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Datasheet for the decision of 27 March 2014

Case Number: T 1008/11 - 3.3.03

Application Number: 04005984.2

Publication Number: 1574537

IPC: C08G59/18, C09J163/00, C08G59/42, C08L63/00

Language of the proceedings: EN

Title of invention:
Epoxy adhesive composition

Patent Proprietor:
Dow Global Technologies LLC

Opponents:
Henkel AG & Co. KGaA
Sika Technology AG

Headword:

Relevant legal provisions:
EPC Art. 54, 56
RPBA Art. 12(4), 13(1), 13(3)

Keyword:
Novelty - main request (yes)
Inventive step - main request (yes)
Late-filed document admitted (D16: yes; D14: no)
Late-filed argument - admitted (no)

Decisions cited:
T 0101/87, T 1002/92, T 0240/95, T 0591/01, T 0708/05, T 1115/09

Catchword:

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Case Number: T 1008/11 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 27 March 2014

Appellant: (Opponent 1)	Henkel AG & Co. KGaA Henkelstrasse 67 40589 Düsseldorf (DE)
Representative:	Kann, Wolfgang Henkel AG & Co. KGaA VTP Patente 40191 Düsseldorf (DE)
Appellant: (Opponent 2)	Sika Technology AG Zugerstrasse 50 6340 Baar (CH)
Representative:	Sika Patent Attorneys c/o Sika Technology AG Geschäftsstelle Zürich Tüffenwies 16 Postfach 8048 Zürich (CH)
Respondent: (Patent Proprietor)	Dow Global Technologies LLC 2040 Dow Center Midland, MI 48674 (US)
Representative:	Schaad, Balass, Menzl & Partner AG Dufourstrasse 101 Postfach 8034 Zürich (CH)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 9 March 2011 concerning maintenance of the European Patent No. 1574537 in amended form.**

Composition of the Board:

Chairman:	F. Rousseau
Members:	O. Dury
	R. Cramer

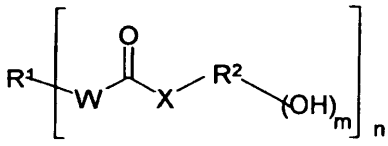
Summary of Facts and Submissions

I. The appeals by the opponents lie against the interlocutory decision of the opposition division posted on 9 March 2011 to maintain in amended form European patent No. EP 1 574 537 in respect of European application 04 005 984.2.

II. Notices of opposition to the patent had been filed by opponent 01 and opponent 02, requesting revocation of the patent in its entirety on the grounds of Art. 100(a) EPC (lack of novelty and of inventive step; both opponents), Art. 100(b) EPC (opponent 01) and Art. 100(c) EPC (opponent 02).

III. By the decision under appeal the patent was maintained on the basis of the main request filed on 2 November 2010 during the oral proceedings before the opposition division and comprising 11 claims, of which claims 1, 10 and 11 read:

"1. An epoxy adhesive composition comprising
a) a first epoxy resin,
b) a second epoxy resin modified with an acrylonitrile-butadiene rubber, the latter comprising on average less than 25 wt% acrylonitrile, component b) comprising at least 30 wt% of acrylonitrile-butadiene rubber, and
c) a toughener of formula I



(I)

wherein m is 1 or 2, n is 2 to 6, R^1 is an n-valent radical of an elastomeric prepolymer after the removal of the terminal isocyanate, amino or hydroxyl group,

the elastomeric prepolymer being soluble or dispersible in epoxy resin, W and X are independently -O- or -NR^3-, at least one of W and X being -NR^3-, R^2 is an m+1-valent radical of a polyphenol or aminophenol after the removal of the phenolic hydroxyl group and optionally of the amino group, and R^3 is hydrogen, a C_1 to C_6 alkyl or phenyl,
the total amount of component b) and component c) being more than 30 % based on the total weight of the composition, and the weight ratio of component c) to component b) being greater than 1:1."

"10. Use of the epoxy adhesive composition according to one of the preceding claims for the assembly of parts of a vehicle."

"11. A vehicle, parts of which are assembled by the epoxy adhesive composition according to one of claims 1 to 9."

Claims 2 to 9 were dependent claims directed to embodiments of claim 1.

IV. The decision under appeal was based, *inter alia*, on the following documents:

D2: Technical Data Sheet STRUKTOL® POLYDIS 3604, Schill + Seilacher AG, Hamburg (2 pages)
D5: EP-A-0 308 664
D7: Technical Data Sheet Hycar® Reactive Liquid Polymers CTBN 1300X13 & CTBN 1300X13F, Noveon (3 pages)
D8: WO 01/94 492
D9: "Toughening mechanisms in elastomer-modified epoxies", J. Mat. Sci., Vol. 21, pages 2462-2474 (1986)

D12: DE 198 45 607

In its decision, the opposition division considered among others that the main request fulfilled the requirements of Art. 83 EPC, Art. 84 EPC, Art. 123(2) and 123(3) EPC. Novelty was further acknowledged considering *inter alia* that

- there was no disclosure in D5 of an acrylonitrile content below 25 wt.% together with a ratio of component c) to b) greater than 1 simultaneously;
- D12 did not disclose an acrylonitrile content below 25 wt.%.

The main request was also considered as inventive starting from either D12 or D5 as the closest prior art.

V. Opponent 01 (appellant 01) lodged an appeal against the above decision. In the statement setting out the grounds for the appeal, appellant 01 requested that the patent be revoked and submitted

D14: WO 00/37554

D15: Encyclopedia of Chemical Technology, Kirk-Othmer, 4th Edition, Vol. 8, pages 1005-1019.

VI. Opponent 02 (appellant 02) lodged an appeal against the above decision. In the statement setting out the grounds for the appeal, appellant 02 requested that the patent be revoked and submitted

D13*: Technical Data Sheet Struktol Polydis 3604, Schill + Seilacher AG, Hamburg, (2 pages).

VII. By letter of 15 August 2011, the respondent (patent proprietor) filed comments on the statements of grounds of appeal and requested that the appeals be dismissed.

VIII. In the communication issued on 14 October 2013 accompanying the summons to oral proceedings, the Board identified relevant issues to be addressed during the oral proceedings.

IX. With letter of 24 January 2014, the respondent submitted three auxiliary requests as well as

D16: Annex 1: Test data with regard to the patent in suit (6 pages)

D17: Annex 2: Comparative examples in respect of the patent in suit and D12

X. Appellant 02 announced by letter of 5 March 2014 that he would not attend the oral proceedings.

XI. During the oral proceedings held on 27 March 2014 in the absence of appellant 02 as announced, the respondent withdrew his written request not to admit D15 into the proceedings.

XII. The appellants' arguments relevant for the present decision may be summarised as follows:

Cited documents

a) D13* contained the same information as D2, which had been filed together with the notice of opposition and had been published after the filing date of the patent in suit. It was derivable from the indication "Änderungen vorbehalten: 00/2001" on page 2 of D13* that D13* had been published in January 2001. Such data sheets were intended for distribution to clients and, thus, were made available to the public. Therefore, D13* was valid prior art according to Art. 54(2) EPC.

b) D16 and D17 should not be admitted into the proceedings because they were filed late and the appellants had not had sufficient time for example to evaluate those experiments in their laboratory and/or perform counter-experiments. Considering that the respondent argued that the experiments performed in D17 were not time-intensive, those data should have been submitted earlier.

Novelty over D5

c) D5 disclosed epoxy compositions comprising a) a first epoxy resin C), b) a second epoxy resin A) modified by an acrylonitrile-butadiene rubber comprising 5-50 wt.%, i.e. less than 25 wt.%, acrylonitrile and c) a toughener B) according to Formula (I), wherein the total amount of b) and c) was of 10-60 wt.%, the weight ratio c:b of 5:1 - 1:5 and the amount of acrylonitrile of the acrylonitrile-butadiene rubber was of at least 30 wt.% as e.g. in Addukt 23. Therefore, all the technical features of claim 1 being disclosed in D5, the subject-matter of claim 1 was not novel.

Inventive step

d) D12 was a suitable starting point because it belonged to the same technical field and addressed the same technical problem as the patent in suit.

i) Appellant 01 considered that the subject-matter claimed differed from the examples of D12 in three features, namely the nature of the toughener (c), the acrylonitrile content of the modifying rubber of the second epoxy resin and the c:b weight ratio.

It was not contested that the data of the patent in suit and/or D16 showed that a little improvement in the impact peel strength at -40°C and at room temperature was obtained over D12. However, it was questioned at the oral proceedings whether the preparation process of component RAM B indicated in D16 could lead to a product according to operative claim 1. It was also noted that the sum of the weight percentages of the components specified in D16 did not add up to 100 %, but to 98.95 %.

D12 disclosed that it was possible to modify the acrylonitrile content of the modified epoxy resin e.g. by using acrylonitrile-butadiene rubber comprising less than 25 wt.% acrylonitrile, such as the products X8 and X13 also used in the patent in suit. Besides, D15 taught that reducing the acrylonitrile content of an acrylonitrile-butadiene rubber increased its glass transition temperature (D15: top of page 1006; Table 1), which was known to directly affect the flexibility of the rubber. During the oral proceedings before the Board, appellant 01 argued that such a conclusion could also be drawn from D9. Considering that rubber elasticity was further related to impact properties, it was obvious that the impact properties of those rubbers would be improved by lowering the acrylonitrile content. In the section "Acrylonitrile Content" of D15 (page 1015), it was further indicated that lowering the acrylonitrile

content of acrylonitrile-butadiene rubber led to improving the low temperature properties. Similar conclusions would be drawn from D13*. Under these circumstances, the improvement relied upon by the respondent was obvious in the light of the teaching of D15 and D13*.

Considering that D12 explicitly made reference to D5 on page 7, the skilled person would have contemplated combining the teaching of both documents and in particular would have obviously used the toughenerers taught in D5 instead of those disclosed in D12.

Although a weight ratio of components c:b smaller than 1:1 was used in the examples, D12 contained no information that would have prevented the skilled person from using ratios greater than 1:1, especially considering that such ratios were also used in D5, which was cited in D12. In that respect, according to e.g. decisions T 240/95 of 6 July 1999, T 594/01 of 30 March 2004, T 708/05 of 14 February 2007 and T 1115/09 of 14 June 2012, none of which was published in OJ EPO, a weight ratio of 1:1 was not limited to the single value of "1" but had, from the technical point of view, to be read as a range of "1 ± ε" with ε being the measurement error, i.e. it encompassed values slightly exceeding 1. Finally, Table 3 of D8 showed that weight ratios of components c:b greater than 1:1 were usual, that argument in view of D8

being presented for the first time in the oral proceedings.

Therefore, the improvement relied upon by the respondent was obvious in the light of the prior art.

ii) Appellant 02 considered that the subject-matter claimed differed from the examples of D12 in that it required an acrylonitrile content of the epoxy modifier of less than 25 wt.%. According to the patent in suit, that distinguishing feature led to an improvement of the low temperature impact strength. That effect would have been obvious in the light of D13*.

According to appellant 02, the subject-matter claimed also differed from D12 in the nature of the toughener (c). Considering that no effect related to that feature had been shown, it would have been obvious to find an alternative toughener to those disclosed in D12 following the teaching of D5, which specifically disclosed those toughenners. D5 being referred to in D12, the skilled person would have contemplated combining the teaching of these documents.

e) Alternatively, D5, which belonged to the same technical field and aimed at providing epoxy compositions having good tensile shear strength and peel strength, was also a suitable starting point for analysing inventive step. The compositions of examples 4, 5 and 6 listed in Table 1 of D5 differed from the subject-matter of

operative claim 1 in that the acrylonitrile content of the acrylonitrile-butadiene modifying the second epoxy was of 26 wt.%. It would have been obvious to improve the low temperature impact strength of the compositions of D5 by decreasing the acrylonitrile content of the acrylonitrile-butadiene rubber following the teaching of either D15 or D13*, optionally in combination with D7. In that respect, D5 taught that various acrylonitrile content could suitably be used. Similar considerations applied when starting from either example 9 or 28 of D5.

f) D14, which belonged to the same technical field and addressed the same technical problem as that of the patent in suit, was also a suitable starting point.

i) The subject-matter of claim 1 of the main request differed from examples 2 and 3 of D14 only in that the acrylonitrile content in the rubber was below 25 wt.% instead of 26 wt.% and the requirement that the total amount of components b) and c) was greater than 30 wt.% and not around 25 wt.%. In reply to a question of the Board during the oral proceedings, no information regarding component Dynacol 7250 and/or its effect on the preparation process disclosed in the examples of D14 could be provided. Nevertheless, D14 could alternatively be considered as the closest prior art and was even closer to the subject-matter claimed. Therefore, D14 was *prima facie* highly relevant in the sense that it could affect

the decision on inventive step.

ii) D14 had been retrieved during an additional search performed after the decision of the first instance had been taken, which focused on the specific type of toughenerers (c) of formula (I). D14 was in the name of Henkel Teroson GmbH, which was a different legal entity from appellant 01 (Henkel AG & Co. KGaA). Therefore, D14 could not necessarily have been known earlier by appellant 01.

iii) For these reasons, D14, which was filed together with appellant 01's statement of grounds of appeal, should be admitted into the proceedings.

g) At the very end of the oral proceedings before the Board, appellant 01 questioned whether the claimed technical effect was plausible over the whole scope of the claims, considering that
- the ratio of components c:b mentioned in operative claim 1 was open-ended;
- the compositions defined in operative claim 1 encompassed those comprising epoxy resins b) wherein the acrylonitrile content of the acrylonitrile-butadiene rubber was as low as e.g. 1 wt.%.

XIII. The respondent's arguments relevant for the present decision may be summarised as follows:

Cited documents

a) Document D13* was late filed and there was no evidence on file that it had been made available

to the public at the filing date of the patent in suit. In that respect, the meaning of the indication "Änderungen vorbehalten.00/2001" had not been established. Under these circumstances D13* did not belong to the state of the art. Furthermore it had not been shown that D13* was *prima facie* highly relevant in the sense of T 1002/92 (OJ EPO 1995, 605).

For these reasons, D13* should not be admitted into the proceedings.

b) D16 was a repetition of the examples of the patent in suit and only indicated what had exactly been done. It did not bring additional information that was not derivable from the patent in suit. Although it could not be explained why the total amounts of components used amounted to about 99 wt.%, and not 100 wt.%, it remained that D16 showed that the examples illustrative of the subject-matter now being claimed had improved impact peel strength both at -40°C and at room temperature in comparison to examples not according to the main request.

D17 had been filed in reply to the communication of the Board in order to confirm the arguments brought forward earlier, in particular that the subject-matter now being claimed represented an improvement over either D12, D5 and/or D14, which had all been considered by the appellants as alternative starting points for the evaluation of inventive step. In that respect, D14 had only been filed together with appellant 01's statement of grounds of appeal.

D16 and D17 had further been filed within the deadline set in the communication of the Board and the appellants had never contested their admission into the proceedings before the oral proceedings. The experiments performed in those documents were not complicated and could have been repeated easily in the period between their filing and the date of the oral proceedings.

Therefore, D16 and D17 should be admitted into the proceedings.

Novelty over D5

c) The specific combination of features according to claim 1 could only be arrived at after performing a series of selections within the ambit of D5. Therefore, novelty over D5 was given.

Inventive step

d) D12 was a suitable starting point and the subject-matter claimed differed therefrom in the three features identified by appellant 01.

The problem to be solved resided in the provision of epoxy adhesive compositions which upon curing resulted in products having improved impact peel strength at -40°C while maintaining satisfying impact peel strength at room temperature. The comparison of samples C36 and C34 of the patent in suit, corresponding to examples INV9 and COMP2 of D16, or of examples C32 and C36-C37 of the patent in suit, corresponding to INV1 and INV9-INV10 of D16, showed that said problem was solved. The same conclusion could be drawn from the data provided

in D17.

Neither D12 nor any of the other documents cited by the appellants contained an indication that the acrylonitrile content of the rubber had an influence on the impact peel strength at -40°C of the epoxy compositions. Nor did they provide a hint to use an acrylonitrile content lower than 25 wt.%. The fact that, among all the documents cited in the proceedings, example 28 of D5 was the sole example carried out using an acrylonitrile content of less than 25 wt.% showed that said feature was not obvious.

The prior art also provided no hint to use a weight ratio c:b greater than 1:1. In that respect almost all the examples of D5 were performed using a c:b weight ratio of 1:1 and examples 1-6 listed in Table 1 of D5 showed that the best impact peel strength was obtained when a ratio of 1:1 was used.

There was also no hint to use a toughener c) according to operative claim 1 instead of those according to D12. In that respect, comparative example 2 of Table 3 of D12 had been prepared using a toughener according to D5 and corresponding to those according to operative claim 1. Considering the poor results obtained for comparative example 2, D12 would have led the skilled person to avoid using toughеners according to D5. Therefore, D12 taught away from the claimed solution.

Since epoxy compositions were complex systems, effects produced by changes made to their

compositions could usually not be predicted, as indicated in D9.

Considering that D15 taught on page 1015 that the chemical resistance of acrylonitrile-butadiene rubbers decreased with decreasing amounts of acrylonitrile, the skilled person would not have been motivated to decrease the acrylonitrile content of the nitrile rubbers used in D12. Besides, D15 dealt with the properties of acrylonitrile-butadiene rubber *per se*, not with their effect as a modifier of epoxy in adhesive epoxy resin compositions.

e) D8 taught tougheners c) which were neither according to D12 nor to D5. No fair comparison could be made between the examples listed in Table 3 of D8 because many variables had been adjusted. Besides, the poor results shown in D8 by the comparison with tougheners according to D5 taught away from using tougheners according to that document that corresponded to those of operative claim 1. Finally, D8 contained no hint to use an epoxy resin modified by an acrylonitrile-butadiene rubber having a content of acrylonitrile lower than 25 wt.% and/or a weight ratio c:b of greater than 1:1. Therefore, even if the skilled person was searching in D8 for a solution to the problem identified above, which was contested, he would not arrive at the subject-matter now being claimed.

f) For these reasons, the skilled person would not have been motivated to modify the compositions exemplified in D12 so as to arrive at compositions

according to operative claim 1.

g) D5 did not deal with impact peel strength at low temperature.

Example 28 was the only example of D5 using an acrylonitrile-butadiene rubber comprising less than 25 wt.% acrylonitrile but had been performed using less than 30 wt.% acrylonitrile-butadiene rubber modifier and a weight ratio of components c) to b) of 1:1. Examples C29 and C30 of the patent in suit, corresponding to INV7 and COMP1 of D16, showed that using a weight ratio c:b of 1.4 instead of 1:1 led to an improvement of the impact peel strength both at -40°C and at room temperature. The same conclusion could be drawn from the data provided in D17.

D5 did not suggest using a weight ratio of components c:b greater than 1:1. Rather, D5 would have led the skilled person not to depart from using a ratio of 1:1, not only because most examples of D5 had been performed using a ratio of 1:1, but also because the data provided in Table I (page 17) of D1 showed that the highest peel strength was obtained when the weight ratio of c:b (or 1A:1B in said Table I) was 1:1.

Therefore, D5 was not a more suitable starting point than D12.

h) Document D14, which was considered by appellant 01 as an alternative starting point, was late filed. Appellant 01 had provided no good reasons justifying the filing of that document only in the appeal proceedings, and there could hardly be any,

since D14 was in the name of HENKEL Teroson GmbH, which belonged to the same affiliated company as appellant 01. Considering that operative claim 1 was filed together with the proprietor's reply to the notice of opposition, D14 could have been filed much earlier and there was no reason justifying its submission only with the statement of grounds of appeal.

The subject-matter of operative claim 1 differed from examples 2 and 3 of D14 at least in that the total amount of components b) and c) was more than 30 wt.% based on the total weight of the composition and in that the acrylonitrile-butadiene rubber comprised less than 25 wt.% acrylonitrile. Besides, there was no evidence on file that the reaction product of example 1 of D14 was a toughener of formula (I) according to operative claim 1. The comparison of examples BM 1496 C2 (according to operative claim 1) with the last comparative example (similar to examples 2 and 3 of D14) given in Table 1 of the patent in suit showed that those differences resulted in an improved impact peel strength both at -40°C and at room temperature. The same conclusion could be drawn from D17. There was no hint in D14 and/or in any of the cited documents to modify the compositions of D14 so as to arrive at a composition as now being claimed, in particular when an improved impact peel strength both at -40°C and at room temperature was sought.

For these reasons D14 was neither *prima facie* highly relevant nor more relevant than the documents already on file, in particular D12. Therefore and in agreement with the criteria set

out in decision T 1002/92, D14 should not be admitted into the proceedings.

Further request

i) Although the contested decision was based *inter alia* on pages 2 to 4 as filed during the oral proceedings of 2 November 2010, page 4 was erroneously missing in the "Druckexemplar". Therefore, it was requested to re-introduce said page 4 into the Druckexemplar.

XIV. Appellants 01 and 02 (opponents 01 and 02) requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeals be dismissed (main request) or, alternatively, that the decision under appeal be set aside and the patent be maintained on the basis of one of the auxiliary requests 1-3 filed with the letter of 24 January 2014.

XV. The Board announced its decision at the end of the oral proceedings.

Reasons for the Decision

1. The appeals are admissible.

Main request

2. Novelty

2.1 The sole objection concerning lack of novelty was in respect of D5.

2.2 D5 discloses compositions (claim 19; examples) comprising:

- epoxy resins C) corresponding to component a) of operative claim 1;
- a copolymer A) based on 1,3-diene(s) and polar ethylenically unsaturated comonomer(s);
- a compound B) corresponding to the toughener c) of formula (I) according to operative claim 1 (D5: claim 1).

2.2.1 The definition of copolymers (A) in D5 overlaps with that of an epoxy resin modified with an acrylonitrile-butadiene rubber according to component b) of operative claim 1 (see D5: claims 1, 5; page 4, line 15, to page 5, line 13, in particular page 4, line 40, to page 5, line 5). Besides, the ranges for the relative amounts of A) and B) and the acrylonitrile content of A) also overlap with the values specified in operative claim 1 (D5: page 5, lines 1-2; page 15, lines 19-25).

However, the specific combination of features according to claim 1 may only be arrived at from the claims and/or description of D5 after performing a series of

selections between different passages of D5, in particular regarding

- the selection of an epoxy resin modified with an acrylonitrile-butadiene rubber as component A);
- the amount of at least 30 wt.% acrylonitrile-butadiene rubber;
- the content of less than 25 wt.% acrylonitrile of the acrylonitrile-butadiene rubber;
- a total amount of A) and B) of more than 30 wt.% based on the total weight of the composition;
- a weight ratio of toughener : (epoxy resin modified with an acrylonitrile-butadiene rubber) greater than 1:1.

2.2.2 Example 28 of D5 is the sole example of D5 that was performed using an epoxy resin modified with an acrylonitrile-butadiene rubber comprising less than 25 wt.% acrylonitrile, namely 18 wt.% (D5: page 25, lines 25-32), all the other examples being carried out using an epoxy resin modified with an acrylonitrile-butadiene rubber comprising 26 wt.% acrylonitrile, i.e. outside of the range of operative claim 1 (D5: page 16, lines 34-41; page 23, lines 40-45; Tables I-V).

However, according to page 25, lines 25-31 of D5, the amount of acrylonitrile-butadiene rubber used in example 28 to modify the epoxy resin is lower than 30 wt.% and there is no reason to consider, let alone any evidence in that respect, that the epoxy resin thus prepared comprises "at least 30 wt.% acrylonitrile-butadiene rubber" as specified in operative claim 1 of the main request. Therefore, at least for that reason, example 28 does not anticipate the subject-matter now being claimed.

2.2.3 Under these circumstances, D5 does not directly and unambiguously disclose a composition according to operative claim 1 and the appellants' sole objection concerning lack of novelty has to be rejected.

3. Inventive step

3.1 The patent in suit

3.1.1 The patent in suit aims at providing epoxy adhesive compositions which upon curing result in products having superior mechanical properties, in particular high impact peel strength at low temperatures (-40°C) while maintaining the mechanical properties of conventional epoxy adhesive compositions at room temperature (see paragraphs [0010], [0014] and [0016] of the patent in suit), in particular for assembling vehicle parts (claims 12, 13 and paragraphs [0008] and [0009]).

3.1.2 Epoxy adhesive compositions aimed at solving a similar problem are known from D12.

Each of examples 7 to 12 (see Table 2 of D12) in particular discloses a composition comprising:

(a) 28.0 wt.% of a diglycidylether of bisphenol-A (DGEBA) epoxy resin, corresponding to component a) of operative claim 1;

(b) 17.0 wt.% of a second epoxy resin (acknowledged as "Komponente A" in Table 2 of D12), which is an epoxy resin modified with 40 % of the acrylonitrile-butadiene rubber Hycar CTBN 1300 X13 (page 7, lines 10-12 of D12) which, as agreed by the parties, comprises 26 wt.% acrylonitrile. That second epoxy resin is, thus, structurally similar to component b) of operative claim 1;

(c) 13.5 wt.% of a toughener B), which has a structure corresponding to formula (I) indicated on page 4, lines 1-17 of D12.

The epoxy resin compositions according to D12 further show improved mechanical properties, in particular impact peel strength at low temperatures (D12: page 3, lines 22-24; page 6, lines 28-30; examples 7 to 12 and Table 3).

3.1.3 D12 was considered by the parties and the opposition division as a suitable starting point for analysing inventive step. The Board sees no reason to deviate from that view and considers examples 7 to 12 of D12 to be particularly relevant.

3.2 Problem to be solved in view of D12.

The problem to be solved as compared to D12 resides in the provision of epoxy adhesive compositions having improved impact peel strength at low temperatures (-40°C) while maintaining the mechanical properties of conventional epoxy adhesive compositions at room temperature. That such a problem should be solved can be deduced from the patent in suit (see section 3.1.1 above) and the application as filed.

3.3 Solution

The solution claimed resides in a composition according to operative claim 1 that differs from D12, in particular examples 7 to 12, in that

- the toughener c) of operative claim 1 comprises between R^1 and R^2 the moiety –W-CO-X- with W and X being independently -O- or -NR^3- and with at least one of W and Y being -NR^3, which moiety is not

present in the tougheners B) of D12. The tougheners c) of operative claim 1 are, thus, structurally different from those according to D12, in particular those used in each of examples 7-12. That conclusion was not disputed by the parties;

- the amount of acrylonitrile of the acrylonitrile-butadiene rubber used to modify the second epoxy resin b) is less than 25 wt.% (as compared to 26 wt.% in the examples of D12);
- the weight ratio of toughener:modified epoxy resin is greater than 1:1 (as compared to 13.5:17, i.e. lower than 1:1 in the examples of D12).

3.4 Success of the solution

3.4.1 Impact peel strength at -40°C and at room temperature of a series of examples illustrative of the invention and of comparative examples is reported in Table 1 of the patent in suit. However, the nature and the amount of the components in addition to compounds b) and c) as well as the manner in which the compositions and the samples have been prepared are apparently missing. There is in particular no indication in the patent in suit that the procedure indicated in paragraph [0040] has been followed. Therefore, from the sole information provided in the patent in suit, no conclusion may be drawn as to the influence of the above-mentioned distinguishing features on the properties of the epoxy adhesive compositions.

3.4.2 Admissibility of D16

In reply to the communication of the Board, in which the issue identified in section 3.4.1 had been addressed, the respondent submitted D16, in which the

examples of the patent in suit are explained in more detail, the preparation process, the amounts of components a), b) and c) according to operative claim 1 and the chemical nature of the components used being indicated on page 1, page 2 and pages 3-5 of D16, respectively.

It is true that, as objected by appellant 01, the total of the weight percentages indicated on page 1 of D16 adds up to 98.95 wt.% and not 100 wt.%. Appellant 01 has however not provided any argument as to how that apparent minor discrepancy could affect the reading of D16, in particular in respect of the comparison offered by the respondent. Therefore, D16 is read as it stands, i.e. considering that no other components were used in addition to those specified therein.

The argument of appellant 01 that the preparation procedure specified on page 4 of D16 was not detailed enough to show whether the synthesis indicated could effectively provide the compound RAM B illustrated in D16 is not supported by the facts and does not, in the absence of any concrete indication as to which details are supposed to have been omitted, undermine the credibility of the tests submitted. Therefore, in the absence of any evidence to the contrary, it is considered that components RAM 965 and RAM B used in D16 are according to formula (I) of operative claim 1.

D16 was submitted in reply to the communication of the Board, within the deadline set, i.e. two months before the oral proceedings. During that period of time, the appellants did not raise any objection regarding the admission of D16, nor did they request any further time or a postponement of the oral proceedings in order to take said document into account. Besides, D16 provides

explanations about what exactly was done in the examples of the patent in suit without adding any information, i.e. it merely confirms the reading of those examples by the opposition division as indicated in the contested decision, according to which comparative example C34 and examples C36-C37 of the patent in suit could be fairly compared.

Under these circumstances, the Board decides to admit D16 into the proceedings (Art. 13(1) and 13(3) RPBA).

3.4.3 Examples INV1 to INV11 of D16 deal with compositions according to operative claim 1 and comprising

- a mixture of three epoxy resins DER 330, DER331 and DER671 as component a);
- various rubber modified epoxy resins consisting of 60% DGEBA and 40% of CTBN type acrylonitrile-butadiene rubber(s) comprising various amounts of acrylonitrile as component b);
- either RAM B or RAM 965 as toughener c).

Example COMP1, already indicated as a comparative example in the application as filed under the designation C30, differs from the subject-matter of operative claim 1 in that the amount of b) and c) is of exactly 30 wt.% and in that the weight ratio of c:b is of exactly 1:1, i.e. in both cases values below those defined in operative claim 1. Appellant 01's argument that in decisions T 240/95, T 594/01, T 708/05 and T 1115/09 a specific technical value had to be read as a range taking into account the measurement error is not pertinent for the present case because i) those decisions deal with the issue of novelty and ii) in the present case the closest prior art in view of which the technical problem solved by the claimed subject-matter has to be assessed has not been held to concern a

composition comprising b) and c) in a total amount of 30 wt.% and in a weight ratio c:b of 1:1.

Example COMP2 differs from the subject-matter of operative claim 1 only in that the acrylonitrile content of the acrylonitrile-butadiene rubber used to modify epoxy resin b) is 26 wt.%, i.e. above the amount required by operative claim 1 (less than 25 wt.%).

Example COMP3 differs from the subject-matter of operative claim 1 in that the total amount of components b) and c) is 28 wt.%, i.e. below the amount of more than 30 wt.% required by said claim 1.

Example COMP4 differs from the subject-matter of operative claim 1 in that the total amount of components b) and c) is 27 wt.% (and not more than 30 wt.% as requested by operative claim 1) and in that the acrylonitrile content of the acrylonitrile-butadiene rubber used to modify epoxy resin b) is 26 wt.% (and not less than 25 wt.% as defined in operative claim 1).

While examples INV1 to INV7, INV9, INV10, COMP1 and COMP2 have all been performed using the same toughener RAM B, examples INV8, INV11, COMP3 and COMP4 were carried out using toughener RAM 965, both tougheners being according to formula (I) of operative claim 1 (see point 3.4.2 above). The comparison within each of those groups of examples may be made in order to assess whether any effect may be related, for a given toughener, to features such as the acrylonitrile content of the modifier of epoxy resin b), the amount of component b), or the total amount of components b) and c). In that respect, the table given on page 6 of D16 shows that all the examples according to operative

claim 1 have improved impact peel strength at -40°C as compared to all the comparative examples, the impact peel strength at room temperature being maintained.

3.4.4 In the absence of any evidence to the contrary, there is no reason to expect that the effect shown in D16 is not plausible over the whole scope of the claims. Besides, appellant 01 acknowledged during the oral proceedings before the Board that such an effect in terms of an improvement of the impact strength at -40°C was indeed present and appellant 02 did not comment in that respect.

Accordingly, it is credible that the improvement in impact peel strength at -40°C is only obtained when the specific requirements defined in operative claim 1 are met.

At the end of the oral proceedings before the Board, appellant 01, however, argued for the first time that the improvement in impact peel strength at -40°C relied upon by the respondent was not credible over the whole scope of the claims. Not only was that objection submitted after the discussion on inventive step starting from D12 as the closest prior art had already taken place but it was furthermore neither supported by any evidence nor in line with appellant 01's former line of argument, according to which it had been agreed that a "little" improvement had been shown. The Board, exercising its discretionary power under Art. 13(1) and 13(3) RPBA, therefore rejected that objection.

3.4.5 For these reasons, the technical effect relied upon by the respondent and formulated in section 3.2 above is considered to be effectively solved.

3.5 Obviousness of the solution

3.5.1 Although toughener B) is defined in a general manner in claims 1 and 2 of D12, the sole tougheners exemplified in D12 are those according to formula (I) of D12 (page 3, line 66, to page 4, line 17). Besides, the sole tougheners that are used in D12 in an epoxy composition comprising both an epoxy resin and a modified epoxy resin according to components a) and b) of operative claim 1 are also according to formula (I) of D12, which is, as explained above, different from formula (I) of operative claim 1. Hence, D12 itself does not provide any hint to use tougheners as defined in the subject-matter now being claimed.

3.5.2 Comparative example 2 of D12 further discloses an epoxy resin composition according to the teaching of D5, i.e. prepared using a toughener of formula (I) according to operative claim 1. Considering the poor result obtained in terms of impact peel strength at both -40°C and at room temperature (D12, Table 3: properties "Impact -40°C and Impact RT), D12 teaches away from using tougheners according to D5, i.e. from the solution provided by operative claim 1.

3.5.3 According to D12, the acrylonitrile content of the acrylonitrile-butadiene rubber used to modify the second epoxy resin can be varied between 10 and 30 % (D12: page 3, lines 53-55) and the amounts of epoxy resin, modified epoxy resin and tougheners can be of 10-45 wt.%, pref. 15-30 wt.%, 5-25 wt.%, pref. 10-20 wt.% and 5-30 wt.%, pref. 5-20 wt.%, respectively (D12: page 6, lines 4-8). Therefore, it is correct, as argued by appellant 01, that the acrylonitrile content of the acrylonitrile-butadiene rubber and the weight ratio of toughener to modified epoxy resin disclosed in

D12 overlap with the requirements set in respect of those parameters in operative claim 1. There is, however, no indication in D12 to use amounts of those components as defined in operative claim 1 in order to solve the technical problem identified above. In that respect, it has to be taken into account that the respondent showed in D16 that, for the specific toughening according to operative claim 1, the amounts defined in operative claim 1 are required in order to provide an improvement in impact peel strength at low temperature.

3.5.4 There is moreover no hint in the prior art documents cited other than D12 that would have motivated the skilled person to modify the weight ratio toughener:modified epoxy resin together with the acrylonitrile content of the modifier of the second epoxy resin used in examples 7-12 of D12 in order to solve the technical problem identified above.

3.5.5 D15 discloses general information on acrylonitrile-butadiene rubber *per se*. It is related neither to epoxy resins chemically modified with said rubbers, nor to adhesive compositions comprising a mixture of an epoxy resin and a modified epoxy resin, nor to tougheners according to components a), b) and c), respectively, of operative claim 1 and/or used in D12. Besides, D15 is not specifically related to impact peel strength at -40°C. In that respect, it was in particular not shown that the information regarding the improvement of properties mentioned on pages 1006, 1007 and 1015 of D15 was related to the impact peel strength of compositions of the type used in D12.

Under these circumstances, appellant 01's argument that the skilled person would have decreased the

acrylonitrile content of the acrylonitrile-butadiene rubber in order to improve the impact peel strength properties of the compositions of D12 appears to be based on hindsight. In that respect, it is further to be taken into account that D12 itself, although disclosing the possibility of using epoxy resins modified using various amounts of acrylonitrile (page 3, lines 52-55) and specifically aimed at improving impact peel strength at -40°C, did not suggest using such modified resins in the examples.

For these reasons, the objection based on the combination of D12 and D15 fails to convince.

3.5.6 Appellant 01 considered combining the teaching of D12 and D13* relating to a nitrile rubber modified epoxy resin called "Struktol Polydis 3604". However, there is no evidence on file that D13* had been made available to the public before the filing date of the patent in suit. The terms "Änderungen vorbehalten. 00/2001" have not been shown to be indicative of a publication date. In that respect, it is pointed out that that issue had been explicitly identified in the communication of the Board but that no evidence was submitted by the appellants to remove that deficiency.

The fact that an additional document D2 makes reference to a product also called "Struktol Polydis 3604", which appears to be identical to that described in D13*, does not change that conclusion. D2 has not been shown to belong to the state of the art or to common general knowledge (end of section 8.2 of the reasons, pages 15-16 of the contested decision), so that the information about "Struktol Polydis 3604" provided in that document has not been shown to have been made available to the skilled person before the filing date

of the patent in suit. Nor does D2 contain any evidence that D13* was made available to the public before said filing date.

For those reasons, the appellants' objection relying on the technical teaching on "Struktol Polydis 3604" provided in D13* was rejected.

3.5.7 During the oral proceedings before the Board, appellant 01 relied for the first time on D8 and D9 in support of its argument in favour of the obviousness of the solution. Although those documents were cited in the opposition proceedings, they had not been previously relied upon in the appeal proceedings. The question therefore arises whether that new line of argument by appellant 01, according to which D8 and D9 rendered the claimed solution obvious, may be admitted into the proceedings.

Table 3 of D8, which was considered by appellant 01, does not allow a fair comparison to be made between the epoxy compositions prepared in the examples reported therein because those compositions were made using different tougheners according to each of examples 1 to 5 of D8. Besides, it was accepted by the parties present at the oral proceedings that the tougheners used in D8 (components D and E) were all according to D12 and that a toughener according to operative claim 1 was only used in comparative example 2 of D8, which exhibited poor impact peel strength both at room temperature and -40°C. Hence, for the same reason as for D12, D8 does not provide a hint to tougheners c) according to operative claim 1 and would have taught away from the solution provided by the present main request.

D9 is related to composite systems of epoxy resins modified using an elastomeric phase of acrylonitrile-butadiene rubber in the form of particles i.e. a two-phase systems (D9: abstract; sections 1. Introduction, 2.1 Materials, 3.1 Morphology, 4. Summary and conclusions). D9 is therefore directed neither to epoxy compositions as claimed, nor to chemically modified epoxy resins according to D12.

Under these circumstances, the Board, making use of its discretionary power, decides to reject the line of argument of appellant 01, which relied on either D8 or D9 (Art. 13(1) and (3) RPBA).

3.6 Consequently, it cannot be objectively concluded that the subject-matter of the patent in suit was, having regard to the state of the art, obvious to a person skilled in the art and therefore the appellant's objection of lack of inventive step starting from D12 as the closest prior art is rejected.

4. The appellants considered that D5 represented an alternative starting point for the evaluation of inventive step.

However, the closest prior art for assessing inventive step is a prior art document disclosing subject-matter conceived for the same purpose or aiming at the same objective as the claimed invention and having the most relevant technical features in common. A further criterion for the selection of the most promising starting point is the similarity of technical problem (Case Law of the Boards of Appeal of the EPO, 7th edition, 2013, I.D.3.1 to I.D.3.4).

In the present case, it is explicitly indicated in

paragraph [0010] of the patent in suit that its aim was to improve impact peel strength at -40°C while maintaining the mechanical properties at room temperature. Whereas D12 also specifically aims at solving that problem, D5 only addresses the issue of impact peel strength at room temperature and is silent in respect of low temperature behaviour. Besides, the examples of D12 provide a direct comparison with the teaching of D5 and show that a composition according to D5 has poorer properties than those of D12. No evidence was provided by the appellants that would contradict that result.

Therefore, in the present case, D5 does not constitute an alternative starting point for assessing inventive step, as it was not shown or even argued to be structurally closer to the claimed invention and, most importantly, it does not address the central issue of the patent in suit, namely impact peel strength at temperatures as low as -40°C.

Consequently, the appellant's objection of lack of inventive step starting from the more remote prior art document D5 must be rejected.

5. Appellant 01 considered that D14 represented a more suitable starting point than D12 for the evaluation of inventive step.

5.1 Considering that D14 was first submitted together with appellant 01's statement of grounds of appeal, its admission into the proceedings is subject, pursuant Art. 12(4) RPBA, to the discretion of the Board, taking into account *inter alia* the reasons invoked by appellant 01 to justify its submission in appeal and not at an earlier stage of the proceedings and the

relevance of the new submission (Case Law of the Boards of Appeal of the European Patent Office, 7th edition, 2013, IV. C.1.2.3 and 1.4.1 to 1.4.5).

5.2 Late filing of D14

The sole argument brought forward by appellant 01 for justifying the filing of D14 only in appeal was that the decision of the opposition division had put the focus of the case on tougheners c) of formula (I). Accordingly, appellant 01 had performed an additional search directed to those tougheners.

However, those tougheners were already the subject of granted claim 2 and were used in the examples of the patent in suit, as is derivable from paragraph [0032] of the patent in suit. In addition, the patent proprietor/respondent had already shifted the focus of the case onto said tougheners in its reply to the notice of opposition by letter of 26 March 2008 i.e. more than two and a half years before the oral proceedings before the first instance. This would have provided the opponents with ample time to perform an additional search directed to the tougheners defined in the granted claims if they had considered it necessary. However, they awaited the decision of the opposition division before doing so. Under these circumstances, there is no proper justification from appellant 01/ opponent 01 for having submitted on appeal new evidence D14 and the new line of argument allegedly demonstrating a lack of inventive step when starting from that document as the closest prior art.

5.3 Relevance of D14

5.4 Examples 2 and 3 of D14 deal with the preparation of a composition comprising a DGEBA epoxy resin, a toughener B) prepared according to example 1 of D14 and an epoxy resin modified using an acrylonitrile-butadiene rubber. It was agreed by the parties present at the oral proceedings before the Board that those examples differ from the subject-matter of operative claim 1 at least in that the modifier comprises 26 wt.% acrylonitrile (and not less than 25 wt.%) and in that the total amount of modified epoxy and toughener is lower than 30 wt.% of the whole compositions. The respondent and appellant 01, however, disagreed in respect of whether or not the toughener used in these examples was according to formula (I) of operative claim 1. In that respect, the nature of the toughener used in these examples could not be established with certainty at the oral proceedings, in particular in respect of the use of component Dynacol 7250 and its effects on the structure of the toughener obtained. Accordingly, doubts arose whether D14 could constitute a prior art closer to the claimed subject-matter than D12.

Besides, even if appellant 01's argument that D14 discloses a toughener c) according to operative claim 1 was to be followed, appellant 01 did not provide any evidence to support the allegation that the problem solved over D14 resided in the provision of further, alternative compositions. In the absence of any strong indication, for example in the form of experimental evidence, that the problem solved over D14 was merely the provision of an alternative epoxy composition, the Board is not satisfied that the reasoning in respect of inventive step submitted by appellant 01, which starts from D14 as the closest prior art, would be highly

likely to result in the claimed subject-matter lacking an inventive step. Requesting from the patent proprietor to demonstrate that the problem solved over D14 is not merely the provision of further epoxy compositions would amount, in the present case, i.e. in the absence of any evidence that the problem indeed has to be reformulated in a less ambitious manner, to conducting the opposition proceedings anew, which would be against the purpose of appeal proceedings.

5.5 Therefore, in the present case, the Board decided not to admit D14 into the proceedings not only because of its late filing but also because of the deficiency in the line of argument in respect of D14 (Art. 12(4) RPBA), taking particular account of the need for procedural economy and the need to act fairly towards the respondent.

5.6 Appellant 01's objection of lack of inventive step starting from D14 is, therefore, not considered.

6. Under these circumstances, the subject-matter of claim 1 is inventive. The same applies to each of claims 2 to 11, which either depend on claim 1 or make reference to it.

7. The main request of the respondent (patent proprietor) being allowable, there is no need to consider the auxiliary requests. Nor is there any reason to decide whether D17, submitted by the patent proprietor in support of an inventive step, should be admitted into the proceedings.

8. The respondent requested the reintroduction into the Druckexemplar of page 4 as filed during the oral proceedings of 2 November 2010.

However, said page 4 already formed part of the basis for the impugned decision, as can be seen from the Annex to the minutes of the oral proceedings before the opposition division, the tenor of the contested decision and the documents on which decision was based (EPO Form 2327, page 1). Therefore, the respondent's request is without object.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Goergmaier F. Rousseau

Decision electronically authenticated