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Datasheet for the decision of 9 October 2019

Case Number:	T 2452/16 - 3.3.03
Application Number:	06823555.5
Publication Number:	1967550
IPC:	C08L71/02, C08K5/57, C08L83/08
Language of the proceedings:	EN

Title of invention:
ROOM TEMPERATURE CURABLE SILICON GROUP-CONTAINING POLYMER COMPOSITION

Patent Proprietor:
Momentive Performance Materials Japan LLC

Opponents:
Henkel AG & Co. KGaA
Wacker Chemie AG

Relevant legal provisions:
EPC Art. 56
RPBA Art. 13(3)

Keyword:
Inventive step - Main request and 8th auxiliary request (no) - 11th auxiliary request (yes)

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Case Number: T 2452/16 - 3.3.03

DECISION
of Technical Board of Appeal 3.3.03
of 9 October 2019

Appellant: (Opponent 1)	Henkel AG & Co. KGaA Henkelstrasse 67 40589 Düsseldorf (DE)
Representative:	Henkel AG & Co. KGaA CLI (Patente) 40191 Düsseldorf (DE)
Appellant: (Opponent 2)	Wacker Chemie AG Hanns-Seidel-Platz 4 81737 München (DE)
Representative:	Mieskes, Klaus Theoderich Wacker Chemie AG Intellectual Property Hanns-Seidel-Platz 4 81737 München (DE)
Respondent: (Patent Proprietor)	Momentive Performance Materials Japan LLC 5-2-20, Akasaka Minato-ku Tokyo 107-6112 (JP)
Representative:	Gille Hrabal Brucknerstrasse 20 40593 Düsseldorf (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 12 September 2016 rejecting the opposition filed against European patent No. 1967550 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	M. C. Gordon
Members:	D. Marquis
	R. Cramer

Summary of Facts and Submissions

I. The appeal lies against the decision of the opposition division posted on 12 September 2016 rejecting the oppositions against European patent EP 1967550.

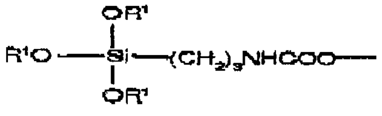
II. The patent was opposed on the grounds that its subject matter lacked novelty and inventive step. The decision of the opposition division to reject the oppositions was announced at the oral proceedings on 21 June 2016. It was based on the patent as granted (main request).

Independent claim 1 and claim 6 of the main request read:

"1. A room temperature curable silicon group-containing polymer composition, comprising:

(A) a reactive silicon group-containing polymer obtained through a urethane reaction between polyoxypropylene polyol whose number average molecular weight is 500 to 50,000 and γ-isocyanate propyltrialkoxysilane, having a main chain being substantially composed of polyoxypropylene, and having a reactive silicon-containing group represented by a formula:

[Chemical Formula 24]



$$R^1O-\underset{OR^1}{\overset{OR^1}{Si}}-(CH_2)_3NHCOO-$$

.....(1)

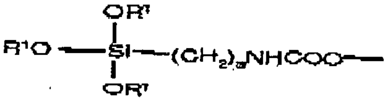
(wherein R^1s are the same or different and each represents an alkyl group having 1 to 4 carbons) at an

end of the main chain, and based on 100 parts by weight of said reactive silicon group-containing polymer;
(B) 0.01 to 10 parts by weight of a curing catalyst; and
(C) 0.05 to 25 parts by weight of a hydrolyzed and condensed product of amino group-substituted alkoxysilane".

"6. A room temperature curable silicon group-containing polymer composition, comprising:

(A) a reactive silicon group-containing polymer obtained through a urethane reaction between polyoxypropylene polyol whose number average molecular weight is 500 to 50,000 and γ-isocyanate propyltrialkoxysilane, having a main chain being substantially composed of polyoxypropylene, and having a reactive silicon-containing group represented by a formula:

[Chemical Formula 32]



$$R^1O-\underset{OR^1}{\overset{OR^1}{\underset{|}{\overset{|}{Si}}}}-(CH_2)_3NHCOO-$$

....(1)

(wherein R1s are the same or different and each represents an alkyl group having 1 to 4 carbons) at an end of the main chain, and based on 100 parts by weight of said reactive silicon group-containing polymer;
(B) 0.01 to 10 parts by weight of a curing catalyst;
(C1) 0.05 to 25 parts by weight of amino group-substituted alkoxysilane, and
(D) 1 to 500 parts by weight of heavy calcium carbonate being surface-treated with glycol that is liquid at room temperature, the glycol being at least one kind selected from ethylene glycol, propylene glycol,

diethylene glycol, and 1,4-butanediol".

III. The following documents, *inter alia* were cited during opposition proceedings:

D1: EP 1 810 994 A1
D2: DE 10 2004 008688 A1
D3: EP 0 918 062 A1
D4: EP 1 746 133 A1
D5: EP 1 566 412 A1
D6: WO 99/55755 A1
D7: WO 03/014226 A1
D8: EP 0 824574 A1
D9: EP 0 997 469 A2
D10: US 2005/234170 A1
D19: ASI Adhesives & Sealants Industry, Choosing the Right Silane Adhesion Promotors for SMP Sealants , 27 February 2002, retrieved from the internet on 20 May 2016, URL http://www.adhesivesmag.com/articles/83563-choosing-the-right-silane-adhesion-promoters-for-smp-sealants, pages 1 to 8
E1: Additional experimental data referring to compositions #1 to #4, submitted as Annex I with the letter of 4 November 2015, pages 1 to 3
E2: Additional experimental data referring to further details of compositions #1 and #3 of E1, submitted as Annex with the letter of 20 May 2016

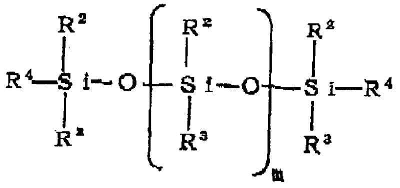
IV. In its decision, the opposition division concluded that the claims of the main request were novel over D1. Regarding inventive step, D2 represented the closest prior art for claim 1 of the main request. With respect to that document the technical problem was the provision of a room temperature curable silicon group-containing polymer without lowering of the adhesiveness under water immersion conditions. None of the prior art documents rendered the subject matter of claim 1 of the main request obvious. The same conclusion was reached for claim 1 of the main request starting from D5. The assessment of inventive step of claim 6 of the main request was based on D5 as closest prior art. The technical problem was the provision of a room temperature curable silicon group-containing polymer with increased water resistance. None of the prior art documents rendered the subject matter of claim 6 of the main request obvious. The main request met the requirements of the EPC.

V. The opponents 1 and 2 (appellants 1 and 2) lodged an appeal against that decision.

VI. The patent proprietor (respondent) submitted with their rejoinder the first to tenth auxiliary requests which, with the exception of the eighth auxiliary request, were all withdrawn during the oral proceedings before the Board. In addition the following documents were submitted:
D22: print of http://www.kanekatexas.com/MSPoly home.html
D23: comparative example based upon D2

Claim 1 of the eighth auxiliary request differed from claim 1 of the main request in that the definition of component (C) was complemented by the following: "which is at least one kind selected from linear polydiorganosiloxane represented by the general formula:

[Chemical Formula 25]

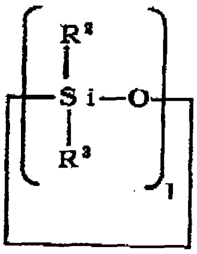


$$R^4-\underset{R^2}{\overset{R^2}{Si}}-O-\left[\underset{R^3}{\overset{R^2}{Si}}-O\right]_m-\underset{R^3}{\overset{R^2}{Si}}-R^4$$

.....(2)

(wherein R^2s are the same or different and each represents an alkyl group, and R^3s represent aminopropyl groups or N-(β-aminoethyl)-aminopropyl groups. R^4s represent hydroxyl groups or alkoxyl groups. m is an integer of 0 (zero) to 30.), and cyclic polydiorganosiloxane represented by the general formula:

[Chemical Formula 26]



.....(3)

(wherein R^2 represents the same or different alkyl group, and R^3 represents an aminopropyl group or an N-(β-aminoethyl)-amixiopropyl group. 1 is an integer of 3 to 30.)".

VII. In a communication sent in preparation of oral proceedings, the Board summarised the points to be dealt with and provided a preliminary view on the disputed issues.

VIII. Oral proceedings were held on 9 October 2019.

IX. The arguments provided by the appellants, as far as relevant to the present decision, can be summarised as follows:

Main request

Inventive step

(a) Since D2 disclosed moisture curable adhesive compositions with properties that were comparable to those disclosed in the patent in suit, D2 represented the closest prior art for claim 1 of the main request. D2 already disclosed a combination of a tin based curing catalyst and condensed amino group substituted alkoxysilane that were used in a base polymer. Claim 1 differed from the closest prior art D2 in the nature of the base polymer corresponding to component (A) according to claim 1 of the main request.

(b) The patent in suit did not show any effect linked to polymer (A). Also, the experimental reports E1 and E2 did not establish the presence of any effect with respect to D2 because the reactive silicon group-containing polymers produced in these experimental reports were not sufficiently identified. In particular, it had not been established whether the polymer according to the patent in suit and that representing D2 had the same number of silicon containing end groups. That was of particular relevance since these end groups were reactive groups of the polymer that necessarily had an influence on the properties of the cured adhesive. As a result, E1 and E2 did not constitute fair comparative examples that could establish the presence of an effect over D2.

(c) The technical problem in view of D2 was the provision of alternative compositions.

(d) The prior art D3 to D8 and D10 already disclosed the use of reactive silicon group-containing polymers according to claim 1 of the main request in adhesive compositions that were similar to the compositions of the patent in suit. The use of these polymers in the compositions of D2 was thus obvious. Claim 1 of the main request lacked an inventive step.

Eighth auxiliary request

Inventive step

(e) Claim 1 of the eighth auxiliary request further defined component (C) as being a component of chemical formula 25 or 26. Since it had not been established that that limitation of claim 1 provided any effect, the problem remained the provision of alternative compositions.

(f) D9 already disclosed condensed amino groups substituted alkoxysilanes, the same class of compounds that were referred to as adhesion promoters in D2, with explicit reference to D9. The definition of these adhesion promoters in D9 encompassed the definition provided in claim 1 of the eighth auxiliary request. Their use in the composition according to D2 was thus obvious. Claim 1 of the eighth auxiliary request lacked an inventive step.

Eleventh auxiliary request

(g) No further comments were made on that request from the side of the appellants.

X. The arguments provided by the respondent, as far as relevant to the present decision, can be summarised as follows:

Main request

Inventive step

(a) D2 was not a promising starting point for claim 1 of the main request. In particular, D2 did not disclose a reactive trialkoxysilyl urethane terminated polymer component (A) as defined in claim 1 of the main request nor a polymer composition comprising, based on 100 parts of polymer (A), 0.05 to 25 parts by weight of a hydrolyzed and condensed product of amino group-substituted alkoxysilane. With regard to the basis polymer of the adhesive compositions, D2 only disclosed a formulation of MS polymer types ("modified silicones" silanterminierte Polyether der Firma KANEKA) or silane terminated polyurethanes.

(b) Example 1 and comparative 2 as well as example 9 and comparative example 5 of the patent in suit established the presence of improved adhesion under water immersion. The experimental reports E1 and E2 also showed improved adhesion properties when a component (A) according to claim 1 of the main request was used in the adhesive composition. While it was plausible from the patent in suit and from the documents D4 and D5 that the polymers used in the examples of E1 had on average a different number of silyl end groups, a comparison of the mechanical properties of the compositions disclosed in E1 showed that the number of silyl end groups on the polymer was either irrelevant or had no influence on the adhesive composition, showing the validity of the evidence provided in E1 over D2.

(c) The objective technical problem underlying the present invention was the provision of a room temperature curable silicon group containing polymer composition which exhibited an increased water resistance in which the adhesiveness was not decreased even under water immersion conditions and at the same time had a lower residual tack.

(d) None of the cited prior art rendered the solution provided in the patent in suit obvious. D3 and in particular its examples 1 and 6 did not provide any reason or incentive to use polymers comprising urethane groups instead of polymers being end functionalized by hydrosilylation. On the contrary, the polymer obtained by hydrosilylation in example 1 and the polymer obtained by a urethane reaction in example 6 both exhibited comparable properties but resulted in compositions having shorter surface tack free time and shorter time until the viscosity reached a predetermined value when the polymer of example 1 was used as compared to the polymer of example 6.
Accordingly, D3 in fact taught away from the use of polymers comprising urethane groups in order to solve the objective technical problem of improved water resistance and improved residual tack.

(e) D6 did not mention any hydrolyzed and condensed amino group-containing alkoxysilane and consequently that document could not render obvious the combination of the claimed invention. Moreover, the polymer obtained via a urethane reaction in example 6 was not associated with any particular technical effect when compared, for example, to a MS polymer (example 4). Besides, all examples containing polymers comprising urethane groups did not comprise any adhesion promoter. Thus, the effect of any combination of the polymer and a specific adhesion promotor was not taught by D6. Accordingly, prior art document D6 did not give any incentive or motivation to solve the objective technical problem by using polymers comprising urethane groups and a hydrolyzed and condensed amino group-containing alkoxysilane.

(f) A comparison of example 1 of D10 which comprised a polymer obtained by hydrosilylation and example 10 of D10 which comprised a polymer obtained by a urethane reaction showed that the workability, recovery rate and comprehensive evaluation as sealant was better in the case of the polymer obtained by hydrosilylation than that comprising urethane groups. Thus, D10 taught away from the use of polymers containing urethane groups and did not give any indication of the beneficial effects of urethane groups on the water resistance and residual tack. Accordingly, D10 did not give any incentive or motivation to solve the objective technical problem by using polymers comprising urethane groups and a hydrolyzed and condensed amino group-containing alkoxysilane.

(g) As a result, claim 1 of the main request was inventive over the closest prior art D2.

Eighth auxiliary request

Inventive step

(h) In claim 1 of the eighth auxiliary request the chemical formulae defining the structure of component (C) meant that R^3 mandatorily represented an aminopropyl group or an N-(β-aminoethyl)-aminopropyl group. Accordingly, each repeating unit of the adhesion promotor (C) comprised an amino group.

(i) That specific structure of the adhesion promoter was not rendered obvious by any prior art document. D9 taught the hydrolysis and condensation of aminopropyl containing trialkoxysilanes together with alkyl containing trialkoxysilanes. Accordingly, from these examples of D9 the skilled person did not get any information as to the impact of this combination of structural features on the water resistance or residual tack.

(j) The same was true for prior art document D2 which only mentioned aminoalkyl /alkyl / alkoxy siloxane mixtures. No specific structure was given and in particular no structures where every repeating unit had an amino group. Accordingly, D2 did not render obvious this additional feature of auxiliary request 8. Claim 1 of the eight auxiliary request thus involved an inventive step.

Eleventh auxiliary request

(k) No further comments were made on that request from the side of the respondent.

XI. The appellants requested that the decision under appeal be set aside and that the patent be revoked.

XII. The respondent requested that the appeals be dismissed, or alternatively that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the eighth auxiliary request filed with the reply to the statements of grounds of appeal, or on the basis of the eleventh auxiliary request filed during oral proceedings before the Board.

Reasons for the Decision

Main request

1. The decision of the opposition division with regard to novelty of claim 1 of the main request was contested by opponent 2 in appeal. However, in view of the negative conclusion reached on inventive step for claim 1 of the main request and claim 1 of the eighth auxiliary request and since no objection of lack of novelty was filed against the eleventh auxiliary request, there is no need for the Board to decide on that objection.

2. Inventive step

2.1 An object of the patent in suit was to provide room temperature curable silicon group-containing polymer compositions which exhibited good curing properties, excellent adhesiveness and storage stability, and good water resistance, in which the adhesiveness was not decreased even under water immersion condition (paragraph 9).

2.2 Although the contested decision of the opposition division contains an assessment of inventive step of claim 1 of the main request starting from both D2 and D5, the decision nevertheless identifies D2 as the most relevant document to represent the closest prior art for claim 1 of the main request (section 4.1.2 of the decision).

2.3 D2 concerns the preparation of moisture curable adhesive and sealant compositions by first compounding a formulation consisting of at least one aminoalkoxysilane/aminoalkoxysiloxane and at least a tin compound which is added to a basis polymer in a second step (claims 1 and 6, paragraphs 1, 2 of D2). D2 further discloses in its introduction (paragraph 9) that the use of aminosilanes was already known in the art to improve the adhesion properties under water as well as the moisture resistance of hybrid adhesives and sealants. While the adhesion properties of the hybrid polymers under wet conditions (water or moisture) are not further reported in the examples of D2, it is implicit from paragraph 9 that these properties are also required in the moisture curable adhesives and sealants of D2 since the formulations of D2 are based on aminosilanes (claim 1). Under these circumstances the choice of document D2 as representing the closest prior art for the assessment of inventive step was a reasonable one. It is on the basis of that document that the Board addressed the question of inventive step at the oral proceedings.

2.4 A formulation of an aminoalkoxysilane/ aminoalkoxysiloxane and a tin compound in D2 is said to be generally prepared by adding a tin compound to a silane or siloxane compound (paragraph 21), that formulation being subsequently added to a basis polymer. The basis polymer is not particularly limited in D2, preferred are however silane terminated polyethers such as MS-Polymer types or silane terminated polyurethanes (paragraph 25). Example 7 of D2, which discloses the sole adhesive composition of that document, is based on a mixture of MS-Polymer S 203 H and S 303 H as basis polymer which are dialkoxysilyl terminated polyoxypropylenediols (D22) that do not correspond to the definition of component (A) in claim 1 of the main request. As a matter of fact, a reactive silicon group-containing polymer as defined under component (A) in claim 1 of the main request having a trialkoxysilyl urethane group is not disclosed in the whole of D2.

2.5 The aminoalkoxysilanes/aminoalkoxysiloxanes of the formulations according to D2 are disclosed in paragraph 16. These may be monomeric, oligomeric or co-oligomeric aminoalkoxysilanes or siloxanes. Among the components cited in the list of aminoalkoxysilanes/aminoalkoxysiloxanes mentioned in paragraph 16, reference is made to document EP 0 997 469, which corresponds to D9 in the present proceedings, mentioning also the commercially available DYNASYLAN®1146. DYNASYLAN®1146 is an oligomer of an aminoalkyl-/alkyl-/alkoxy-ailoxane and as such is an amino group substituted alkoxysilane. The fact that it is disclosed as being an oligomer, which is further described in D19, implies that DYNASYLAN®1146 is a product obtained by hydrolysis and condensation of an amino group substituted alkoxysilane. That compound thus corresponds to component (C) according to claim 1 of the main request. DYNASYLAN®1146 is also used in the formulation according to example 6 of D2.

2.5.1 The formulation of example 6 also contains dibutyltin dilaurate which is disclosed as a curing catalyst in paragraph 19 of D2 and thus corresponds to component (C) according to claim 1 of the main request. The formulation of example 6 of D2 is consequently based on components (B) and (C) according to claim 1 of the main request. The use of that formulation in a basis polymer is however not specifically disclosed in D2. Indeed, the sole adhesive composition disclosed in D2 (example 7) is based on the formulation of example 1, which contains an aminoalkoxysilane that is not according to claim 1 of the main request. It is however clear from the general wording describing the use of the formulations in a basis polymer in paragraph 25 and from the list of formulations of examples 1 to 6 disclosed in paragraph 27, none of which are suggested as being preferred over the others, that any of the formulations according to examples 1 to 6 were considered to be usable in a basis polymer as defined in paragraph 25 and in particular can be seen as being equally disclosed as part of the adhesive composition of example 7 as an alternative to the formulation of example 1.

2.5.2 D2 does not disclose any limitation with regard to the amount of components used in the adhesive compositions. The composition of example 7 contains a total amount of 22.4 parts of basis polymer (MS-Polymer S 203 H and S 303 H) and 0.7 parts of formulation according to example 1. Applied to the formulation of example 6 containing 90 parts of DYNASYLAN 1146 and 10 parts of dibutyltin dilaurate, the amounts of components according to example 7 when adapted to 100 parts of basis polymer correspond to the ranges of 0.01 to 10 parts by weight of component (B) and 0.05 to 25 parts by weight of component (C).

2.5.3 The compositions according to claim 1 of the main request thus differ from the adhesive composition of the closest prior art D2 in the definition of component (A).

2.6 The patent proprietor relied on examples 1 and 9 of the patent in suit as well as on the supplementary examples of E1, E2 and D23 that were considered to demonstrate that the compositions of claim 1 of the main request had improved properties over the compositions of D2.

2.6.1 In particular it was argued in the rejoinder (point 3.2.1.1.1) that example 1 and comparative example 2 of the patent in suit showed that the use of an amino group substituted alkoxysilane as component (C), that is also hydrolyzed and condensed, leads to an adhesive with improved adhesion under water immersion. Since however the use of a hydrolyzed and condensed amino group substituted alkoxysilane is already disclosed in D2 and thus does not constitute a distinguishing feature over claim 1 of the main request, that comparison is not relevant for the formulation of the problem solved over D2.

2.6.2 It was also argued that example 9 and comparative example 5 of the patent in suit showed that the presence of silylurethane groups in (A) according to claim 1 of the main request leads to an adhesive with improved adhesion under water immersion. The adhesive compositions of these examples contain a component (A), dibutyltin dilaurate as component (B) and N-(β-aminoethyl)-aminopropyltrimethoxysilane (Silquest A-1120) as component (C). Component (A) in particular is in both examples a mixture of two reactive silicon group-containing polypropylene polymers, one having both ends terminated with a reactive silicon group (Polymer (H) prepared according to synthesis example 8) and the other having a reactive silicon group at one end of its chain only (Polymer (J) prepared according to synthesis example 10). The difference between the mixtures of example 9 and comparative example 5 is that in example 9 the end groups of both polymers are silylurethane groups whereas in comparative example 5 the polymers are obtained by hydrosilylation and as a result do not bear a urethane linkage.

2.6.3 The mixture of two polymers used as component (A) in example 9 corresponds to the mixture of polymers defined in the second and third embodiments according to the patent in suit (paragraphs 33-51). This mixture of polymers as component (A) is more restricted than the definition provided in claim 1 of the main request. It is thus doubtful whether example 9 can show the presence of an effect over the whole scope of claim 1 of the main request. That is confirmed by the passages on page 7, lines 40-43 and on page 8, lines 18-21 of the patent in suit mentioning that blending two polymers as used in example 9 can result in improved curing properties and adhesion.

2.6.4 Furthermore, component (C) used in the compositions according to example 9 and comparative example 5 is not a hydrolyzed and condensed product as required in claim 1 of the main request and as disclosed in D2. In that respect, the adhesive composition of example 9 does not represent the subject matter of claim 1 of the main request and the adhesive composition of comparative example 5 is not representative of the closest prior art D2 either. Under these circumstances, the comparison of example 9 and comparative example 5 can not serve credibly to establish the presence of an effect attributable to the distinguishing feature of claim 1 of the main request over D2.

2.6.5 The respondent also relied on the experimental reports E1 and E2 submitted during the opposition procedure. E1 discloses a comparison of adhesive properties of four adhesive compositions containing a reactive silicon group containing polymer, a tin curing catalyst and an amino group substituted alkoxysilane.

2.6.6 The reactive silicon group containing polymer of these compositions is based on the commercially available polypropylene oxide Acclaim® 12200. In the case of compositions #2 and #4 that polypropylene oxide contains $(CH_3O)_3Si-CH_2CH_2CH_2NHC(=O)O-$ end groups, in accordance with the definition provided in claim 1 of the main request. In the case of compositions #1 and #3, the polypropylene oxide contains $(CH_3O)_3Si-CH_2CH_2CH_2O-$ end groups and is thus not according to claim 1 of the main request.

2.6.7 It is further indicated in E1 that the preparation of the reactive silicon group containing polymer of compositions #2 and #4 was adapted from synthesis example 1 of the patent in suit. As to the preparation of compositions #1 and #3, reference was made to E2, which contains the experimental details of the preparation adapted from synthesis example 1 of D5.

2.6.8 Neither E1 nor E2 indicate the number of silicon containing end groups present in the polymers prepared for compositions #2 and #4 or compositions #1 and #3. The technical expert of appellant 2 submitted at the oral proceedings that it was common general knowledge that the properties of these types of adhesive compositions partly depend on the number of silicon containing end groups on the reactive silicon group containing polymer. That submission is credible especially in view of the fact that claim 1 of the main request itself defines component (A) as being a reactive silicon group-containing polymer and also in view of the general disclosure in paragraph 5 of D2 according to which curing of these types of compositions proceeds by the formation of Si-O-Si networks by reaction of the silicon containing end groups of the basis polymer corresponding to component (A) of the patent in suit.

2.6.9 The respondent argued that while it could be acknowledged that the basis polymers prepared by a process according to the patent in suit or a process according to D5 had on average a different number of silicon containing end groups, it had not been established that that was relevant at all, especially in view of the fact that the adhesive compositions according to E1 all had comparable mechanical properties. However, the contrary appears to be the case as demonstrated by compositions #1 and #2 which differ only in the nature of the polymer corresponding to component (A) and show significant differences in elongation (230% versus 260%), M50 (3.54 kgf/cm^2 versus 4.96 kgf/cm^2) and Emax (155% versus 215%) in table on page 2 of E1.

2.6.10 It follows from the above that if the different types of basis polymers disclosed in E1 also differ in the number of silicon containing end groups, any effect in respect of the properties of the resulting adhesive compositions containing these basis polymers cannot be causally linked to the presence or absence of a urethane linkage on the silicon containing end groups. Under these circumstances, the Board comes to the conclusion that E1 does not provide a fair comparison that could demonstrate the presence of an effect for the compositions according to claim 1 of the main request.

2.6.11 The respondent also referred to the experimental evidence D23 provided with the statement of grounds of appeal. However, the only two examples described in D23 contain the same mixture of MS Polymer S 203 H and S 303 H as in example 7 of D2, both of which do not contain silylurethane end groups. D23 addresses the effect of the nature of component (C) on the properties of the adhesive compositions which is not relevant to the present assessment of inventive step of claim 1 of the main request over D2, which relates to the effect that the definition of component (A) might have.

2.7 The evidence relied upon by the respondent therefore does not establish the presence of any superior effect over D2 attributable to one of the features distinguishing the composition of claim 1 of the main request over that of example 7 of D2. Under these circumstances, the problem that can be formulated with respect to D2 is the provision of further room temperature curable silicon group containing polymer composition.

2.8 It remains to be determined whether the subject matter according to claim 1 of the main request was obvious to a person skilled in the art starting from the closest prior art D2. The question posed in that respect is whether the skilled person would have considered the component (A) as defined in claim 1 of the main request in order to provide further room temperature curable silicon group containing polymer compositions.

2.8.1 D2 itself does not impose any particular requirements as to the choice of the basis polymer corresponding to component (A) in claim 1 of the main request. Paragraph 25 teaches in that respect that the basis polymer should preferably be a formulation of silane terminated polyether or silane terminated polyurethane. No limitation in respect of the type of silane terminated polyether is set out in D2. Under these circumstances, a skilled person could consider any silane terminated polyether or silane terminated polyurethane available in the prior art.

2.8.2 D3 already disclosed the use of silane terminated polyethers (paragraphs 32, 43-49 and claim 1). In particular, example 6 of D3 (polymer P6) concerns a polyoxypropylene triol of molecular weight 17000, the terminals of which were reacted with isocyanate propyl trimethoxysilane resulting in a polymer according to the definition of component (A) in claim 1 of the main request. The adhesive composition of example 34 based on that polymer P6 is reported in Tables 1 and 2 of D3, alongside the adhesive composition of example 28 based on polymer P1 obtained by hydrosilylation. The properties disclosed for these two adhesive compositions in Tables 1 and 2 do not significantly differ from one another: surface tack free time, time until the viscosity reached 1600000 cP and 50% Modulus being close in value, especially in view of the values of the same properties reported for the other compositions. In that respect, the argument of the respondent according to which D3 would teach away from the composition containing polymer P6 must fail.

2.8.3 Polymers according to the definition of component (A) in claim 1 of the main request are also known from D6 (examples 3 to 7 including prepolymer B prepared from examples 1 and 2). The argument of the respondent according to which these polymers were not indicated as being preferred in D6 is not relevant in view of the technical problem formulated, which solution only needs to show that polymers corresponding to the definition of component (A) were available to the skilled person in that field as alternatives to the polymers disclosed in D2.

2.8.4 D10 also discloses a polymer according to claim 1 of the main request, in particular a polyoxypropylene diol of molecular weight 37000 which is terminated by reaction with γ-isocyanatopropyltrimethoxysilane (Polymer P10 of synthetic example 10). Example 5 of D10 shows that the use of polymer P10 in adhesive compositions also containing a curing catalyst and an adhesion promoter were known in the art. The Board does not find in D10 and in particular in the comparison of examples 1 and 5 a teaching leading away from the use of polymer P10 in adhesive compositions. In that respect, the compositions according to example 1 and example 5 differ not only in the nature of their basis polymer but also differ significantly in the nature and amount of curing catalysts (1 phr of dibutyltin bisacetylacetonate in example 1 and 0.1 phr of dibutyltin dilaurate in example 5). As a result, any difference in the properties of the cured compositions according to example 1 and example 5 cannot be attributed to the basis polymer only. Thus, the argument of the respondent regarding a teaching away of D10 fails.

2.8.5 D3, D6 and D10 thus show that reactive silicon group-containing polymers as defined in claim 1 of the main request were known as basis polymers in the context of adhesive compositions containing curing catalysts and adhesion promoters. The use of one of these polymers in the compositions of D2 in order to provide further room temperature curable silicon group containing polymer compositions does not involve an inventive step.

2.9 Claim 1 of the main request therefore does not meet the requirements of Article 56 EPC.

Eighth auxiliary request

3. Inventive step

3.1 Claim 1 of the eighth auxiliary request differed from claim 1 of the main request in that component (C) of the room temperature curable silicon group containing polymer composition was further defined as being either of chemical formula 25 or of chemical formula 26. In particular, for the compounds of chemical formula 25 the substituents on the silicon atoms was defined as R^2: alkyl group, R^3: aminopropyl groups or N-(β-aminoethyl)-aminopropyl groups, R^4: hydroxyl groups or alkoxyl groups and m is an integer of 0 to 30. In particular, each repeating unit of component (C) according to claim 1 of the eighth auxiliary request comprised an amino group.

3.2 No additional effect compared to the subject-matter of the main request was shown to be related to the use of component (C) as now defined in claim 1 of the eighth auxiliary request. The technical problem thus remained the provision of further room temperature curable silicon group containing polymer compositions.

3.3 The closest prior art D2 discloses that siloxane oligomers according to D9 could be used as adhesion promoters in adhesive compositions (paragraph 16). Claim 1 of D9 defines siloxane oligomers of formula (I) where the silicium atoms bear substituents R which can be (i) aminopropyl-functional groups, (ii) methoxy, ethoxy, 2-methoxyethoxy and/or propoxy groups, and (iii) if desired, alkyl, alkenyl, isoalkyl or cycloalkyl groups of 1 to 18 carbon atoms and/or aryl groups of 6 to 12 carbon atoms.

3.4 The definition provided for the generic substituents R in claim 1 of D9 therefore overlaps with the definitions provided in claim 1 of the eighth auxiliary request since any substituent R according to claim 1 of D9 can be an alkyl group (corresponding to R^2 in the eighth auxiliary request), aminopropyl groups or N-(β-aminoethyl)-aminopropyl groups (corresponding to R^3 in the eighth auxiliary request) and methoxy-, ethoxy-, 2-methoxyethoxy- and/or propoxy groups (corresponding to alkoxy groups in R^4 of the eighth auxiliary request) and wherein m is between 2 and 30 (corresponding to the range of 0 to 30 in the eighth auxiliary request) (see also passage on page 4, lines 20-30 of D9).

3.5 The selection of specific compounds known to be adhesion promoters within the disclosure of D9 in order to provide further room temperature curable silicon group containing polymer compositions does not involve an inventive step. Also, it was not shown that the combination of component (A) as defined in claim 1 with the choice of a component (C) of chemical formula 25 or 26 as defined in claim 1 of the eighth auxiliary request provided any additional effect. Claim 1 of the eighth auxiliary request therefore does not meet the requirements of Article 56 EPC.

Eleventh auxiliary request

4. The eleventh auxiliary request corresponds to the main request from which claims 1 to 5 were deleted and claims 6 to 8 were renumbered accordingly. While that request was filed for the first time at the oral proceedings before the Board, its admittance into the proceedings was not objected to by the appellants. Since claims 1 to 5 of the main request were deleted in the eleventh auxiliary request to address lack of inventive step and the remaining claims of the eleventh auxiliary request were already present in the main request, it is appropriate for the Board to exercise the discretion allowed pursuant to Article 13(1) and (3) RPBA to admit the eleventh auxiliary request into the proceedings.

5. The claims of the eleventh auxiliary request correspond to claims 6 to 8 of the main request. Novelty of claims 6-8 of the main request was not contested in appeal. Novelty of the eleventh auxiliary request was thus not disputed in appeal. Also, claims 6-8 of the main request were found to involve an inventive step over the closest prior art D5 by the opposition division. The Board also indicated in its preliminary opinion (point 7.1) that the reasoning of the opposition division in respect of inventive step and more specifically its choice of closest prior art D5 had not been challenged in appeal and that the attack based on D5 submitted by appellant 1 was not substantiated. In particular, it was noted by the Board that the attack of appellant 1 did not set out clearly and concisely the reasons why it was requested that the decision

under appeal be reversed, amended or upheld. The appellants did not submit any further comments on those issues at the oral proceedings. Since novelty of the claims according to the eleventh auxiliary request was not contested and the Board can identify no grounds for reversing or amending decision of the opposition division on inventive step of these claims, the Board comes to the the conclusion that the eleventh auxiliary request satisfies 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 department of first instance with the order to maintain the patent on the basis of the 11th auxiliary request filed during oral proceedings before the Board.

The Registrar: The Chairman:

Beschwerdekammern des Europäischen Patentamts
Boards of Appeal of the European Patent Office
Chambres de recours de l'Office européen des brevets

B. ter Heijden M. C. Gordon

Decision electronically authenticated