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Datasheet for the decision of 7 May 2025

Case Number: T 1543/23 - 3.3.03

Application Number: 07838574.7

Publication Number: 2069415

IPC: C08G18/10, C08G18/71, C08G18/48

Language of the proceedings: EN

Title of invention:
PROCESS FOR PREPARING A CURABLE SILYLATED POLYURETHANE RESIN

Patent Proprietor:
Momentive Performance Materials Inc.

Opponent:
Henkel AG & Co. KGaA

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

Keyword:
Grounds for opposition - subject-matter extends beyond content of the application as filed (no)
Remittal - special reasons for remittal

Decisions cited:
G 0002/10, G 0001/16

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Case Number: T 1543/23 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 7 May 2025

Appellant: (Patent Proprietor)	Momentive Performance Materials Inc. 260 Hudson River Road Waterford, NY 12188 (US)
Representative:	Gille Hrabal Partnerschaftsgesellschaft mbB Patentanwälte Brucknerstraße 20 40593 Düsseldorf (DE)
Respondent: (Opponent)	Henkel AG & Co. KGaA Henkelstrasse 67 40589 Düsseldorf (DE)
Representative:	Viering, Jentschura & Partner mbB Patent- und Rechtsanwälte Hamborner Straße 53 40472 Düsseldorf (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 27 June 2023 revoking European patent No. 2069415 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	O. Dury
Members:	F. Rousseau
	M. Millet

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division revoking European patent No. 2 069 415.

The decision was based on the patent as granted (rejection of the opposition) as the main request and auxiliary requests 1 to 14, all submitted during the oral proceedings on 17 May 2023.

II. According to the reasons for the contested decision which are relevant to the appeal proceedings:

(a) The description as a whole, read in conjunction with the inventive examples, was "considered to provide a direct and unambiguous teaching, i.e. a pointer in the application as filed", for the features of granted claim 1, except for the feature "aging is achieved in an oven at 50°C for 28 days". Although the latter was based on paragraph [0060] and Figure 2 of the application as filed concerning inventive Examples 3-5 and CE1 of the application as filed, paragraph [0061] and Figure 3 described different ageing conditions, i.e. at 80°C for 28 days, which were used in inventive Example 7 and CE6. Accordingly, the application as filed did not provide a pointer for limiting the scope of the claimed invention to said feature. The subject-matter of claim 1 represented an intermediate generalisation which extended beyond the content of the application as filed, contrary to the requirements of Article 100 (c) EPC. The main request was therefore not allowable.

(b) Auxiliary requests 1 to 14 were admitted into the proceedings. For the same reasons as for the main request, the definition of an ageing temperature of 50°C or 80°C constituted an inadmissible intermediate generalisation. As a result, these requests were also not allowable.

(c) On this basis, European patent 2 069 415 was revoked, as all of the requests submitted extended beyond the content of the application as filed.

III. An appeal was filed by the patent proprietor (appellant). The appellant submitted auxiliary requests 1 to 28 with the statement of grounds of appeal.

IV. A rejoinder to the statement of grounds of appeal was filed by the opponent (respondent).

V. With letter of 10 May 2024, the appellant submitted a revised version of auxiliary requests 21 to 27.

VI. In preparation for the oral proceedings, a communication pursuant to Article 15(1) RPBA containing the Board's provisional opinion was issued.

VII. Oral proceedings before the Board were held on 7 May 2025 with the participation of both parties.

VIII. The final requests of the parties were as follows:

The appellant requested that the decision under appeal be set aside and the case be remitted to the opposition division for consideration of the remaining grounds of opposition of insufficient disclosure and lack of an inventive step, either on the basis of the main request

(patent as granted), or alternatively, in this order, on the basis of one of auxiliary requests 1 to 20 submitted with the statement of grounds of appeal, auxiliary requests 21 to 27 submitted with letter of 10 May 2024, or auxiliary request 28 also submitted with the statement of grounds of appeal.

The respondent requested that the appeal be dismissed. Should the subject-matter of the main request be found not to extend beyond the content of the application as filed, it was requested that the case be remitted to the opposition division for examination of sufficiency of disclosure and inventive step.

IX. The claims which are relevant to the present decision are claims 1 and 9 of the patent as granted (main request) which read as follows (compared to claim 1 of the application as filed, deleted portions are indicated by the Board in ~~struck-through~~ and addition in underlined with reference signs for the features added in superscript):

"1. A process for preparing a curable silylated polyurethane resin which comprises:

a) silylating hydroxyl-terminated polyol polymer, which is a di- or polyisocyanate-extended polyols(i) which contains partially reacted di- or polyisocyanate(ii), with isocyanatosilane under anhydrous conditions(iii) to provide a silylated polyurethane containing residual isocyanate; and,

b) at the desired point near the end of the silylation reaction(iv), which is determined by viscosity(v) of the reaction mixture being in the range of 1,000 mPa•s (1,000 cP) to 150,000 mPa•s (150,000 cP)(ix), scavenging

isocyanate present in the silylated polyurethane of step (a) with an excess of(vi) at least one isocyanate-reactive scavenging agent which is a mono-alcohol or a mixture of different mono-alcohols(vii) to provide a silylated polyurethane resin ~~of reduced~~ which contains less than 0.02 weight percent(viii) isocyanate ~~content~~,

the silylated polyurethane resin ~~of reduced isocyanate content~~ resulting from step (b) which contains less than 0.02 weight percent(viii) isocyanate possessing a viscosity following aging in the range of 1,000 mPa•s (1,000 cP) to 150,000 mPa•s (150,000 cP)(ix) which is less than that of the isocyanate-containing silylated polyurethane resin resulting from step (a) following the same conditions of aging, wherein the viscosity is measured at 25°C on a Brookfield RVDV-II + cone and plate viscometer(x) and aging is achieved in an oven at 50°C for 28 days(xi)."

"9. A curable silylated polyurethane resin obtained by the process of claim 1".

X. The parties' submissions, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. The contentious point concerned the question whether claims 1 and 9 of the main request extended beyond the content of the application as filed.

Reasons for the Decision

Main request (patent as granted)

Ground of opposition pursuant to Article 100 (c) EPC

1. In accordance with the established Case Law of the Boards of Appeal of the EPO, the relevant question to be decided in assessing whether the subject-matter of an amended claim extends beyond the content of the application as filed, is whether after the amendment the skilled person is presented with new technical information (see G 2/10, point 4.5.1 of the Reasons and Case Law of the Boards of Appeal of the EPO, 10th edition 2022, II.E.1.3.1). In other words, the above mentioned amendment is only allowable if the skilled person would derive the resulting claimed subject-matter directly and unambiguously, using common general knowledge, from the application as filed. This test referred to as the "gold standard" was confirmed in the context of disclosed disclaimers in decision G 1/16 (points 17 and 18 of the Reasons).

Whether new technical information results from an amendment in a particular case requires a technical assessment of the overall technical circumstances of the individual case under consideration, taking into account the nature and extent of the disclosure in the application as filed.

Claim 1

2. It is common ground that the subject-matter of granted claim 1 is based on claim 1 of the application as filed in which features i) to xi) identified in section IX of

the summary of Facts and Submissions have been inserted.

2.1 Step a) of claim 1 as filed to which features (i) to (iii) have been added defines the reaction of an hydroxyl-terminated polyol polymer with an isocyanatosilane in order to provide a silylated polyurethane containing residual isocyanate.

Features (i) and (ii)

2.1.1 While feature (i) defining a di- or polyisocyanate-extended polyol undisputedly represents one of the possibilities taught in the application as filed for the hydroxyl-terminated polyol polymer (paragraph [0015] on page 6, lines 3-4 and page 10, 4th and 5th lines of paragraph [0029]), the respondent submits, contrary to the appellant's contention, that feature (ii) defining that said di- or polyisocyanate-extended polyol contains partially reacted di- or polyisocyanate is not based on paragraph [0015] or [0029] of the application as filed.

In the respondent's opinion, feature (ii) would allow for the presence of both partially reacted and unreacted di- or polyisocyanate. It would go beyond the content of paragraphs [0015] and [0029], according to which, given the language "either ... or", the presence of residual isocyanates could originate either from partially reacted di- or polyisocyanate or from unreacted di- or polyisocyanate, but not both (rejoinder, page 5, second full paragraph).

This is not convincing.

The reading of the wording "*either from partially reacted di- or polyisocyanate, or from unreacted di- or polyisocyanate*" present in paragraphs [0015] and [0029] does not take into account the context and the technical teaching of those passages.

According to paragraph [0013] of the application as filed (last three lines), the hydroxyl-terminated polyol polymer to be silylated can be a hydroxyl-terminated polyurethane prepolymer. Paragraph [0015] of the application as filed (sentence bridging pages 5 and 6 and following sentence) discloses as a hydroxyl-terminated polyol the reaction of hydroxyl-terminated polymers with a di- or polyisocyanate to increase the molecular weight of the polyols, i.e. a compound in which the di- or polyisocyanate has been reacted. Such reaction product, which in claim 1 is defined to be hydroxyl terminated and therefore to contain hydroxyl end-groups, will not in practice contain unreacted di- or polyisocyanates as the sole compound with residual isocyanate. This would imply the presence of only unreacted di- or polyisocyanate and polymers with only hydroxyl end groups, which are the reaction products of polyol and di- or polyisocyanate. From a statistical point of view, this is technically not sensible.

For this reason, the passage "either from partially reacted di- or polyisocyanate, or from unreacted di- or polyisocyanate" in paragraphs [0015] and [0029] is rather to be understood by the skilled person as meaning "from partially reacted di- or polyisocyanate and possibly unreacted di- or polyisocyanate". It therefore covers both possibilities, in line with the respondent's interpretation of that feature.

On this basis, features (i) and (ii) of operative claim 1 correspond to one of the hydroxyl-terminated polyol polymers whose use in step a) of claim 1 is disclosed in the application as filed.

Feature (iii)

2.1.2 The respondent acknowledges that feature (iii) (anhydrous conditions) is disclosed in paragraph [0026] of the application as filed and apply to all embodiments. In view of the reasons given for the use of that measure, namely to avoid premature hydrolysis of the alkoxysilane groups, i.e. which are part of the isocyanatosilane to be reacted with the hydroxyl-terminated polyol, and also in view of the well known moisture sensitivity of isocyanate groups, it is implicit to the skilled person that anhydrous conditions are required. This is illustrated in Examples 3 to 5 in which the polyol is sparged with nitrogen at 85°C for 16 hours, confirming the necessity to use anhydrous conditions for the synthesis of the silylated polyurethane resin. This conclusion was never contested by the respondent in appeal, in particular in reaction to the Board's communication (points 10.1.2 and 10.1.3) or at the oral proceedings.

2.1.3 The Board therefore concludes that the definition of step a) of the method of operative claim 1 does not extend beyond the content of the application as filed.

2.2 The additional features of operative claim 1 define with step b) the scavenging of residual isocyanate groups and, in the last part of that claim, the resulting properties of the silylated polyurethane resin.

2.2.1 At this juncture, it is useful to first consider the purpose of the invention as defined in claim 1 as originally filed. According to paragraph [0003] of the latter, which describes the problems arising with the prior art, residual isocyanate present in small amounts in silylated polyurethane resins reacts slowly over time with the residual hydroxyl-terminated polymer, resulting in an undesirable increase in viscosity of the product. The aim of the present invention is therefore to provide resins whose viscosity on storage is improved (paragraph [0004]). While the reaction can be prolonged in order to react all of the isocyanate, this results in batches whose viscosity might vary significantly (paragraph [0004]). It is therefore sought to provide a method which leads to a polyurethane resin which is free of residual isocyanate and exhibits viscosity stability, while avoiding viscosity variability from batch to batch (paragraph [0005]).

2.2.2 Against this background, the question to be answered is whether a skilled person wishing to implement the method defined in claim 1 as filed for the hydroxyl-terminated polyol polymer defined by features (i) and (ii) would be guided in a direct and unambiguous way by the overall teaching of the application as filed to use additional features (iv) to (xi).

In this respect, the skilled person has at his/her disposal not only the general teaching provided in the application as filed, but also the preferences expressed therein, as well as the exemplified embodiments.

Exemplified embodiments of a method for silylating a hydroxyl-terminated polyol polymer in accordance with

features (i) and (ii), i.e. a method for silylating an already formed di- or polyisocyanate-extended polyol polymer are taught in Examples 3 to 5 of the application as filed.

Examples 6 and 7 are less relevant to the skilled person, as they concern a silylation reaction which takes place in parallel to the reaction of the monomeric diisocyanate with polymeric polyol, in accordance with the other method described in paragraph [0025] of the application as filed.

Feature (viii)

2.2.3 Concerning the residual content of isocyanate in the polymer obtained by the method of claim 1 as filed, it can be inferred from the general teaching of the application as filed in claim 21 and paragraph [0031] that it is preferably less than about 0.02 wt.%, corresponding to feature (viii) of operative claim 1. Since these passages form part of the teaching of the application as filed, this amount will be understood by the skilled person as corresponding to a polyurethane resin which is meant to meet the objectives defined for the present invention, i.e. which is free from residual isocyanate, as indicated in paragraph [0005], which is also confirmed in the summary of the invention given in line 2 of paragraph [0009] of the application as filed.

Moreover, methods which would be understood by the skilled person to be meant to solve the problem addressed in paragraph [0005] of the application as filed are those of the inventive examples, including that of Example 3 in which the isocyanate concentration of the product obtained is 0.02%. This also implies that a method leading to a residual content of

isocyanate of less than 0.02 wt.%, as defined in operative claim 1, is also meant to solve the problem addressed in the application as filed, confirming the analysis given in the preceding paragraph. This is also confirmed in Examples 4 and 5 of the application as filed, according to which the residual content can be as low as 0.00 wt.%.

Features (vi) and (vii)

2.2.4 With regards to the means for achieving the level of residual isocyanate defined by feature (viii), the skilled person is taught in claim 13, paragraph [0033] and paragraph [0034] of the application as filed that the isocyanate-reactive scavenging agent mentioned in claim 1 as filed is a mono-alcohol or a mixture of different mono-alcohols, i.e. in accordance with feature (vii) of operative claim 1. It is undisputed in this respect that no other class of isocyanate-reactive scavenging agents is taught in the application as filed. The use of a mono-alcohol is furthermore highlighted with Examples 3 to 5 of the application as filed, in which the scavenging agent used is methanol.

As to the amount of said scavenging agent, according to paragraph [0030] of the application as filed, it is preferably added in an excess to ensure that all of the residual isocyanate has reacted, which means that the resulting product is free from residual isocyanate, this definition covering a residual amount of less than about 0.02 wt.% (see point 2.2.3 above). An excess of scavenging agent in accordance with feature (vi) of operative claim 1 is therefore implicit to the skilled person in order to prepare a polymer fulfilling feature (vii). This is also confirmed by Examples 3 to 5 of the application as filed.

Features (iv) and (v)

2.2.5 With respect to the time at which the isocyanate-reactive scavenging agent is to be added, the application as filed teaches in paragraph [0029] on page 10 that it is "*at a desired point near the end of the silylation reaction*" as defined with feature (iv) of operative claim 1, which desired point is disclosed in this paragraph to be determined by the viscosity of the reaction mixture, corresponding to feature (v) of operative claim 1, or some other methods. In fact, the only method indicated is the measurement of the viscosity, as employed in Examples 3 to 5. This merely reflects the key aspect of the present invention concerning the viscosity of the polyurethane resin prepared by the present invention, as can be seen from paragraphs [0004] and [0005] of the application as filed (see point 2.2.1 above). On this basis, the skilled person implementing the invention of claim 1 as filed would necessarily also make use of features (iv) and (v).

Features (ix), (x) and (xi)

2.2.6 Feature (ix) defines the same range from 1 000 mPa•s (1000 cP) to 150 000 mPa•s (150 000 cP) for the viscosity of both the reaction mixture at the desired point near the end of the silylation reaction at which the isocyanate-reactive scavenging agent is added and after ageing, which is consistent with the objective of providing a polyurethane resin that exhibits viscosity stability, as indicated in paragraph [0005] of the application as filed (see also point 2.2.1 above). This range of values at the point at which the isocyanate-reactive scavenging agent is added and after ageing is

disclosed in the application as filed in paragraphs [0029] and [0041], respectively. It corresponds to the viscosity generally recommanded in the application as filed and which therefore the skilled person would understand to be applicable to all processes within the ambit of claim 1 as filed. The skilled person implementing the invention of claim 1 as filed would be therefore guided to prepare a polyurethane resin having the viscosity defined by feature (ix).

For this reason, the respondent's unsubstantiated argument at the oral proceedings that claim 1 should be limited to the specific methods described in the examples using the specific values of viscosity described therein, or limited to the narrowest viscosity range described in paragraph [0041] of the application as filed, i.e. from about 35 000 cP to about 65 000 cP, is without merit.

Finally, it is undisputed that the viscosities indicated in the application as filed correspond to those measured at 25°C on a Brookfield RVDV-II + cone and plate viscometer, as disclosed in paragraph [0048] of the application as filed, which conditions are defined by feature (x) in operative claim 1.

2.2.7 Summing up, having regard to the goals set out in the application as filed and the explicit and implicit technical means recommended for this purpose in this document, it is concluded in agreement with the position of the opposition division that the skilled reader of the application as filed would be guided in a direct and unambiguous manner to the subject-matter resulting from the combination of claim 1 as filed with features (i) to (x).

2.2.8 Finally, as regards the ageing conditions constitutive of feature (xi), i.e. in an oven at 50°C for 28 days, it is undisputed that those are indicated only in relation to Examples 3 to 5 and Figure 2 of the application as filed. Those represent for the skilled person in the context of the present invention conditions used for an accelerated test to assess the stability of the curable silylated polyurethane resin in terms of viscosity, since storage does not normally take place at such a high temperature. Considering that Examples 4 and 5 constitute examples of the disclosed process resulting from the combination of claim 1 as filed and additional features (i) to (x), it is immediate for the skilled person that the test defined in Examples 4 and 5 and which is constitutive of feature (xi) is also meant to be generally applicable to said method in accordance with claim 1 as filed, supplemented by features (i) to (x).

The respondent submitted that the ageing conditions defined by feature (xi) which are disclosed in Figure 2 could not be inserted into claim 1 as filed without specifying that the measurement of viscosity is carried out at the time intervals shown in Figure 2. Should this not be done, this would, in the respondent's view, extend the claimed subject-matter beyond the content of the application as filed. This is technically not sensible and therefore unconvincing for the following reasons:

Contrary to the use of a temperature of 50°C and a total time of 28 days, which indicate to the skilled person accelerated conditions under which the product obtained by the process according to claim 1 exhibits stability in terms of viscosity in agreement with the objective set out in the application as filed,

measuring the viscosity at various time intervals during these 28 days is irrelevant to the method defined in claim 1 as filed and to the problem sought to be solved. This is because only one measurement of the viscosity is necessary after 28 days, as the viscosity is expected to increase over this period. Measurements at different time intervals, as shown in Figure 2, are merely seen by the skilled person as additional information concerning the manner how viscosity increases over time. They demonstrate that a reduced isocyanate content leads to a reasonable increase in viscosity. However, this is not part of the process for preparing a curable silylated polyurethane resin as defined in claim 1 of the application as filed.

Finally, the respondent submitted that paragraph [0060] and Figure 2 do not disclose that the "*resin resulting from step (b) has a viscosity following aging […] which is less than that of the […] resin resulting from step (a) following the same conditions of aging*". This is not convincing considering that the inventive examples of the application as filed, including Examples 4 and 5, which are in accordance with operative claim 1, are understood by the skilled person to implicitly fulfil said condition defined in claim 1 of the application as filed.

Conclusion

2.3 In view of the foregoing, it is concluded that the subject-matter of operative claim 1 does not extend beyond the content of the application as filed.

Claim 9

3. Operative claim 1 concerns a process for preparing a curable silylated polyurethane, i.e. a process which leads to the product defined by operative claim 9 (see section IX of the summary of Facts and Submissions). Accordingly, since the subject-matter of claim 1 does not extend beyond the content of the application as filed, the same holds true for the subject-matter of claim 9.

4. Accordingly, the subject-matter of the patent in suit has not been shown to extend beyond the content of the application as filed.

Remittal

5. The remaining grounds for opposition of insufficient disclosure and lack of an inventive step were not decided upon by the opposition division, let alone debated at the oral proceedings. It was undisputed that under the present circumstances the case should be remitted for further prosecution. This is seen by the Board to constitute "special reasons" within the meaning of Article 11 RPBA to remit the case for further prosecution to the department whose decision was appealed.

Accordingly, exercising its discretion under Article 111(1), second sentence, EPC, the Board decides to remit the case to the opposition division for further prosecution.

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 for further prosecution.

The Registrar: The Chairman:

D. Hampe O. Dury

Decision electronically authenticated