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**Datasheet for the decision  
of 20 May 2014**

**Case Number:** T 0880/11 - 3.3.09

**Application Number:** 05701042.3

**Publication Number:** 1709132

**IPC:** C09J123/20, E04B1/76,  
E04D13/16, C08K7/04

**Language of the proceedings:** EN

**Title of invention:**

PROCESS FOR MANUFACTURING PANELS OF MINERAL WOOL

**Patent Proprietor:**

Rockwool International A/S

**Opponent:**

Saint-Gobain Isover G+H AG

**Headword:**

**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

Inventive step - (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern  
Boards of Appeal  
Chambres de recours**

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

Case Number: T 0880/11 - 3.3.09

**D E C I S I O N  
of Technical Board of Appeal 3.3.09  
of 20 May 2014**

**Appellant:** Rockwool International A/S  
(Patent Proprietor) Hovedgaden 584  
2640 Hedehusene (DK)

**Representative:** Samuels, Lucy Alice  
Gill Jennings & Every LLP  
The Broadgate Tower  
20 Primrose Street  
London  
EC2A 2ES (GB)

**Respondent:** Saint-Gobain Isover G+H AG  
(Opponent) Bürgermeister-Grünzweig-Str.1  
67059 Ludwigshafen (DE)

**Representative:** Kuhnen & Wacker  
Patent- und Rechtsanwaltsbüro  
Prinz-Ludwig-Straße 40A  
85354 Freising (DE)

**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 10 February  
2011 revoking European patent No. 1709132  
pursuant to Article 101(3)(b) 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 proprietor of European patent No. 1 709 132 against the opposition division's decision to revoke it.
- II. In the notice of opposition, the opponent had 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: DE 3223246 A1; and

D2: US 4,025,680.

- III. The decision of the opposition division was based on the claims as granted (main request) and a first and second auxiliary request. According to the decision, the invention underlying the main request was insufficiently disclosed and the subject-matter of the first and second auxiliary requests lacked an inventive step.

The first auxiliary request, which is the only request relevant to the present decision, comprised the following independent claims:

- "1. A method of bonding together the surfaces of two elements formed of mineral fibre, wherein the two elements have been cut from a mineral fibre

web such that the mineral fibres forming the elements are oriented predominantly parallel to the surfaces to be bonded, the method comprising applying an adhesive to one or both of the surfaces to be bonded together, characterized in that the adhesive is a hot melt adhesive which has a melting point of from 50 to 200°C and in that the adhesive is applied to one or both of the surfaces to be bonded by spraying,".

- "9. Use of the product of the method of any of claims 1 to 8 as an insulation panel"
  
- "11. A method of forming a mineral wool insulation panel comprising providing a web of mineral wool having a top face and a bottom face and two opposing side faces and a first end defining the width of the web and a longitudinal direction parallel to the top and bottom faces and side faces and a transverse direction parallel to the top and bottom faces and perpendicular to the side faces, and a thickness between the top and bottom faces,  
cutting at least two elements from the web, the cut being made in the transverse direction, so that the top and bottom faces of each element are formed from the top and bottom faces of the web, bonding two elements together with the top face of one element being bonded to the bottom face of the other element to form a pre-panel,  
and cutting from the pre-panel at least one insulation panel comprising parts of at least two elements and having a predetermined thickness in which the thickness direction of the insulation panel is parallel to the bonded surfaces of the elements forming the pre-panel,

characterized in that the elements are bonded together using hot melt adhesive applied to one or both of the faces to be bonded by spraying."

- "12. Use of an insulation panel produced according to claim 11 as an insulation panel on a surface to be insulated, wherein the insulation panel is applied to the surface to be insulated so that the bonded surfaces of the elements forming the insulation panel are perpendicular to the surface to be insulated, whereby the mineral fibres in the insulation panel are predominantly perpendicular to the surface to be insulated."
  
- "18. A process for manufacturing panels of mineral wool comprising a step of producing a web of mineral wool with fibres arranged parallel to the plane of the non-woven fabric, cutting off elements therefrom, and then bonding the so-obtained elements together, characterized in that a web of mineral non-woven fabric is obtained having a maximal technologically obtainable width of 20 cm, then a strip is cut off therefrom, said strip having a width corresponding to a required final panel length, the so-obtained strips are bonded together by the largest surfaces, the bonding being effected by gluing with the use of a layer of hot adhesive sprayed on one or both bonded surfaces at a temperature of 150-185°C and then the panels sprayed with the adhesive are pressed together, the maximum time of spraying and adhesive setting being 12 seconds, and the so-obtained panels are cut into strips of thickness corresponding to the insulation thickness, said cutting being performed along the dimension corresponding to the length of the panel."

The opposition division reasoned that the subject-matter of claim 1 of the first auxiliary request differed from the closest prior art document D1 by the use of a hot melt adhesive having a melting point of from 50 to 200°C. The use of hot melt adhesives was known from D2. The selection of the range of melting point as required by claim 1 was obvious (a) since hot melt adhesives with a melting point below 50°C would have inferior adhesive characteristics at room temperature, in particular on hot summer days, and (b) since for hot adhesives with a melting point above 200°C, decomposition of the adhesive could occur. Furthermore, hot melt adhesives having a melting point as required by claim 1 were known in the art. The objective technical problem was the provision of an alternative method of bonding the surfaces of two elements together using a different adhesive which hardened faster. While the adhesive in D1 hardened within hours, the hot melt adhesives used in D2 exhibited faster hardening. The skilled person would thus replace the adhesive of D1 by the hot melt adhesives of D2 in order to accelerate the process of bonding. There was nothing in the specification which proved that the use of a particular adhesive increased the stability of the panels once bonded together. The replacement of the adhesive of D1 by the hot melt adhesive according to D2 was thus obvious.

- IV. This decision was appealed by the proprietor (hereinafter "the appellant"). With the statement setting out the grounds of appeal, filed on 17 June 2011, the appellant filed a set of comparative experiments and a first and second auxiliary request.

- V. The opponent (hereinafter "the respondent") filed a response to the appeal.
- VI. In its preliminary opinion, issued prior to the oral proceedings, the board addressed *inter alia* the issue of inventive step starting from D1 as the closest prior art.
- VII. With its letter of 8 July 2013, the appellant filed a new main request and new first to ninth auxiliary requests with the main request being identical to the the first auxiliary request before the opposition division (for the wording of claims 1, 9, 11, 12 and 18, see point III above).
- VIII. On 20 May 2014, oral proceedings were held before the board. The parties maintained their requests filed during the written proceedings and no new requests were filed.
- IX. The appellant's arguments, in so far as relevant to the present decision, can be summarised as follows:

The subject-matter of the main request was inventive. All claims required the use of a hot melt adhesive to bond mineral fiber elements together. In this respect, the "hot adhesive" referred to in claim 18 would be understood by the skilled person to refer to a hot melt adhesive. Unlike the claims, the closest prior art document D1 used water glass as the adhesive. The effect obtained by this distinguishing feature was the provision of an improved bonding strength between the mineral fibre elements. The tests submitted with the statement of grounds of appeal clearly supported this effect. As to the respondent's argument that the validity of the tests was questionable since

insufficient information had been given as regards the way the tests had been carried out, this was not supported by any evidence. Furthermore, the argument that the drying time for the water glass in the tests was not sufficient to obtain maximum bonding strength was not correct or substantiated. More specifically, as stated in the test report, it was ensured that the water glass had completely dried. Furthermore, if the respondent did not believe that the drying time was long enough in the tests, it had had three years to demonstrate this. However the respondent had chosen not to do so. There was thus no evidence on which to doubt the test results.

The test results could also be extrapolated to hot melt adhesives in general since all hot melt adhesives had a similar chemical structure and mode of action.

Furthermore, even if there was some variation between the bonding strengths achieved with various hot melt adhesives, these would still not be as low as that obtained with water glass. The fact that D1 reported excellent pressure, tear and flexible strength did not matter, since the tests clearly showed that hot melt adhesives improved bonding strength even further.

Furthermore, in D1 the bonding strength obtained with water glass was compared with that obtained with no adhesive at all and this document did not contain any comparison with hot melt adhesives. Finally, the respondent's argument that the inventive step approach based on an improved bonding strength could not be applied to claim 1 was not valid since in the same way as with all the other claims, this claim referred to the bonding of mineral fibre elements by hot melt adhesives. The objective technical problem was therefore the provision of an improved bonding strength between mineral fibre elements. The claimed solution



was not obvious on the basis of D1. This document focused on non-combustible adhesives and nothing in D1 suggested that providing a strong bond between mineral fibre elements might be of importance. Furthermore, none of the other documents dealt with the problem of providing stronger bonding. In particular it was not mentioned in D2 that the hot melt adhesive disclosed therein improved the bonding strength between mineral fibre elements.

The fact that the skilled person would have known from D2 that hot melt adhesives reduced production time was irrelevant since the reduction of production time was not the objective technical problem.

- X. The respondent no longer had an objection of insufficiency of disclosure. Furthermore, no objections as regards lack of novelty were made.
  
- XI. The respondent's arguments, in so far as relevant to the present decision, can be summarised as follows:

The subject-matter of the main request lacked inventive step over D1 taken as the closest prior art. The claimed subject-matter differed from this document in that a hot melt adhesive rather than water glass was used to bond mineral fibre elements together. Contrary to the appellant's assertion, the problem solved in view of D1 was not the provision of an improved bonding strength between the mineral fibre elements. In this respect, the validity of the appellant's tests was questionable since no information had been provided concerning the way the tests were carried out. In particular, the test report was silent as regards the type of water glass, the type of hot melt adhesive, the question whether the amount of water glass (20 g)

referred to the water glass in its wet or dried state, the thickness of the mineral fibre elements, the way the tearing force was applied, and at what position exactly the fibre elements broke. The validity of these tests was questionable for the further reason that the time the water glass was allowed to dry was only 1.5 hours in the tests. This was too short to achieve maximum bonding strength. As confirmed by the last paragraph on page 11 of D1, in fact several hours were necessary to achieve maximum bonding strength. Had the water glass in the tests of the appellant been dried for several hours, it would have had the same bonding strength as the hot melt adhesive.

Furthermore, it was explicitly stated in lines 11 to 15 of page 7 of D1 that due to the bonding between the mineral fibre elements, the resulting panels had excellent pressure, tear and flexural strength. This confirmed that with water glass, the same bonding strength could be achieved as with the claimed hot melt adhesives.

Moreover, claim 1 was not directed to lamellar panels of mineral fibre elements and therefore the inventive step analysis based on the problem of improving bonding strength did not apply to this claim.

Consequently, the effect obtained by hot melt adhesives was not an improvement in bonding strength but a reduction of production time. More specifically, the water glass of D1 needed several hours to effect bonding while bonding occurred within seconds in the case of a hot melt adhesive. Since it was however already known from column 3, lines 20 to 22 of D2 that hot melt adhesives led to optimum production speed, the

claimed subject-matter was obvious in view of D1 in combination with D2.

XII. The appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of the main request, alternatively one of the first to ninth auxiliary requests, all as filed with letter of dated 8 July 2013.

XIII. The respondent requested that the appeal be dismissed.

### **Reasons for the Decision**

1. The appeal is admissible.
2. Main request - inventive step
  - 2.1 The only attack made by the respondent against the main request was based on lack of inventive step.
  - 2.2 The invention underlying the opposed patent concerns panels of mineral wool for use as sound, thermal and fireproof insulation of external walls of buildings, as well as ceilings of garages over which heated rooms are located (column 1, lines 3 to 7 of the patent specification).
  - 2.3 In the same way as the opposed patent, D1 concerns insulation panels to be used for the insulation of walls, floors, ceilings and roof constructions (page 1, lines 2 to 6 in conjunction with page 13, lines 15 to 16). In line with both parties' arguments and the decision of the opposition division, D1 can therefore be considered to represent the closest prior art.

In D1 (figure 2) several mineral fibre elements are bonded together on top of each other such that a block is formed; slices are then cut lengthwise out of this block and turned by 90°. The bonding is achieved in D1 by applying an inorganic adhesive such as water glass onto the surfaces of the elements to be bonded (page 11, lines 26 to 33).

As agreed by both parties, the subject-matter of all claims differs from that of D1 in that according to the claims, bonding is effected by a hot melt adhesive rather than an inorganic binder such as water glass.

2.4 The problem addressed in the patent (column 4, lines 52 to 54) and referred to by the appellant is the provision of an improved bonding strength between mineral fibre elements.

2.5 As a solution to this problem, the patent (all claims) proposes the bonding of the mineral fibre elements by way of a hot melt adhesive. It is noted in this respect that the term "hot adhesive" used in claim 18 would be understood by the skilled person to refer to a hot melt adhesive. This was not disputed by the respondent.

2.6 It was a matter of dispute between the parties whether the problem of improving the bonding strength between mineral fibre elements over D1 is solved.

2.6.1 With the statement of grounds of appeal, the appellant submitted comparative tests relating to the type of adhesive. More specifically, two mineral wool fibre elements were cut from a mineral fibre web and rotated such that the mineral fibres were oriented predominantly parallel to the surfaces to be bonded. The resulting elements were then bonded, in a first

experiment, with a hot melt adhesive, namely a polyolefin having a fusing temperature of around 100°C, or, in a second experiment, with water glass as disclosed in D1. The strength of the bonds obtained in the two experiments was then determined in terms of the load at breaking point. The results were 250N, 390N and 316N for the fibre elements bonded with the hot melt adhesive and 35N, 42N and 52N for the fibre elements bonded with the water glass (see table on page 3 of the statement of grounds of appeal). The bond strength obtained with the hot melt adhesive was thus at least five times higher than that obtained with the water glass.

- 2.6.2 According to the respondent, the validity of these tests was questionable since the test report did not contain sufficient information concerning the way the tests were carried out. In particular, the test report was silent as regards (a) the type of water glass, (b) the type of hot melt adhesive, (c) whether the specified amount of water glass (20 g) referred to the water glass in its wet or dried state, (d) the thickness of the mineral wool fibre elements, (e) the way the tearing force was applied and (f) at what position exactly the fibre elements broke.

First of all, however, the respondent's argument is not in fact entirely correct. More specifically, the hot melt adhesive is specified in terms of its chemical structure, namely that it is a polyolefin adhesive, and in terms of its fusing temperature, namely around 100°C. It is also clear on the basis of the test report that the amount of water glass refers to the amount of water glass in its wet state. More particularly, in the test report this amount is that which is sprayed onto

the surfaces to be bonded, and something that is sprayed must be in the wet state.

Secondly, the respondent has not provided any proof that the set-up of the test is critical to the outcome of the tests such that when set up in particular ways, for instance at a certain web thickness, the tests lose their validity.

2.6.3 During the oral proceedings, the respondent for the first time argued that the tests were of limited value since the time that the water glass in these tests was allowed to dry was only 1.5 hours. This in the respondent's view was too short to achieve maximum bonding strength. As confirmed by the last paragraph on page 11 of D1, in fact several hours were necessary to achieve maximum bonding strength. Had the water glass in the tests of the appellant being dried for several hours, it would have had the same bonding strength as the hot melt adhesive.

The board does not find the respondent's argument convincing. Firstly, the tests were submitted with the statement of grounds of appeal, ie roughly three years prior to the oral proceedings before the board. If the respondent believed that the water glass in these tests was not fully dried and thus had not reached its maximum bonding strength, it had ample opportunity to provide evidence for this. Since the respondent chose not to provide this evidence, the respondent's submission is nothing more than an unsubstantiated assertion. Secondly, as set out on page 3 of the statement of grounds of appeal, the water glass was allowed to dry for at least 1.5 hours in order to ensure that the water glass had dried before the measurement was taken. In the absence of any counter-

evidence, it must therefore be assumed that the water glass in the appellant's tests was fully dried and thus had reached its maximum bonding strength.

- 2.6.4 The respondent further argued that it was explicitly stated in lines 11 to 15 on page 7 of D1 that due to the bonding ("*Klebestellen*") between the mineral fibre elements, the resulting panels had excellent pressure, tear and flexural strength. This confirmed that with water glass, the same bonding strength could be achieved as with the claimed hot melt adhesive.

There is however no comparison in D1 between the bonding strength obtained with water glass and that obtained with hot melt adhesives. In fact, the comparison made in D1 is between the bonding strength obtained with water glass (page 7, lines 11 to 15) and that obtained without any adhesive at all (page 5, lines 1 to 21). D1 does therefore not constitute any evidence that the bonding strength obtained with water glass is as good as that obtained with hot melt adhesives.

- 2.6.5 The board in its communication had addressed the issue whether the problem of providing an improved bonding strength was solved over the entire scope of the claims, ie also for hot melt adhesives other than the one used in the appellant's tests. In this respect, the appellant explained during the oral proceedings that all hot melt adhesives had similar modes of action. Therefore, in the appellant's view the test results applied to hot melt adhesives in general.

It was not contested by the respondent that all hot melt adhesives are similar in terms of their mode of action. And it is indeed true that they all effect

bonding upon solidifying from the molten state. In view of this, it is credible to the board that the results obtained in the appellant's tests for one particular hot melt adhesive remain valid for all kinds of hot melt adhesives, at least insofar as the results show a significant improvement in bonding strength of the hot melt adhesive over water glass.

Moreover, the bonding strength of the hot melt adhesive used in the appellant's tests was five times higher than that obtained with water glass. Hence, even if bonding strength varies depending on the type of hot melt adhesive, this would still not necessarily imply that the bonding strengths of other hot melt adhesives are as low as that of water glass.

2.6.6 The respondent finally argued that claim 1 was not directed to lamellar panels of mineral fibre elements and that therefore the inventive step analysis based on the problem of improving bond strength did not apply to this claim. The board does not agree. In the same way as for all the other claims, claim 1 refers to a method of bonding together the surfaces of mineral fibre elements with a hot melt adhesive and, as set out above, by applying a hot melt adhesive, a bonding strength is obtained that is improved compared to that in D1.

2.6.7 Consequently, whereas evidence has been provided by the appellant that the claimed hot melt adhesive leads to improved bonding strength, the respondent has neither been able to dent the credibility of this evidence nor filed any counter-evidence. In view of this, the board considers it more likely than not that the bonding strength obtained with the hot melt adhesives as covered by all claims is superior to that obtained in



D1. The objective technical problem solved by the subject-matter of all claims is thus the provision of an improved bonding strength between mineral fibre elements.

2.7 It remains to be examined whether in view of this problem, the claimed solution was obvious.

2.7.1 D1 focuses on adhesives that are non-combustible and for that reason suggests an adhesive made of an inorganic material, such as water glass. D1 does not address at all the problem of providing a strong bond between mineral fibre elements, let alone suggest the use of hot melt adhesives to solve this problem. The claimed solution is thus not obvious in view of D1.

2.7.2 The respondent argued that the claimed solution was obvious in view of D1 in combination with D2.

D2 discloses fibre panels composed of individual mineral fibre elements ("fibre strips"), which can be adhered to each other by means of an adhesive applied along the abutting edges of the elements (column 3, lines 3 to 8 and claim 2). D2 states that many conventional adhesives can be used. The only concrete adhesive disclosed in this document is a hot melt adhesive (column 3, lines 19 to 23 and claim 3).

D2 does not contain any indication that by means of such a hot melt adhesive, the bonding strength between mineral fibre elements can be improved. The skilled person starting from D1 and looking for adhesives that improve bonding strength would thus not have had any reason to apply the hot melt adhesive of D2 to the mineral fibre elements of D1. Therefore, the claimed

subject-matter is not obvious in view of a combination of D1 with D2.

- 2.7.3 The respondent argued that the effect obtained by hot melt adhesives was a reduction of production time. More specifically, while hot melt adhesives exerted their bonding effect within seconds, it was necessary to wait for several hours in the case of water glass. Since it was already known from column 3, lines 20 to 22 of D2 that hot melt adhesives lead to optimum production speed, the claimed subject-matter was obvious in view of D1 in combination with D2.

The respondent's argument implies that the problem solved in view of D1 is the provision of an adhesive that reduces production speed. This is however not the objective technical problem (see point 2.6.7 above). Therefore the respondent's argument must be disregarded when applying the problem-and-solution approach.

- 2.7.4 The subject-matter as defined in the claims of the main request is thus inventive.
3. During the oral proceedings, the appellant adapted the description to the amended claims. The respondent had no objections against the amendments so made. Also the board acknowledges that these amendments 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:
  - (1) Claims 1 to 18 according to the main request filed with the letter dated 8 July 2013;
  - (2) The amended description pages numbered 2 to 6 as filed during the oral proceedings of 20 May 2014.

The Registrar:

The Chairman:



M. Cañueto Carbajo

W. Sieber

Decision electronically authenticated