, the ground of opposition under Article 100(b) EPC prejudices the maintenance of the patent as granted. The main request thus is not allowable.

2.5 In view of this, the appellant's further insufficiency objections against the main request need not be dealt with as far as the main request is concerned.

First auxiliary request

3. *Admissibility*

The claims of the first auxiliary request differ from the granted claims only in that product claims 1 to 9 have been deleted and the numbers and dependencies of the remaining granted process claims 10 to 16 have been adapted. As not disputed by the appellant during the oral proceedings before the board, this amendment did not confront it with any new subject-matter that it could not deal with during the oral proceedings. The board therefore decided to admit the first auxiliary request into the proceedings.

4. *Sufficiency of disclosure*

4.1 Independent process claim 1 refers to a production process for a pulverised water-absorbent resin powder, which comprises the steps of:

- obtaining crosslinked polymer particles by way of an aqueous solution polymerisation step,
- pulverising the crosslinked polymer,
- grinding the resultant crosslinked polymer particles until the bulk density thereof increases to not lower than 0.72 g/ml, and
- surface cross-linking the ground particles.

4.2 The insufficiency objection discussed with regard to the main request, namely that granted claim 1 covers insufficiently disclosed powders with non-smoothened particle surfaces, is no longer applicable to the first auxiliary request as the only independent claim (claim 1) is now directed to a process which requires grinding and thus smoothing of the polymer particles.

4.3 However, the other insufficiency objections raised in the context of the main request still apply to the first auxiliary request and therefore will be discussed in the following.

4.4 More particularly, the appellant raised a further insufficiency objection against the main request on the basis of D2. According to the appellant, the experiments described in this document show that carrying out the process steps as defined in claim 1 (claim 10 of the main request), in particular the grinding step, is not sufficient to obtain the bulk

density required by the present claims. A further technical measure is thus necessary in order to achieve the required bulk density. As no teaching is present in the patent as regards this technical measure, the skilled person would not know how to obtain the required bulk density and thus the invention as defined in claim 1 is insufficiently disclosed.

4.4.1 D2 describes experiments in which the appellant attempted to repeat example 1 of the opposed patent. In these experiments, acrylate polymers were prepared using various temperature profiles during polymerisation (page 6 of D2). In two different experiments using two different pulverisers, the polymers were then pulverised, ground and classified (isolation of the 212-850 μm fraction) in a way similar to that in example 1 of the opposed patent (page 9 of D2). The obtained fractions were subsequently surface crosslinked.

The bulk densities of the obtained samples are shown in the table on page 12 of D2. As can be seen from this table, none of the pulverised and ground samples (denoted Ex1_1, Ex1_2, Ex1_3, Ex1_4, Ex2_1, Ex2_2, Ex2_3 and Ex2_4) has a bulk density equal to or above 0.72 g/ml as required by claim 1 of the first auxiliary request.

Consequently, even though in the experiments of D2 the process steps of claim 1 were carried out, the bulk densities were not as required by this claim. It therefore seems to be credible to the board that the steps of claim 1 as such are not sufficient to obtain the required bulk density.

4.4.2 In the board's view, however, this does not establish insufficiency of disclosure. In the present case, it is self-evident that in order to obtain the required bulk density by the steps of claim 1, the bulk density of the starting material before grinding must not be too low, since grinding can increase the bulk density only to a certain extent. The skilled person trying to work the invention would therefore approach the task appreciating that the bulk density of the pulverised particles before grinding must be sufficiently high so as to obtain the required bulk density after grinding. It can be deduced from the opposed patent that bulk densities before grinding in the range of eg 0.64 g/ml to 0.68 g/ml are suitable in this respect (see comparative examples 1 to 7, where bulk density values of non-ground samples are reported).

D2 does not contain any information as regards the bulk densities of the particles before the grinding step and it was acknowledged by the appellant during the oral proceedings before the board that in fact these values may have been below the values used in the opposed patent. Hence, D2 does not establish that the skilled person carrying out the process as defined by claim 1, when appropriately construed, would be unable to obtain the required bulk density.

4.5 The appellant raised a further insufficiency objection in view of D3. This document describes experiments where two commercially available samples were ground but where only bulk densities below the lower limit of claim 1 were obtained. According to the appellant, in the same way as with D2, these experiments proved that

the process steps of claim 1, in particular grinding, were not sufficient to obtain the bulk densities required by this claim.

The respondent stated on page 5 of its letter of 17 November 2011 that the commercial polymers used in D3 had already been surface crosslinked before they were used by the appellant in its experiments. This statement was reiterated during the oral proceedings before the board and the appellant did not dispute it, either in the written or during the oral proceedings. Under these circumstances, the board can only accept that in the experiments described in D3 the surface crosslinking step was applied before the polymers were ground. These experiments thus differ from the process of claim 1 in that surface crosslinking is carried out before grinding while claim 1 requires the opposite, ie surface crosslinking subsequent to grinding. Therefore, contrary to the appellant's assertion, D3 does not demonstrate that the process steps of claim 1 are not sufficient to obtain a bulk density as required by this claim.

4.6 The appellant finally argued with regard to the main request that claim 1 contained an open-ended range for the water absorption capacity ("not lower than 23 (g/g)") and thus covered powders with non-achievably high water absorption capacities.

4.6.1 The only claim of the first auxiliary request containing such an open-ended range is dependent claim 6.

4.6.2 This claim, by way of its dependency on claim 1, contains the further feature that the bulk density of the ground particles is not lower than 0.72 g/ml. The lower the bulk density of a powder, the looser are the particles of the powder packed and the greater are the free spaces remaining between these particles, which in turn means the more can water penetrate into and thus be absorbed by the powder. In other words, with decreasing bulk density, water absorption capacity increases. Consequently, the lower limit of the bulk density of 0.72 g/ml implies an upper limit for the water absorption capacity. The appellant's assertion that claim 6 lacks any upper limit for the water absorption capacity is thus not valid and, accordingly, no insufficiency arises in this respect. This is in line with the conclusion in T 487/89 of 17 July 1991 (not published in OJ EPO, point 3.5) that if a claim which contains an open-ended range seeks to embrace values which should be as high as can be attained above a specified minimum level, while at the same time complying with the other parameters of the claim, then such open-ended parameters are normally unobjectionable under Article 83 EPC (see also T 129/88 of 10 February 1992; not published in OJ EPO; point 2.1.4 and T 773/06 of 22 April 2006; not published in OJ EPO; point 2.1).

4.6.3 The appellant referred in this respect to decision T 1008/02 of 11 January 2005 and argued that according to this decision, a missing upper limit for the water absorption capacity leads to insufficiency of disclosure.

This decision concerned a case where the relevant claim did not contain an upper limit for an absorbency under

load. The present board acknowledges that absorbency under load is related to the water absorption capacity as referred to in present claim 6. However, contrary to the present claim 6, the claim in T 1008/02 (see point II of the decision) did not contain any lower limit for the bulk density and thus, contrary to the present case, there was no further parameter which provided an implicit upper limit for the absorbency under load. The decision is thus not relevant to the present case.

4.6.4 The appellant finally argued that in the examples of the opposed patent, water absorption capacity decreased with decreasing bulk density, contrary to the above consideration (point 4.6.2 above). This is however not correct. More specifically, in none of the examples using the same type of polymer does water absorption capacity (whether under load or under no load) decrease when the bulk density decreases (examples 1 to 10).

4.7 In view of the above, the invention as defined by the claims of the first auxiliary request is sufficiently disclosed.

5. *Inventive step*

5.1 The invention concerns the production of water absorbent powders (page 2, line 7 of the opposed patent and claim 1 of the first auxiliary request).

5.2 Similarly, the textbook D1 refers to commercial processes for the manufacture of superabsorbent polymers. As acknowledged by both parties, D1 can thus be considered to represent the closest prior art.

D1 discloses the polymerisation of acrylic monomers to a superabsorbent powder and the smoothing of the particles of this powder by a grinding step. The grinding step consists of two-stage milling. It is also stated that the bulk density is increased by this grinding step (paragraph bridging pages 73 and 74; second part of page 74; first paragraph of point 3.2.6 and last paragraph on page 93; and third and fourth paragraphs on page 95).

Specific bulk density values are not disclosed in D1. The process of claim 1 thus differs from this document *inter alia* in that the grinding of the pulverised polymer particles is continued until the bulk density thereof increases to not lower than 0.72 g/ml.

- 5.3 The technical problem addressed in the opposed patent is the achievement of *inter alia* improved liquid permeability under load (page 3, lines 12 to 18).
- 5.4 As a solution to this problem the patent proposes a process according to claim 1, which is characterised in that the polymer particles are ground until the bulk density increases to not lower than 0.72 g/ml and subsequently the obtained particles are surface crosslinked.
- 5.5 Table 2 of the opposed patent compares the liquid permeability under load of (a) powders prepared by the process of claim 1, ie whereby the pulverised particles are ground such that before surface crosslinking their bulk density is not lower than 0.72 g/ml, and (b) powders prepared by a process whereby the pulverised

particles are not subjected to a grinding step and where therefore the bulk density before surface crosslinking is below the lower limit of claim 1. The results show that the liquid permeability under load of powders prepared according to claim 1 is superior. More specifically, the liquid permeation under load in:

- examples 6 and 7 (process of claim 1 applied to polymer (A)) is 375 g and 362 g respectively, compared to 175 g in comparative example 4;
- examples 8 and 9 (process of claim 1 applied to polymer (B)) is 519 g and 353 g respectively, compared to 260 g in comparative example 5;
- example 10 (process of claim 1 applied to polymer (C)) is 1081 g, compared to 1009 g in comparative example 6.

(The polymers in the comparative examples were not subjected to grinding before surface crosslinking such that their bulk density before surface crosslinking was below the lower limit of claim 1).

The above problem thus is credibly solved by the process of claim 1.

5.6 D1 does not contain any indication that the bulk density before surface crosslinking should be increased to values as required by claim 1 in order to improve liquid permeability under load. The skilled person confronted with the problem of improving liquid permeability under load would therefore not have chosen a process where, before surface crosslinking, the bulk density was increased to values as required by claim 1.

The solution chosen in claim 1 hence is not obvious in view of D1 itself.

5.7 The appellant argued in this respect that D1 mentions the problem of particle attrition and that it would have been obvious to solve this problem by way of removing angular portions of the particles by means of grinding. The relevant question to be answered is however not whether D1 contains any motivation for grinding the particles but whether the skilled person when confronted with the problem of improving liquid permeability under load would have ground the particles such as to arrive at a bulk density as required by claim 1. As has been set out above, this is not the case.

5.8 The appellant further argued that surface crosslinking as disclosed in D1 already solved the problem of improving the liquid permeability and that therefore this problem had already been solved in D1. However, it is the bulk density after grinding and not the surface crosslinking step by which the claimed process differs from D1 and, as set out above (point 5.5), selecting a bulk density before surface crosslinking as required by claim 1 improves the liquid permeability under load and this is not obvious from D1.

5.9 The subject-matter of claim 1, and by the same token of dependent claims 2 to 6, is therefore inventive in view of D1.

5.10 The appellant finally argued that D7 as well as D9 proved that surface crosslinked polymers with a bulk density as required by claim 1 have been commercially

available before the priority date of the opposed patent.

However, neither D7 nor D9 address the objective technical problem of improving liquid permeability under load. Hence, the skilled person confronted with this problem would not have had any motivation to increase the density of the powders in D1 to values as disclosed in D7 or D9.

Therefore, inventive step has also to be acknowledged in view of D1 in combination with either D7 or D9.

6. *Amended description*

During the oral proceedings, the description was adapted to the claims of the first auxiliary request. The appellant did not raise any objections against the amended description and the board is satisfied that the amendments effected in the description meet the requirements of the EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of:
 - (a) claims 1 to 6 according to the first auxiliary request filed during the oral proceedings of 19 March 2013;
 - (b) pages numbered 2 to 13, and 24 of the amended description as filed during the said oral proceedings and pages numbered 14 to 23 as granted;
 - (c) figures 1 to 9 as granted.

The Registrar:

The Chairman:

M. Cañueto Carbajo

W. Sieber