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Datasheet for the decision of 29 January 2026

Case Number: T 1024/24 - 3.3.09

Application Number: 08712625.6

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IPC: A21D2/18, A21D8/04, A21D13/02

Language of the proceedings: EN

Title of invention:
IMPROVED FLOUR BASED DOUGH AND METHOD OF PREPARING SUCH DOUGH

Patent Proprietor:
CSM Bakery Solutions Europe Holding B.V.

Opponent:
International N&H Denmark ApS

Headword:
Improved dough/CSM BAKERY

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (no) - main request (no) - auxiliary request (no)

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Catchword:

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Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1024/24 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 29 January 2026

Appellant: (Opponent)	International N&H Denmark ApS Parallelvej 16 2800 Kongens Lyngby (DK)
Representative:	D Young & Co LLP 3 Noble Street London EC2V 7BQ (GB)
Respondent: (Patent Proprietor)	CSM Bakery Solutions Europe Holding B.V. Fruitlaan 24 4462 EP Goes (NL)
Representative:	Nederlandsch Octrooibureau P.O. Box 29720 2502 LS The Hague (NL)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 6 June 2024 concerning maintenance of the European Patent No. 2117322 in amended form.**

Composition of the Board:

Chairman	A. Haderlein
Members:	S. Arrojo
	A. Jimenez

Summary of Facts and Submissions

I. The appeal from the opponent (appellant) is directed against the decision of the opposition division holding that the claims according to the main request filed on 5 December 2019 complied with the requirements of the EPC.

II. In the decision under appeal, the opposition division held that the subject-matter of claims 1 and 9 of the main request involved an inventive step when starting form **D10** (Krishnarau et al., "*Enzymes Increase Loaf Volume of Bread Supplemented with Starch Tailings and Insoluble Pentosans*") as the closest prior art. **D20** (Courtin et al., "*Arabinoxylans and Endoxylanases in Wheat Flour Bread-making*"), representing common general knowledge, was considered not to be an appropriate starting point for assessing inventive step.

III. The appellant requested that the patent be revoked, submitting that claims 1 and 9 of the request held allowable by the opposition division lacked both novelty and inventive step in view of D10. The appellant further argued that auxiliary requests 1 to 6, filed during the first-instance proceedings, were likewise not allowable as they did not comply with the requirements of Article 56 EPC.

IV. The patent proprietor (respondent) requested that the appeal be dismissed (main request) or, in the alternative, that the patent be maintained on the basis of one of auxiliary requests 1 to 6 filed as annexes to the reply to the statement of grounds of appeal, corresponding to auxiliary requests 1 to 6 submitted during the first-instance proceedings. The respondent

further requested that document D32 not be admitted into the appeal proceedings.

V. The respondent submitted that the subject-matter of independent claims 1, 9 and 10 of the main request complied with the requirements of the EPC, as correctly concluded by the opposition division. The respondent further maintained that auxiliary requests 1 to 6 were likewise allowable.

VI. Claims 1 and 9 according to the **main request** read as follows:

"1. A method of preparing a flour based dough, said method comprising mixing flour, a source of water-unextractable (WU) arabinoxylans, xylanase and water, wherein the source of WU arabinoxylans comprises at least 25% WU arabinoxylans by weight of dry matter, less than 5 wt.% gluten and less than 25 wt.% starch, and wherein said source of WU arabinoxylans is applied in an amount sufficient to deliver at least 2.5 g of WU arabinoxylans per kg of flour."

"9. Use of a source of WU arabinoxylans comprising at least 25% of WU arabinoxylans by weight of dry matter, less than 5 wt.% gluten and less than 25 wt.% starch, to improve the quality of dough or the volume of baked dough, said use comprising incorporating the source of WU arabinoxylans in a dough in an amount sufficient to deliver at least 2.5 g WU arabinoxylans per kg of flour, wherein said dough exhibits at least 10 units of xylanase activity per kg of flour."

- Claim 1 of **auxiliary request 1** further specifies that the xylanase is *"applied in an amount sufficient to*

deliver at least 30 units of xylanase activity per kg of flour".

- Claim 1 of **auxiliary request 2** corresponds to that of the main request, where the water-unextractable arabinoxylans (WU-AX) fraction contains at least 35% WU arabinoxylans (instead of 25%).

- Claim 1 of **auxiliary request 3** corresponds to a combination of claim 1 according to auxiliary requests 1 and 2.

- Claim 1 of **auxiliary requests 4 and 5** corresponds to that of the main request where the WU-AX and gluten in the flour-based dough are provided in a *"weight ratio of 1:2 to 1:8"*.

- Claim 1 of **auxiliary request 6** defines the use of a source of WU-AX and corresponds to claim 9 of the main request (see above).

VII. Final requests

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

- The respondent requested that the appeal be dismissed or, in the alternative, that the patent be maintained on the basis of one of auxiliary requests 1 to 6 filed with the reply to the appeal.

Reasons for the Decision

Main request

1. Inventive step

The invention

1.1 The invention defined in **claim 1** at issue concerns a method of preparing a flour-based dough, comprising the steps of mixing flour, a source of water-unextractable arabinoxylans (WU-AX) and xylanase.

Closest prior art

1.2 The appellant cited, *inter alia*, document D10 as the starting point for the assessment of inventive step. The respondent likewise based its inventive step analysis on this document.

1.3 The board agrees that document D10 represents both a suitable starting point and a promising springboard for the assessment of inventive step. Accordingly, the problem–solution approach will be formulated starting from D10 as the closest prior art.

1.4 Document D10 discloses (see abstract) methods for increasing the loaf volume of bread supplemented with starch tailings and/or insoluble pentosans by incorporating pentosanase and α-amylase enzymes. More specifically, D10 describes (see page 1251, left column, first paragraph) the preparation of a "*starch tailings*" fraction by removing gluten proteins. This fraction is then further purified (see page 1251, right column, last paragraph) through enzymatic digestion of

the starch to obtain a composition enriched in insoluble pentosans.

As noted by the appellant, document D20 discloses (see the first paragraph on page 226) that the non-starch polysaccharides (NSP) present in wheat flour endosperm comprise about 85 wt% arabinoxylans (AX), of which 25 to 30 wt% are water-extractable (WE-AX). Since WE-AX are soluble and would be removed during the washing steps in the preparation method of document D10, only the remaining 70 to 75 wt% of AX, corresponding to the water-unextractable AX (WU-AX) fraction, would remain in the insoluble residue. Assuming that the remaining approximately 15 wt% of NSP are likewise insoluble and therefore also retained in that residue, the proportion of WU-AX in the insoluble pentosan fraction isolated in D10 — corresponding to the claimed "*source of WU-AX*" — would be about 80 wt%. This value is thus well above the minimum of 25 wt% defined in claim 1 at issue.

Document D10 further investigates the effects of α-amylase and xylanase (Nutrilife MP 802), alone or in combination, on bread to which WU-AX (i.e. the pentosan fraction) has been added. In one experiment (see page 1253, last paragraph), two control tests without added insoluble pentosans (with and without xylanase) are compared with breads containing added insoluble pentosans. The results (see Figure 7, Table 2 and page 1254, left column) show that the addition of either xylanase or insoluble pentosans alone leads to a reduction in loaf volume. However, when both are applied together, this negative effect is offset, resulting in a loaf volume comparable to, or even slightly higher than, that of the control containing neither xylanase nor insoluble pentosans.

The board will formulate the assessment of inventive step starting from the method involving the addition of both xylanase and a WU-AX source, as illustrated in the right-most column of Figure 7 of document D10 (see also "*1.5% added pentosans + enzyme*" in Table 2).

1.5 In this bread formulation, the bread contains 1.5 wt% insoluble pentosans, corresponding to 15 g per kg of bread. Given that the flour content per kilogram of bread is less than 1 kg (due to the presence of other ingredients), the concentration of insoluble pentosans per kg of flour is correspondingly higher. Therefore, the threshold of delivering at least 2.5 g of WU-AX per kg of flour is clearly achieved.

1.6 The opposition division concluded that D10 provided no direct and unambiguous disclosure of the levels of residual starch and gluten in the isolated insoluble pentosans fraction or WU-AX source.

1.7 The appellant argued that such levels were implicitly disclosed as D10 explicitly indicated that both the gluten and the starch were removed from the insoluble pentosans. To further substantiate the argument that these amounts were implicitly disclosed in D10, the appellant filed experimental report D32.

1.8 The board will assume for the sake of the argument (in the respondent's favour) that there is no direct and unambiguous disclosure in D10 of the WU-AX source containing less than 5 wt% gluten and less than 25 wt% starch.

1.9 The subject-matter of claim 1 therefore differs from the closest prior art in that the WU-AX source contains less than 5 wt% gluten and less than 25 wt% starch.

Problem solved by the invention

1.10 According to the patent (see paragraphs [0018] and [0019]), the object of the invention is to provide a dough product exhibiting improved processability and excellent proof stability, while yielding a high bake volume.

1.11 Examples 2 to 4 of the patent compare doughs containing either xylanase or WU-AX alone with embodiments incorporating both xylanase and WU-AX. The results (see Tables 2, 4 and 6) demonstrate that when xylanase and a WU-AX source are combined across different types of dough, the resulting dough, bread and crumb properties are improved relative to the comparative examples containing only one of the components.

Example 5 presents a similar assessment using different types of xylanase and varying amounts of WU-AX.

In Example 6, a control dough containing neither xylanase nor a WU-AX source is compared with doughs containing xylanase and different amounts of added WU-AX.

1.12 The respondent argued that the examples in the patent demonstrated that the problem solved by the method of claim 1 was to provide a flour-based dough with improved processability, proof stability and/or bake volume.

Although the examples did not specify the gluten and starch concentrations in the WU-AX source, the effect of this feature could be inferred by comparing the patent results with those reported in document D10. According to D10 (see Figure 7 and Table 2), no

significant improvement was observed when xylanase and pentosan were added to the control dough. This aligns with the stated purpose of D10 (see abstract), which was not to improve bread or dough properties, but merely to mitigate the adverse effects of added pentosans.

By contrast, in Example 6 of the patent (see Tables 10 and 11), the combined addition of xylanase and WU-AX resulted in clear improvements in dough, bread and crumb properties. In view of this comparison, it was highly plausible that the observed improvements were attributable to the distinguishing features, namely the gluten and starch content of the WU-AX fraction.

Accordingly, the solution of claim 1 achieved the effect of improving dough and bread properties. The technical problem could thus be formulated, in accordance with the patent, as providing a dough product with enhanced processability, excellent proof stability and a high bake volume.

1.13 The board disagrees with the respondent for the following reasons.

Firstly, the board is not convinced that the improvements reported in Example 6 of the patent are more significant than those shown in Figure 7 and Table 2 of document D10. While the respondent correctly notes that the increase in loaf volume in Figure 7 relative to the control is described as not statistically significant (see Table 2), the patent provides no assessment or indication that the improvements reported in Example 6, or in any other example, are statistically significant.

Indeed, the relative increase in loaf volume observed in Test A of Table 11 of the patent (103%) compared with the control is very similar to that derivable from Table 2 and Figure 7 of document D10 (102%). Moreover, Test E in Table 11 of the patent does not show any increase in loaf volume relative to the control.

Even if, for the sake of argument, the examples in the patent were considered to demonstrate an improvement over the example in D10, there would be no basis for attributing this effect to the distinguishing features.

Document D10 explicitly discloses (see page 1251, first and last paragraphs) that the pentosans fraction, corresponding to the WU-AX source, is obtained from starch tailings that are subjected to gluten removal and enzymatic starch digestion. It follows that the feature distinguishing the claimed invention from D10 is not the general concept of employing a WU-AX source with low contents of starch and gluten, but rather the narrower definition in claim 1 of the concentration ranges. In other words, D10 anticipates the use of a WU-AX source containing low levels of starch and gluten but does not directly and unambiguously disclose that these levels fall within the defined limits of less than 5 wt% gluten and less than 25 wt% starch.

All examples of the patent employ the same WU-AX isolate as described in Example 1. While the patent states that starch and gluten are removed from this fraction, no quantitative information is provided. In the absence of such disclosure, there is no basis for establishing a causal link between the alleged improvements over the tests in D10 and the amounts of gluten and starch present in the WU-AX fraction, let alone for concluding that any such improvements arise

from operating within the concentration ranges defined in claim 1 at issue.

Since no technical effect can be attributed to the proposed concentrations of gluten and starch in the WU-AX fraction, the objective technical problem must be reformulated in less ambitious terms as the provision of an alternative method for preparing a flour-based dough.

Obviousness

1.14 The requirement that the gluten and starch contents of the WU-AX source be below 5 wt% and 25 wt%, respectively, essentially amounts to an instruction that these components be either absent or present only in relatively low amounts. A corresponding teaching is explicitly derivable from document D10, which discloses that the insoluble pentosans (the WU-AX source) are obtained from starch tailings after removal of gluten (see page 1251, first paragraph) and enzymatic digestion of starch (see page 1251, last paragraph).

1.15 Accordingly, a skilled person starting from D10 would not only be motivated, but would in fact be instructed, to reduce the gluten and starch contents of the insoluble pentosans corresponding to the WU-AX source defined in claim 1.

1.16 There is also no reason to regard the thresholds of less than 5 wt% gluten and less than 25 wt% starch as providing, *per se*, an inventive contribution. As set out above, these values merely express the general requirement that gluten and starch be removed and thus be present at low levels in the WU-AX source, this being essentially the same teaching as conveyed in D10.

1.17 The board therefore concludes that a skilled person starting from D10 and following the explicit teachings in that document would arrive at the subject-matter of claim 1 without the exercise of inventive skills.

1.18 The subject-matter of claim 1 thus lacks an inventive step in view of D10 alone.

Auxiliary request 1

2. Inventive step

2.1 Claim 1 of auxiliary request 1 further specifies that the xylanase is applied in an amount sufficient to deliver at least 30 units of xylanase activity per kg of flour.

2.2 Although the experiments reported in Figure 7 of document D10 relate to the addition of 15 units of xylanase, as correctly pointed out by the appellant, the bread in those experiments is prepared in accordance with the standard AACC pup loaf method. As evidenced by document D21, this method is based on loaves containing either 100 or 200 g of flour. Consequently, the 15 units of xylanase disclosed in Figure 7 of D10 are not expressed per kilogram of flour, as required by claim 1, but rather per loaf containing 100 or 200 g of flour.

2.3 Document D10 therefore discloses methods in which the added xylanase corresponds to an activity of between 75 units per kilogram of flour (in the case of a 200 g loaf) and 150 units per kilogram of flour (in the case of a 100 g loaf). Consequently, irrespective of whether the calculation is based on a 100 or 200 g loaf, the

xylanase activity employed in the methods of D10 is clearly well above the minimum of 30 units per kilogram of flour specified in the claim 1 at issue.

2.4 The same arguments and conclusions as those presented for the main request therefore apply to the current request. Consequently, the requirements of Article 56 EPC are not met.

Auxiliary request 2

3. Inventive step

3.1 Claim 1 of auxiliary request 2 corresponds to that of the main request, where the WU-AX fraction contains at least 35% WU-AX (instead of 25%).

3.2 As explained in the discussion of the main request, D20 indicates that (see first paragraph of page 226) AX constitute 85% of the NSP, from which only 25 to 30% are WE-AX. Consequently, the proportion of WU-AX in the insoluble pentosans fraction is estimated to be about 80 wt%, which is far above the "*at least 35%*" required in claim 1 at issue.

3.3 Therefore, the reasoning presented for the main request also applies to this request, and the subject-matter of claim 1 does not involve an inventive step in view of document D10. The requirements of Article 56 EPC are thus not satisfied.

Auxiliary request 3

4. Inventive step

4.1 Claim 1 under consideration corresponds to a combination of claim 1 according to auxiliary requests 1 and 2.

4.2 As explained above, the amendments made in these auxiliary requests do not give rise to any additional distinguishing features over document D10.

4.3 Accordingly, the arguments and conclusions set out for the higher-ranking requests apply equally to this request.

4.4 The subject-matter of claim 1 is therefore obvious in view of D10. Consequently, the requirements of Article 56 EPC are not met.

Auxiliary requests 4 and 5

5. Inventive step

5.1 Claim 1 according to auxiliary requests 4 and 5 corresponds to that of the main request, with the additional requirement that the weight ratio of WU-AX to gluten in the dough be from 1:2 to 1:8.

5.2 The patent indicates (see paragraph [0031]) that "*to achieve the benefits of the invention it is advisable to adjust the amount of WU arabinoxylans in the dough to the amount of gluten contained therein*" such that the WU-AX to gluten weight ratio is 1:2 to 1:8.

5.3 The respondent argued that since document D10 disclosed a flour with a gluten content of 11.0 to 11.6% (see the Materials & Methods section on page 1251) and the added insoluble pentosans also contained components other than WU-AX, the resulting WU-AX to gluten ratio in D10 would necessarily be below 1:8 and thus fall outside the claimed range. The respondent further submitted that, as shown in Example 3 of the patent, increasing the WU-AX to gluten ratio led to improved bread properties.

5.4 The board is not persuaded by the respondent's arguments.

Firstly, as correctly noted by the appellant, neither Example 3 nor any other example in the patent evaluates the effect of the WU-AX to gluten weight ratio in the dough. The only conclusion that can be drawn from Example 3 is that for a given flour and in the presence of a defined amount of xylanase, increasing the amount of WU-AX results in an improvement in bread properties.

The same teaching is derivable from document D10, which discloses (see page 1254) that the addition of insoluble pentosans increases loaf volume in the presence of xylanase. This effect is explained by the dual role of xylanase, having a positive effect via hydrolysis of WU-AX and a negative effect through degradation of WE-AX. When xylanase is present in excess relative to WU-AX, the negative effect predominates, leading to reduced loaf volume. As shown in Figure 7 of D10, this adverse effect can be mitigated by increasing the amount of insoluble pentosans, thus promoting the beneficial hydrolysis of WU-AX.

Furthermore, since claim 1 at issue — unlike that of auxiliary request 1 — does not define a minimum activity of xylanase in the dough, it also encompasses embodiments in which xylanase is present in low amounts. In such cases, increasing the level of WU-AX would lead to a deterioration of bread properties rather than an improvement.

The board also notes that the respondent's estimation of the WU-AX to gluten ratio in the dough of D10 relies on several assumptions. The respondent assumes that since D10 discloses a flour protein (i.e. gluten) content of 11.0 to 11.6% and the bread used in the tests of Figure 7 contains 1.5% insoluble pentosans, the resulting ratio would be less than 1:8. The respondent further argues that because not all insoluble pentosans are WU-AX, the actual WU-AX to gluten ratio would be even lower and thus fall outside the claimed range.

However, the respondent's estimate overlooks a critical point. Claim 1 defines the weight ratio in the dough, whereas the gluten content of 11.0 to 11.6 wt% disclosed in document D10 is expressed relative to the flour weight, and the 1.5 wt% content of insoluble pentosans is expressed relative to the final baked bread. A skilled person is well aware that the mass of the dough differs from both that of the flour and that of the final bread as the dough contains additional ingredients, some in substantial amounts, such as water, yeast, salt and sugar, while the baked bread loses water during baking.

Consequently, the gluten content expressed on a dough basis will necessarily be lower than that reported on a flour basis, and the concentration of insoluble

pentosans expressed on a dough basis will necessarily be higher than that reported on a bread basis. Taking these differences in weight bases into account, the WU-AX to gluten ratio in D10 is expected to fall within the claimed range of 1:2 to 1:8.

5.5 The board thus concludes that auxiliary requests 4 and 5 do not overcome the inventive-step objections in view of D10.

5.6 The requirements of Article 56 EPC are therefore not met.

Auxiliary request 6

6. Inventive step

6.1 Claim 1 at issue relates to the use of a WU-AX source as defined in claim 1 of the main request *"to improve the quality of dough or the volume of baked dough* [...] *wherein said dough exhibits at least 10 units of xylanase activity per kg of flour"*.

6.2 Having established that the method of preparing a flour-based dough using a WU-AX source as defined in claim 1 of the higher-ranking requests would be obvious in view of document D10 (see the discussions on the main request and auxiliary request 1), the remaining question for the current auxiliary request is whether the defined improvement in dough quality or loaf volume can confer an inventive contribution, particularly in light of the fact that such an improvement would, in principle, serve to limit the scope of the use claim in question.

6.3 As indicated in point 1.12 above, the respondent argued that document D10 (see Figure 7) did not demonstrate that the addition of xylanase and a WU-AX source led to a significant improvement in bread or dough quality when compared with a control containing neither of these components.

6.4 The board notes that - as correctly pointed out by the appellant during the oral proceedings - the use claim in question defines an improvement arising from the addition of a WU-AX source to a dough already containing xylanase, rather than from the simultaneous addition of both components (xylanase and WU-AX source) to the dough.

6.5 Setting aside the board's disagreement with the argument that D10 does not demonstrate any improvement from the combined addition of xylanase and a WU-AX source (see point 1.13 above), it is undisputed that D10 anticipates an improvement resulting from the addition of a WU-AX source to a xylanase-containing dough. This is evident from a comparison of the loaf volumes shown in the second and last columns of Figure 7 of D10: the second column corresponds to a dough containing xylanase but no WU-AX source, while the last column shows the loaf volume obtained when a WU-AX source, in the form of insoluble pentosans, is added. Both Figure 7 and Table 2 clearly demonstrate that the addition of the WU-AX source to the xylanase-containing dough leads to a statistically significant increase in loaf volume.

6.6 Claim 1 according to auxiliary request 6 is therefore obvious in view of D10.

6.7 he requirements of Article 56 EPC are thus not met.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

K. Götz-Wein A. Haderlein

Decision electronically authenticated