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**Datasheet for the decision
of 19 January 2023**

Case Number: T 2736/19 - 3.2.05

Application Number: 06827462.0

Publication Number: 1951777

IPC: B29C44/38, C08G18/48,
C08G18/76, C08J9/14

Language of the proceedings: EN

Title of invention:

Method of molding rigid polyurethane foams with enhanced thermal conductivity

Patent Proprietor:

Dow Global Technologies LLC

Opponents:

Covestro Deutschland AG/Covestro AG
BASF SE

Relevant legal provisions:

EPC Art. 54, 56, 100(a), 100(b), 108
RPBA 2020 Art. 25(2)
RPBA Art. 12(4)

Keyword:

Admissibility of appeal (yes)

Sufficiency of disclosure (yes)

Novelty (yes)

Inventive step (yes)

Resubmission of objections withdrawn at the opposition stage -
admitted (no)

Decisions cited:

T 0220/83



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Case Number: T 2736/19 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 19 January 2023

Appellant: BASF SE
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 19 July 2019
rejecting the opposition filed against European
patent No. 1951777 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman P. Lanz
Members: B. Spitzer
 C. Brandt

Summary of Facts and Submissions

- I. Opponent 2's appeal is against the decision of the opposition division rejecting the oppositions against European patent No. 1 951 777 (the patent).
- II. The opposition was filed against the patent as a whole on the grounds of Article 100(a), together with Article 54 EPC (lack of novelty) and Article 56 EPC (lack of inventive step), and Article 100(b) EPC.
- III. Oral proceedings before the board were held by videoconference on 19 January 2023.
- IV. Requests

The appellant (opponent 2) requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeal be rejected as inadmissible or be dismissed or, alternatively, that the decision under appeal be set aside and that the patent be maintained as amended on the basis of the claims of one of auxiliary requests 1 to 5 filed on 1 April 2020.

Opponent 1, which is a party to the appeal proceedings as of right under Article 107, second sentence, EPC, did not file any requests in the appeal proceedings.

- V. The documents cited during the appeal proceedings include the following:

E1: EP 0 708 127 A2;

E2: M. Taverna et al., "Sandwich Panels: Innovative Solutions using Vacuum-assisted Foam Injection" (UTECH 2000 Conference proceedings, published 2000);

E3: US 3,970,732;

E4: WO 2004/035650 A1;

E5: EP 0 477 920 A2;

E6: US 5,523,334.

VI. Claim 1 as granted (main request) has the following wording:

"A process for producing a molded rigid polyurethane foam having a molded density of 33 to 38 kg/m³, as measured according to ASTM 1622-88, a $\Lambda_{(10^{\circ}\text{C})}$ of less than 20 mW/m.K, as measured according to ISO 12939/ DIN 52612, and having a ratio of molded foam density (kg/m³) to $\Lambda_{(10^{\circ}\text{C})}$ (mW/m.K), measured 24 hours after foam production, from 1.65 to 2.15, by injecting into a closed mold cavity a reaction mixture at a packing factor of 1.03 to 1.9 wherein the mold cavity is under a reduced pressure of 300 to 950 mbar and wherein the reaction mixture comprises:

A) an organic polyisocyanate;

B) a physical blowing agent, wherein the physical blowing agent is present in an amount of from 10 to 30 weight percent of the polyol composition and is a hydrocarbon selected from n-pentane, isopentane, cyclopentane, n-butane, cyclohexane or a mixture thereof,

C) a polyol composition containing at least one polyol with a functionality of 3 or greater and a hydroxyl number between 300 and 800

D) water present at 0 to 2.5 weight percent of the total polyol formulation;

E) catalyst and

F) auxiliary substances and/or additives."

VII. The submissions of the parties relevant to the decision can be summarised as set out below.

(a) Admissibility of the appeal

(i) Appellant

The appellant's arguments put forward during the opposition proceedings had not been evaluated correctly by the opposition division and thus were repeated since they were still pertinent. The statement of grounds of appeal explicitly referred to the decision under appeal. The issues relevant for reviewing the contested decision had been addressed in the statement of grounds of appeal. Therefore, the appeal was admissible.

(ii) Respondent

The appellant had failed to indicate reasons for reversing the decision under appeal. The appellant simply repeated its arguments set out during the opposition phase without taking into account or responding to the decision under appeal. Therefore, the statement of grounds of appeal failed to meet the requirements of Article 12(2) and (3) RPBA and the appeal was inadmissible.

(b) Patent as granted - sufficiency of disclosure

(i) Appellant

The patent did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by the person skilled in the art. A first objection

was that the patent, including the examples, did not disclose how the parameters of the foam were to be obtained. Although the examples of the patent showed that the reaction mixture, the catalyst, the amount of physical blowing agent and the set pressure had an influence on the foam properties, how to combine the numerous claimed parameters to achieve the advantageous effect of the patent was not disclosed. A second objection was that the patent did not disclose how the device for carrying out the process of claim 1 should be configured, especially whether the claimed pressure was only applied at the beginning of the process or whether and how it was maintained during the foaming process.

(ii) Respondent

The appellant had not provided any evidence or verifiable facts to substantiate its allegations of insufficient disclosure (see decisions T 409/91 and T 694/92). The patent included a full and complete description of the claimed processes, and the person skilled in the art would have had no difficulties putting these processes into effect. Moreover, the patent included several examples according to the invention and disclosed at least one way to carry out the invention (see decision T 292/85).

(c) Novelty of the subject-matter of claim 1 as granted

(i) Appellant

The subject-matter of claim 1 as granted was not new in view of document E1. In addition to the reaction mixture and the molded density and thermal conductivity values, the contested features of a packing factor and

a reduced pressure were also disclosed in document E1. The claimed ranges for the pressure and the packing factor were very broad and constituted usual process parameters implicitly disclosed in document E1. Overpacking was a routine measure which inevitably resulted in a packing factor greater than 1.

Document E1 disclosed the foaming in an open mold as one embodiment and generally disclosed machines working at low and high pressures (see document E1, column 16, lines 43 to 48 and column 1, lines 32 to 35). Working at low pressures included and thus anticipated a process working at reduced pressure.

Therefore, the subject-matter of claim 1 was not new in view of document E1.

(ii) Respondent

The subject-matter of claim 1 as granted was new over document E1. Document E1 taught that the starting components were introduced into an open, unheated or temperature-controlled mold, in which the reaction mixture was allowed to expand essentially without pressure to avoid a compacted peripheral zone (see document E1, column 16, lines 43 to 48). Therefore, document E1 excluded the use of a reduced pressure. Concerning the packing factor of 1.03 to 1.9, the appellant had asserted that this was a routine measure for ensuring that the mold was completely filled. However, it had not provided any evidence for this assertion. Document E1 was silent on a packing factor in the claimed specific range of 1.03 to 1.9.

(d) Inventive step of the subject-matter of claim 1 as granted

(i) Appellant

The subject-matter of claim 1 as granted was not inventive over a combination of documents E2 and E1. Document E2 disclosed a process with a reduced pressure (up to 600 mbar; see document E2, page 3, left column, line 6 from the bottom) and a certain overpacking (see document E2, page 2, left column, first paragraph under the subtitle "Working with Process and Chemistry"). The claimed packing factor in the range of 1.03 to 1.9 corresponded to an overpack of 3 to 90%, which was a usual range for completely filling the mold. Thus, the only distinguishing features were the reaction mixture and the values for density and thermal conductivity.

Concerning the technical effect of these distinguishing features, the patent did not show any advantageous effects. The process according to claim 1 as granted was defined by the composition of the reaction mixture, namely features A to F; by two process parameters, i.e. a packing factor and a pressure; and by the properties of the final foam product, i.e. the molded density and thermal conductivity. The components of the reaction mixture were formulated in a broad way. Examples C1 and C2 of the patent (see patent, paragraphs [0065], [0066] and Table 1) were not according to the invention. In Examples 1 and C3 of the patent (see patent, paragraphs [0067] to [0069] and Table 2), a catalyst was added and, thus, these examples were not comparable to Examples C1 and C2. Examples 2 and 3 of the patent (see patent, paragraphs [0070] to [0072] and Table 3) used a different polyol and different catalysts. No special information could be obtained by the comparison of

these examples. Example 4 of the patent (see patent, paragraphs [0073] to [0075] and Table 4) also used a different polyol, different catalysts and a different water content. Examples C4 and C5 of the patent (see patent, paragraphs [0076] to [0078] and Table 5) were outside the scope of claim 1 as granted, as was Example 5 of the patent (see patent, paragraphs [0076] to [0078] and Table 5). Since the variation of the parameters, especially of the packing factor and the reduced pressure, did not reveal a special technical effect, the objective technical problem was merely the provision of an alternative process for the production of a rigid polyurethane foam.

Starting from document E2, the person skilled in the art would have considered document E1 since both documents were used for foaming sandwich insulation panels (see document E2, abstract; document E1, column 17, lines 3 to 10). Furthermore, the process of document E2 was not limited to specific polyurethanes but could be used for a large variety of reaction mixtures. Document E2, last paragraph of the abstract, read: "*The new process, moreover broadens opportunities for new Polyurethane technology solutions. Blowing agents families with a wider range of boiling point can be used and, very remarkable, polyisocyanurate foam can be now easily processed with the injection technique.*" Therefore, the person skilled in the art would have chosen the reaction mixture known from document E1 when starting from the process disclosed in document E2.

By a combination of documents E2 and E1, the person skilled in the art would inevitably have arrived at the claimed invention. For achieving the claimed packing factor and molded density and thermal conductivity values, the person skilled in the art knew that they

had to optimise the different parameters as this was disclosed in document E2, see e.g. page 1, right column, last paragraph: "*The various - and sometimes contradicting - needs have generated a number of technological solutions (...)*" and page 2, left column, second last paragraph: "*The degree of overpacking is usually optimised panel by panel looking for a compromise between homogeneity of foam properties and reasonable demolding times.*" Moreover, the claimed range for the packing factor was very broad. Packing factors usually lay in the claimed range. Concerning the molded density and the thermal conductivity, these values were influenced by the reaction mixture, especially the blowing agent, which was responsible for the foam and cellular structure. Overpacking and the application of a reduced pressure were process features not related to the molded density and the thermal conductivity. At least the examples in the patent did not show this influence (see Examples C1 and C2 and Examples 1 and C3, where the pressure and the packing factor were varied, respectively). Since the claimed range for the packing factor was so broad, the values for the molded density and the thermal conductivity would still be achieved with the reaction mixture known from document E1. Furthermore, with a packing factor in the lower part of the claimed range, the molded density of 20 to 50 kg/m³ for a foam produced according to the disclosure of document E1 would still lie in the claimed range of 33 to 38 kg/m³ when being produced according to the teachings of document E2.

(ii) Respondent

The subject-matter of claim 1 as granted involved an inventive step over documents E2 and E1. First, the person skilled in the art would not have chosen

document E2 as the closest prior art since it related to the production of a polyisocyanurate foam and not a polyurethane foam. Document E2 did not disclose the reaction mixture, especially components B, C, D, E, F; the packing factor; and the molded density and the thermal conductivity as claimed in claim 1 as granted. A packing factor of 1.03 to 1.9 was not implicit in the process of document E2. A packing factor greater than 1 was also not a standard measure for ensuring that a mold was completely filled during foaming. Even if it were, claim 1 as granted claimed a specific packing factor in the range of 1.03 to 1.9. Although document E2 disclosed overpacking in general, it did not disclose a packing factor in the claimed range. Furthermore, a packing factor was not the same as an overpack as shown in paragraph [0009] and Table 2 of the patent. A packing factor of 1.03 to 1.9 did not correspond to a 3 to 90% overpack as alleged by the appellant.

These distinguishing parameters indeed had a technical effect revealed by the examples of the patent. Examples 1 and C3 of the patent (see patent, paragraphs [0067] to [0069] and Table 2) showed the influence of a reduced pressure on the molded density. Examples 2 and 3 of the patent (see patent, paragraphs [0070] and [0071] and Table 3) had almost the same density but for different compositions. Example 5 of the patent showed the influence of lower amounts of blowing agents compared to Examples C4 and C5 of the patent (see patent, paragraphs [0076] and [0077] and Table 5). When producing the foam with a reduced pressure, lower amounts of catalysts and a lower packing factor were necessary to obtain the same molded density and thermal conductivity. Therefore, there was indeed a technical effect although no direct comparison was possible. All

these factors, i.e. lower packing factor, reaction composition and reduced pressure, had an influence on the molded density and the thermal conductivity. Examples 1 to 4 were within the claimed range. These examples used a packing factor falling within the claimed range of 1.03 to 1.9 and had a thermal conductivity of lower than 20 mW/m·K, while all the examples of document E2 had lambda values in the range of 21 to 24 mW/m·K. As a consequence, the choice of the reaction mixture and the packing factor had the technical effect of improved properties, especially a lower thermal conductivity and a lower molded density. Therefore, the objective technical problem was not merely the provision of an alternative process but the provision of a process resulting in a lower molded foam density and a lower thermal conductivity.

The person skilled in the art would not have combined documents E2 and E1. These documents were contradictory. In document E1, an open mold without pressure was used (see document E1, column 16, lines 43 to 48), while document E2 suggested a reduced pressure. Furthermore, document E2 taught that an overpack was not desirable and that it should be reduced (see document E2, page 2, right column, under the heading "Vacuum can make it").

Even if the person skilled in the art had combined these teachings, the resulting process still would not fulfil all the criteria of claim 1 as granted. First, there was no information about the packing factor in the claimed range and second, there was no evidence that the claimed values would have been achieved using the reaction mixture of document E1 with the process of document E2. Document E1 discloses the claimed molded density and the claimed thermal conductivity in the

context of an open mold (see document E1, column 16 line 43 to column 17, line 2). Not only the composition of the reaction mixture but also a reduced pressure and overpacking had an influence on these values. Thus, a combination of the teachings of documents E2 and E1 would not have resulted in a process as claimed in claim 1 as granted. The solution of claim 1 as granted would not have been obvious from the teachings of document E2 in combination with document E1.

(e) Admittance of further inventive-step attacks

(i) Appellant

Further inventive-step objections were based on document E1 with document E2, document E1 with document E3, document E4 with document E2, document E4 with document E3, document E5 with document E2, document E5 with document E3, document E6 with document E2 and document E6 with document E3. These inventive-step objections should be admitted since they had already been raised in opposition proceedings. The contested decision was surprising with respect to the formulation of the objective technical problem and the conclusion on the packing factor. The claimed range of the packing factor was so broad that the claimed values were always achieved. Document E4 disclosed further information regarding overpacking (see document E4, page 14, lines 8 to 12).

(ii) Respondent

These inventive-step objections should not be admitted since they had not been discussed in the decision under appeal. There was no further information at least for the packing factor in document E4.

Reasons for the Decision

1. Admissibility of appeal
 - 1.1 The respondent alleged that the appellant's submissions presented in the statement of grounds of appeal did not address the grounds for the opposition division's decision but were merely a repetition of the arguments presented in the first-instance opposition proceedings. The respondent concluded that the statement of grounds of appeal thus failed to meet the requirements of Article 12(2) and (3) RPBA and that the appeal was inadmissible.
 - 1.2 The board notes that the requirements for an appeal to be admissible are governed by, *inter alia*, Article 108, third sentence, EPC and Rule 99(2) EPC.

Under established case law, the grounds for appeal should specify the legal or factual reasons on which the case for setting aside the decision is based. If the appellant submits that the decision under appeal is incorrect, the statement setting out the grounds of appeal must enable the board and the other party to understand immediately why the decision is alleged to be incorrect and on what facts the appellant bases its arguments without first having to make investigations of their own (see decision T 220/83, OJ EPO 1986, 249, point 4 of the Reasons, affirmed by numerous decisions). The decision on whether the requirements of Article 108, third sentence, EPC and Rule 99(2) EPC are met has to be made on the basis of the contents of both the statement of grounds of appeal and the decision under appeal. Whether a statement of grounds of appeal meets the requirements of Article 108 EPC can only be

decided on a case-by-case basis (see Case Law of the Boards of Appeal of the European Patent Office, 10th edn., 2022, (Case Law), V.A.2.6.3.a)).

1.3 In the case in hand, the arguments, at least in view of inventive step of the subject-matter of claim 1 as granted, presented by the appellant in its statement of grounds of appeal are sufficiently clear to enable the board and the other party to understand immediately why the decision under appeal was alleged to be incorrect and to what extent it should be cancelled. The appellant explicitly referred to the decision under appeal (see statement of grounds of appeal, page 9, last paragraph) and set out why it disagreed with findings in it (see statement of grounds of appeal, page 10, first paragraph to page 11, fourth paragraph).

1.4 Thus, the provisions of Article 108 EPC and Rule 99(2) EPC are met. Since it is uncontested that the further admissibility requirements are also fulfilled, the board decided that the appeal is admissible.

2. Patent as granted - sufficiency of disclosure (Article 100(b) EPC)

2.1 The appellant held the view that the European 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 since the patent did not disclose how the parameters of the foam were to be obtained (first objection) and how the device for carrying out the process of claim 1 should be configured, especially whether the claimed pressure was only applied at the beginning of the process or whether and how it was maintained during the foaming process (second

objection).

- 2.2 The board notes that the advantageous effects of the patent referred to by the appellant seem to relate to the claimed range of the molded density and the claimed thermal conductivity, as stated by the opposition division (see decision under appeal, Reasons, point 3.1) and in the patent (see patent, paragraph [0010]).

To establish insufficiency of disclosure, it is necessary to prove that the patent as a whole does not enable the skilled person - using their common general knowledge - to carry out the invention from the priority or filing date.

Concerning the first objection that the patent did not disclose how the claimed parameters of the foam were to be obtained, the board arrives at the same conclusion as the opposition division (see decision under appeal, Reasons, point 3.2). Although claim 1 uses a plurality of parameters for defining the invention, such as those relating to the components A to F of the reaction mixture, the packing factor and the reduced pressure, it has to be taken into account for assessing sufficiency of disclosure that the description contains specific Examples 1 to 4, which are according to the invention as claimed. Therefore, several ways of how the person skilled in the art can carry out the invention are disclosed in the patent (see Case Law, II.C.5.2.). Under established case law, an objection of lack of sufficiency of disclosure presupposes that there are serious doubts substantiated by verifiable facts (see Case Law, II.C.9). Since the appellant has not provided any evidence for its assertion that due to the plurality of parameters the invention cannot be carried out by a person skilled in the art, the board

sees no reason for overruling the opposition division's conclusion in this respect.

- 2.3 Regarding the second objection that the patent did not disclose how the device for carrying out the process of claim 1 should be configured, especially whether the claimed pressure was only applied at the beginning of the process or whether and how it was maintained during the foaming process, the board refers to paragraphs [0058], [0064] and [0010] of the patent. Paragraphs [0058] and [0064] of the patent disclose, *inter alia*, that "*[t]he vacuum in the buffer tank, and thus the in mold air pressure, is maintained with control valves*". Paragraph [0010] of the patent further explains that "*[i]njection of an appliance foam formulation in a mold maintained at a low pressure gives more freedom (...)*". These passages disclose that the claimed pressure is not only applied at the beginning of the process but is maintained during the foaming process and how this can be achieved.

In view of this disclosure, the board is not convinced that the person skilled in the art would be unable to set and maintain the claimed pressure during the foaming process.

- 2.4 For these reasons, the board concurs with the opposition division's opinion and arrives at the conclusion that the patent discloses the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

3. Novelty of the subject-matter of claim 1 as granted (Article 100(a) EPC in conjunction with Article 54 EPC)
- 3.1 The opposition division was of the opinion that document E1 does not disclose the features of the reduced pressure and the packing factor (see decision under appeal, Reasons, point 4.2). The appellant contested this conclusion, which was based on the fact that in document E1, foaming was done in an open mold (see document E1, column 16, lines 43 to 48).
- 3.2 The board concurs with the oppositions division's opinion. Document E1 does not disclose a reduced pressure of 300 to 950 mbar and a packing factor of 1.03 to 1.9. There is also no implicit disclosure of these features. Although document E1 mentions machines working at low pressures (see document E1, column 1, lines 32 to 35), such a general reference does not anticipate the claim feature of a reduced pressure of 300 to 950 mbar. Moreover, document E1 does not disclose overpacking in general because in document E1 an open mold is used (see document E1, column 16, lines 43 to 48). The reference to high and low pressure machines, mentioned in document E1 in the context of the prior art (see document E1, column 1, lines 33 to 35), does not imply that a packing factor in the claimed range is applied when processing the reaction mixture of current claim 1.
- 3.3 Under the boards' established case law (see Case Law, I.C.4.3.), a prior-art document anticipates the novelty of claimed subject-matter if the latter is directly and unambiguously derivable from that document, including any features implicit to a person skilled in the art. However, an alleged disclosure can only be considered

"implicit" if it is immediately apparent to the skilled person that nothing other than the alleged implicit feature forms part of the subject-matter disclosed.

3.4 This is not the case for the claimed ranges of the pressure and the packing factor, even if they were considered to be usual parameters, as argued by the appellant. Also, the appellant's assertions that overpacking was a routine measure which inevitably resulted in a packing factor greater than 1 and that the claimed ranges for the packing factor and the pressure were very broad cannot justify an implicit disclosure since the subject-matter claimed cannot be inferred directly and unequivocally from the disclosure of document E1. It is not apparent to the skilled person that nothing other than a pressure in the claimed range and a packing factor lying in the range of 1.03 to 1.9 form part of the subject-matter disclosed in document E1.

3.5 Consequently, the board concurs with the opposition division's opinion that the subject-matter of claim 1 is new in view of document E1.

4. Inventive step of the subject-matter of claim 1 as granted based on a combination of documents E2 and E1 (Article 100(a) EPC in conjunction with Article 56 EPC)

4.1 In the board's view, document E2 is a suitable starting point for examining inventive step. The respondent's counterargument that document E2 was directed to the production of polyisocyanurate foam (see document E2, abstract, last sentence) is not convincing since the abstract of document E2 also emphasises that "*[t]he new process, moreover broadens opportunities for new Polyurethane technology solutions*". Document E2 deals

with solutions using vacuum-assisted foam injection for sandwich panels (see document E2, heading). As such, the process known from document E2 can be applied for different reaction mixtures.

- 4.2 Document E2 does not disclose a specific reaction mixture. Components B to F, the molded foam density of 33 to 38 kg/m³ and the thermal conductivity $\lambda_{(10^{\circ}\text{C})}$ of less than 20 mW/m·K are not disclosed. Also, a packing factor of 1.03 to 1.9 is not explicitly mentioned. This is not disputed.

The appellant argued that document E2 implicitly disclosed a packing factor in the range of 1.03 to 1.9 since this corresponded to an overpack of 3 to 90%, which was a usual parameter for completely filling the mold.

The board is not convinced since the appellant did not provide any evidence for this allegation. First, document E2 mentions overpacking but no packing factor. The overpack and the claimed packing factor cannot be directly compared. This is derivable from the definition of these parameters (see patent, paragraph [0009]) and their values given for the examples in the patent (see patent, Tables 1 to 4). Second, document E2 discloses "a certain 'overpacking'" for obtaining an acceptable distribution of density and that vacuum can help reduce the overpacking (see document E2, page 2, left column, first paragraph after the heading "Working with Process and Chemistry" and page 2, right column, first paragraph under the heading "Vacuum can make it"). Document E2 further discloses that "*[t]he degree of overpacking is usually optimised panel by panel looking for compromise between homogeneity of foam properties and reasonable demolding times*" (see

document E2, page 2, left column, second last paragraph). However, document E2 is silent on the degree of overpacking actually applied, let alone give a suitable range for the packing factor. The only general information which can be retrieved from document E2 is that using a reduced pressure also reduces the required overpacking and that the overpacking has an influence on the homogeneity of the foam properties (density and mechanical properties) and demolding times (see document E2, page 2, right column, first paragraph under the heading "Vacuum can make it").

Thus, the board concludes that the claimed packing factor is a further distinguishing feature over the disclosure of document E2.

- 4.3 Regarding the technical effect of the distinguishing features, i.e. the reaction mixture and the claimed packing factor, the patent contains several examples. The molded density and the thermal conductivity result from the claimed process conditions (reduced pressure and packing factor) and the composition of the reaction mixture.

Comparative Examples C4 and C5 and Example 5 of the patent (see patent, paragraphs [0076] and [0077] and Table 5) demonstrate the combined effect of a reduced pressure and a smaller amount of blowing agent, namely that substantially the same molded density and thermal conductivity can be achieved when using half the amount of blowing agent at a reduced pressure. However, Example 5 lies outside the scope of claim 1 as granted for thermal conductivity. Examples 1 and C3 demonstrate that the molded density decreases when the packing factor is lower and the pressure is reduced (see

patent, paragraphs [0067 and [0068] and Table 2). Comparative Examples C1 and C2 reveal the influence of a reduced pressure on the molded density. Thermal conductivity remains unchanged (see patent, paragraphs [0065] and [0066] and Table 1). Examples 1 and C2, both produced at a reduced pressure, show an influence on the thermal conductivity when a catalyst and a lower water content are used (see patent, paragraph [0067]).

Therefore, the board is not persuaded that the objective technical problem is merely the provision of an alternative process for the production of a rigid polyurethane foam as suggested by the appellant. In the board's view, the objective technical problem can be seen in the provision of a process for producing a rigid polyurethane foam resulting in a lower molded foam density.

- 4.4 The question is whether the person skilled in the art starting from document E2 would have considered document E1 and whether they would have arrived at the subject-matter of claim 1 as granted by combining these documents.
- 4.5 Documents E1 and E2 both disclose a process for the production of a rigid polyurethane foam. Document E2 mentions the production of e.g. sandwich insulation panels (see abstract), as does document E1 (see document E1, column 17, lines 3 to 10). Moreover, the process disclosed in document E2 is suitable for a broad field of polyurethanes, and its use is not limited to a special reaction mixture (see document E2, abstract, last paragraph). For these reasons, the board is convinced that the person skilled in the art looking for a solution to the above-mentioned objective technical problem would have considered document E1, in

particular as it discloses the claimed density and thermal conductivity, thus improved properties for these parameters compared to those of document E2 (see document E2, Table 1).

4.6 It is undisputed that at least Examples 1 and 5 of document E1 fall within the claimed reaction mixture according to features A to F of claim 1 as granted and that document E1 also discloses the molded density and thermal conductivity values, albeit when using an open mould (see document E1, column 16, lines 43 to 48; column 18, lines 4 to 54, line 45; column 20, line 45 to column 21, line 37). Document E1 does not disclose the packing factor and the reduced pressure.

4.7 In the board's view, the person skilled in the art starting from the process known from document E2 and using the reaction mixture known from document E1 would not have arrived in an obvious way at the subject-matter of claim 1 as granted for the following reasons.

The board concurs with the opposition division's reasoning that the values for the thermal conductivity and the molded density achieved when foaming in an open mold are not necessarily the same as those achieved in a process with reduced pressure. Moreover, the board agrees with the contested decision that document E1 does not disclose a packing factor (see decision under appeal, Reasons, especially points 5.7 and 5.11).

Regarding the effect of a reduced pressure, reference is made to Comparative Examples C1 and C2 of the patent (see patent, paragraphs [0065] and [0066], Table 1). For Comparative Example C1, ambient pressure is used, and its values for the molded density and the thermal conductivity lie within the claimed range. By merely

reducing the pressure, the density and the packing factor are reduced and lie slightly outside the claimed range while there is hardly any influence on the thermal conductivity (see Comparative Example C2). A comparable result is revealed by Example C3 conducted at ambient pressure compared to Example 1 conducted at reduced pressure. Therefore, it can be concluded that a reaction mixture as disclosed e.g. in Example 1 or 5 of document E1 processed under a reduced pressure as disclosed in document E2 would hardly influence the value for the thermal conductivity, which would thus lie in the claimed range. However, neither document E1 or E2 discloses the claimed packing factor or any value for overpacking or a free rise density for calculating the claimed packing factor.

4.8 For these reasons, the board is of the view that the subject-matter of claim 1 as granted is not rendered obvious starting from document E2 in combination with document E1.

5. Admittance of further inventive-step objections
(Article 12(4) RPBA 2007)

5.1 In its statement of grounds of appeal, the appellant raised further inventive-step objections based on document E1 with document E2, document E1 with document E3, document E4 with document E2, document E4 with document E3, document E5 with document E2, document E5 with document E3, document E6 with document E2 and document E6 with document E3. The appellant requested that these inventive-step objections be admitted since the decision under appeal was surprising with respect to the formulation of the objective technical problem and the conclusion on the packing factor. The claimed range of the packing factor was so broad that the

claimed values were always achieved. Moreover, document E4 disclosed further information on overpacking (see document E4, page 14, lines 8 to 12).

The respondent requested not to admit these further inventive-step objections. There was no further information on the packing factor in document E4.

- 5.2 In the case in hand, the appellant filed its statement of grounds of appeal before the date on which the revised version of the Rules of Procedure of the Boards of Appeal (RPBA 2020) entered into force, i.e. 1 January 2020. Thus, in accordance with Article 25(2) RPBA 2020, Article 12(4) to (6) RPBA 2020 does not apply. Instead, Article 12(4) of the Rules of Procedure of the Boards of Appeal in the version of 2007 (RPBA 2007) continues to apply.

In accordance with Article 12(4) RPBA 2007, the board has the power to hold inadmissible facts, evidence or requests which could have been presented or were not admitted in the first-instance proceedings. This also applies to the issue of admittance of resubmitted objections that were raised but subsequently not pursued further during first-instance proceedings (see Case Law, V.A.5.11.3 d)).

- 5.3 The further inventive-step objections had been raised in writing during the opposition proceedings. However, in the oral proceedings before the opposition division, the appellant did not further pursue these inventive-step objections (see minutes of the oral proceedings before the opposition division, page 4, last paragraph, "*O2 announced that she would also restrict her problem-solution approach to documents D1 and E1 for consistency.*"; note: document D1 corresponds to

document E2).

- 5.4 Documents E3 to E6 are not discussed at all in the reasons for the decision under appeal.

Documents E1 and E2 were discussed for novelty and inventive step. However, the inventive-step objection based on a combination of document E1 with document E2 is *prima facie* not relevant since such a combination would not have rendered obvious the packing factor for the same reasons as set out above (see point 4.7).

Furthermore, the appellant's statement of grounds of appeal does not mention that the decision under appeal was surprising with respect to the formulation of the objective technical problem and the conclusion on the packing factor, as argued by the appellant during the oral proceedings before the board. Moreover, both the objective technical problem used in the contested decision and the opposition division's conclusions on the packing factor are based on the respondent's submissions during the first-instance proceedings.

With regard to the packing factor, the appellant referred to document E4, page 14, lines 8 to 12. Document E4 discloses a 10% overfilling ("10 % Überfüllung"). However, this disclosure, as such, cannot anticipate the claimed packing factor of 1.03 to 1.9 (see point 4.2).

- 5.5 Under these circumstances, the board, exercising its discretion under Article 12(4) RPBA 2007, decided not to admit any of the further inventive-step objections set out in point 5.1 above.

6. Conclusion

None of the grounds for opposition in accordance with Article 100(a) EPC and Article 100(b) EPC prejudices the maintenance of the patent as granted.

Order

For these reasons it is decided that:

1. The appeal is admissible.
2. The appeal is dismissed.

The Registrar:

The Chairman:



N. Schneider

P. Lanz

Decision electronically authenticated