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**Datasheet for the decision
of 4 December 2009**

Case Number: T 2039/07 - 3.3.03

Application Number: 97305696.3

Publication Number: 0822207

IPC: C08G 18/40

Language of the proceedings: EN

Title of invention:

Urethane laminating adhesives useful for retort pouches

Patentee:

MORTON INTERNATIONAL, INC.

Opponent:

HENKEL AG & CO. KGaA

Headword:

-

Relevant legal provisions:

EPC Art. 56

Relevant legal provisions (EPC 1973):

-

Keyword:

"Inventive step - (yes) - after amendment"

Decisions cited:

T 0035/85

Catchword:

-



Case Number: T 2039/07 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 4 December 2009

Appellant:
(Patent Proprietor)

MORTON INTERNATIONAL, INC.
100 North Riverside Plaza
Randolph Street at the River
Chicago
Illinois 60606 (US)

Representative:

Buckley, Guy Julian
Patent Outsourcing Limited
1 King Street
Bakewell
Derbyshire DE45 1DZ (GB)

Respondent:
(Opponent)

Henkel AG & Co. KGaA
FJP
D-40191 Düsseldorf (DE)

Representative:

-

Decision under appeal:

Decision of the Opposition Division of the
European Patent Office dated 18 September 2007
and posted 25 October 2007 revoking European
patent No. 0822207 pursuant to Article 102(1)
EPC 1973.

Composition of the Board:

Chairman: R. Young
Members: M. Gordon
H. Preglau

Summary of Facts and Submissions

I. Mention of the grant of European Patent No. 0 822 207 in the name of Morton International, Inc., in respect of European patent application No. 97305696.3 filed on 29 July 1997, published on 4 February 1998 and claiming a priority date of 29 July 1996 from US 681 577 was announced on 22 September 2004 (Bulletin 2004/39) on the basis of 12 claims.

Independent claim 1 read as follows:

1. A 100 percent solids, two part adhesive composition consisting essentially of

I) a first part comprising

A) from 50 to 99 wt%, based on total weight of (A) plus (B), of a hydroxyl terminated polyester; said polyester being liquid at 20°C and having a hydroxyl functionality of 2 to 2.1 and a hydroxyl number of 50 to 300,

B) from 1 to 50 wt% of an epoxy resin based on total weight of (A) plus (B) which epoxy resin is solid at 20°C and is dissolved within said polyester (A), said epoxy resin (B) having an epoxy equivalent weight of 500 to 3000 and a hydroxyl number of 100 to 250, and

C) up to 0.05 wt% of an isocyanate cure catalyst relative to the weight of (A) plus (B), and

II) a second part comprising a multi-functional isocyanate having an isocyanate functionality of 2 to 4, said second part (II) being provided relative to the total hydroxyl functionality of (A) plus (B) at an NCO/OH ratio of 0.9 to 3.0.

Claims 2 to 9 were directed to preferred embodiments of the adhesive composition of claim 1.

Claim 10 read as follows:

10. A laminate comprising a first polymeric layer and second polymeric layer adhered with an adhesive composition according to any preceding claim.

Claims 11 and 12 were directed to preferred embodiments of the laminate of claim 10.

II. A notice of opposition to the patent was filed on 15 April 2005 by Henkel KGaA.

The grounds of opposition pursuant to Art 100(a) (lack of novelty, lack of inventive step) were invoked.

Inter alia, the following documents were cited together

with the notice of opposition:

D1: EP-A-0 349 838

D2: US-A-4 613 660

III. By a decision announced on 18 September 2007 and issued in writing on 25 October 2007 the opposition division revoked the patent.

- (a) Novelty of the subject-matter claimed was acknowledged.
- (b) The technical problem underlying the patent in suit was the provision of urethane laminating adhesives for adhering polymeric films (which might be formed into retort pouches for food or medical applications) which were - substantially - free of organic solvents and adequately withstood retort conditions.

D1 addressed a similar problem and hence was considered to be the closest prior art. In particular, the adhesives taught by D1, like those disclosed in the patent in suit were of low viscosity.

D1 disclosed a two part adhesive composition consisting essentially of:

a first part comprising:

- A) a polyester polyol,
- B) an epoxy resin having a molecular weight of 320 to 4,000 and

a second part comprising:

- a multi-functional isocyanate having an isocyanate functionality of e.g. 3.

Examples 5 and 9 of D1 related to solvent free, 100 percent solids adhesive compositions.

The selection of a 100 percent solids adhesive composition was not considered to support an inventive step, as the reduction or elimination of volatile organic compounds was a known aim or requirement at the priority date of the patent in suit.

The selection of the specified polyester polyol, epoxy and isocyanate in the claimed amounts in order to provide a solvent free composition having an application temperature of 25 to 50°C, which *inter alia* required that the viscosity be "not too high" was considered to be obvious in the light of the disclosure of D1.

With respect to the composition of example 5 of D1, it was considered that since the epoxy resin employed - Epikote 1002 - was solid, and in view of the reported viscosity of the polyisocyanate component combined with the said composition (2Pa.s at 25°C) the polyester polyol employed was "unlikely" to be solid at 20°C.

Further it was not clear what technical problem was solved by the feature that the epoxy resin was solid at 20°C.

Operative claim 1 specified that the epoxy resin was dissolved in the polyester. D1, on the other hand, disclosed that the epoxy and polyester components were melt blended. It was held that insofar as the epoxy resin did not crystallise upon cooling, that there was no difference between dissolution and melt blending.

Regarding the ratio of NCO/OH specified in the claim it was held that this would be adjusted by the skilled person to the desired crosslinking characteristics of the adhesive as a matter of

routine.

Regarding the requirement in D1 of the presence of a carboxylic acid or anhydride and an oxy acid of phosphorus or derivative thereof, on which the operative claims were silent, it was held that D1 only required that the compositions comprise such compounds, but that there was no requirement that reactions involving these compounds had to take place before the curing of the adhesive composition. Further D1 did not require that the oxy acid of phosphorus be contained in the polyol component, but this could even be contained in the organic polyisocyanate component in the case of two-can type adhesives, and hence only promote the reaction between the polyol and the epoxy during the curing step.

Further, since the claims of the patent as granted employed an open definition, i.e. the terms "a first part comprising", "a second part comprising", correspondingly the presence of either of these compounds was not excluded as long as these were not involved in perceptible reactions with the adhesive composition before curing. Such an embodiment was encompassed by the teaching of D1. Consequently the claimed composition could not be regarded as being "quite different" from that of D1.

In conclusion, starting from D1 neither hindsight nor combination with the teachings of D2 was necessary in order to arrive at the claimed composition.

Consequently the patent was revoked.

- IV. A notice of appeal against this decision was filed by the patent proprietor on 19 December 2007, the prescribed fee being paid on the same day.
- V. The statement of grounds of appeal was received on 3 March 2008.
- (a) A declaration containing experimental results was submitted.
 - (b) The appellant/patent proprietor submitted an amended set of claims 1-12 as the sole request. In this set of claims, the two occurrences of "comprising" in claim 1 had been replaced by "consisting of". The claims were otherwise identical to those of the patent as granted. A correspondingly amended page 2 of the description was also submitted. It was submitted that the amendments had been undertaken to indicate that the first and second parts of the adhesive composition contained only the recited ingredients and not the other ingredients considered essential in D1, i.e. claim 1 of the patent as amended excluded the presence of "an oxy acid of phosphorus or a derivative thereof" and "a carboxylic acid or an anhydride thereof".
 - (c) With regard to inventive step, it was submitted that D1 was in the same technical field as the patent in suit. The invention of the patent in suit however provided adhesives which did not essentially require the presence of the phosphorus and carboxylic compounds necessary according to D1. The experimental evidence of the declaration demonstrated that the compositions of the patent, which excluded the presence of these compounds, provided superior viscosity and adhesive

properties compared to compositions containing these components.

There was no suggestion in D1 that excluding the phosphorus or carboxylic acid compounds would provide an adhesive suitable for use on the preparation of polymer film laminates which were suitable for forming into retorts. Further there was no disclosure or suggestion that the exclusion of the compounds taught to be essential in D1 could provide an adhesive composition with superior performance properties.

VI. The opponent, now the respondent replied with a letter dated 1 September 2008.

(a) With respect to the declaration, it was submitted that the experiments therein only constituted a comparison within the teaching of D1 but did not provide a comparison between the compositions of D1 and those according to the patent in suit and hence could not support an inventive step.

(b) With regard to inventive step it was submitted that the carboxylic acid compound mandatorily present in the composition of D1 could react with the polyol, as explicitly stated at page 6 line 2 of D1. Thus the adhesive composition of D1 no longer contained the carboxylic acid compound as a component but a modified polyol A. The oxyphosphoric acid was however contained according to D1.

D2 disclosed adhesive compositions on the basis of polyols, polyisocyanates and polyepoxides.

Addition of phosphorus acid compounds was not disclosed.

Both D1 and D2 belonged to the same technical

field and concerned a similar problem. The problem according to D2 was to improve the adhesion of solvent free adhesives to various substrates, also at elevated temperature.

The problem of D1 was likewise to provide improved adhesion and improved heat and chemical stability of the adhesive.

As the adhesives of D1 and D2 were both solvent free, as in the patent in suit, the avoidance of small amounts of oxyphosphoric acid could not support an inventive step. On the contrary the claimed composition was rendered obvious.

- VII. On 10 September 2009 the Board issued a summons to attend oral proceedings.
- VIII. Together with a letter dated 3 November 2009 the appellant/patent proprietor submitted a second declaration containing further experimental results. It was submitted that these data showed that compositions according to the operative claims exhibited improved properties, namely reduced viscosity and improved stability to retort conditions compared to similar compositions containing the additional components required according to D1 (i.e. those excluded from the scope of the operative claims). With regard to D2 it was submitted that according to this document polyether polyols were the preferred polyols, not polyester polyols. Further D2 was silent with respect to adhesives with improved properties under retort conditions. Accordingly the skilled person seeking to improve retort properties of an adhesive such as disclosed in D1 would not be led to the subject-matter of the

operative claims by the teachings of D2, let alone led to such subject matter in the expectation of obtaining improved retort properties.

IX. Oral proceedings were held before the Board on 4 December 2009.

(a) The appellant/patent proprietor explained that the subject-matter of claim 1 had been clarified/restricted to a 2-part composition in which the first and second parts consisted only of the specified compounds. No disclosure of such a composition was to be found in the prior art. The respondent/opponent confirmed that novelty was not challenged.

(b) With respect to inventive step the appellant/patent proprietor stated that the first set of data (i.e. the declaration submitted with the statement of grounds of appeal- see section V.(a), above) showed that a composition containing the polyester as disclosed in D1 but omitting the acid anhydride and phosphorus oxy acid compounds, i.e. those components required by D1 which were excluded from the scope of the operative claims, yielded a high viscosity adhesive. The submitted data further showed that the viscosity of the composition corresponding to the teaching of D1, i.e. containing these two components was even higher. It was considered these data showed the benefits of the invention. The second set of experiments submitted with the letter of 3 November 2009 (see section VIII, above) were based on "Main Component C" of D1 but employed a polyester according to the patent in suit. These data showed that omitting the

anhydride and phosphorus acid compound, i.e. those components taught as essential by D1, resulted in significantly lowered viscosity and improved adhesion after retort treatment compared to a composition including these components.

It was further explained that the proportions of components (polyester polyol, isocyanate and, where used, anhydride) in the three experiments reported had been adjusted to ensure that the ratio of NCO/OH remained constant. This explained why the proportion of anhydride employed in the experiments submitted was not identical with that employed in the examples of D1.

It further was explained that in constructing these examples the aim had been to demonstrate the effect of those components required by D1 but excluded by the patent in suit, whilst otherwise operating according to the terms of the operative claims. This constraint meant that it was not possible to maintain the proportions reported in the example of D1, as was explained in the declaration.

The respondent/opponent disputed that the closest prior art was any particular example of D1, in particular composition C invoked by the appellant/patent proprietor, but instead submitted that the document D1 itself constituted the closest prior art. This document contained an example which did not disclose one value of the claim, i.e. the NCO ratio. However the general disclosure of the NCO/OH ratio in D1 - 0.5 to 2.0 - encompassed the range specified in the operative claims. In such a case it was not possible to argue that the selection of a specific sub-part of

this range was inventive.

The "Main Component C" of D1 constituted a modified polyester (i.e. modified with the anhydride). The phosphorus oxy acid compound served as a catalyst for curing the isocyanate, and consequently was encompassed by the operative claims. This component was however, according to the teaching of D1, present in an amount above the range specified for the catalyst in the operative claims. It was disputed that this difference gave rise to an inventive step.

The appellant/patent proprietor disputed that the claimed subject matter constituted a selection from the disclosure of D1. It was also disputed that the phosphorus oxy acid compound served as an isocyanate cure catalyst. Further it was objected that this issue had not previously been raised in the opposition and opposition/appeal proceedings. The respondent/opponent emphasised that D1 contained a specific example which had many features in common with the claimed subject matter. It was emphasised that the anhydride in D1 had reacted - i.e. was no longer present in the polyester as such but gave rise to a modified polyester. It was conceded that it had not been shown that the phosphorus oxy acid was a catalyst for the isocyanate curing. However it had not been shown that this small amount of this additional component gave rise to a technical effect and there were consequently no grounds for assuming this was the case. Regarding the relationship between the polyol and the epoxide it was submitted that according to D1 these were mixed at room temperature which demonstrated that both had

to be liquid. In particular it was emphasised that EPON 828, employed in "Main Component F" of D1 was a liquid.

With regard to D2, the respondent/opponent submitted this document which also related to adhesives, could alternatively be considered as the closest state of the art, reference being made to example 5, disclosing as the polyol bis-hydroxyethyl dimerate (dimerized linoleic acid endcapped with ethylene oxide). This compound was in the strict literal sense a polyester. This diol was reacted with bisphenol A epoxy resin and subsequently reacted with catalyst and combined with a filler. The resulting product was then reacted with isocyanate prepolymer, resulting in an isocyanate system based on liquid dimer polyester. The epoxide could be either liquid or solid. An isocyanate catalyst was also present. The difference compared to the claimed subject matter was that the filler and the epoxide were not further defined. The polyester polyol however had the required properties. Although D2 did not relate to retort properties it did relate to a solvent-free composition for adhering two substrates which composition had high heat resistance. Further it was appropriate to consider the technical problem not in the narrow terms of retort pouches but as relating generally to providing good film adhesion. The problem was to improve the adhesive to make it more stable. This problem was common to D1 and D2 which documents could consequently be combined to arrive at a filler free adhesive system.

The appellant/patent proprietor disputed this approach. With respect to example 5 of D2 it was not certain whether the diol was within the scope of the ester specified in the operative claims. The amount of catalyst was outside (higher) the range of the operative claims. Further it was not known whether the bisphenol A epoxide was liquid or solid. Thus there were many differences compared to the subject-matter of the operative claims.

- X. The appellant (patent proprietor) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the set of claims (1 to 12) and the adapted pages of the description submitted with the statement of grounds of appeal.

The respondent(opponent) requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. *Art. 123(2) and (3) EPC*
 - 2.1 The claims of the main request differ from the claims of the patent as granted in that features (I) and (II) of claim 1 are now specified as "consisting of" rather than "comprising" the specified components.
 - 2.2 No objection to this amendment pursuant to Art. 123(2) or (3) EPC has been raised by the respondent/opponent.

- 2.3 The discussion of features (I) and (II) in the original description is restricted solely to those components specified in the claims. In particular there are no statements indicating in a generalised, non-specific manner that other materials could be present. On the contrary the only statement relating generally to the constitution of features (I) and (II) is to be found at page 3, line 21 of the A-publication which discloses that neither of these requires a solvent, i.e. is of a restrictive nature in respect of the constituents thereof.
- Further the compositions employed in the examples contain only the components specified in the claims.
- 2.4 Consequently the Board is satisfied that the restriction imposed by amending "comprising" to "consisting of" in the present case does not add subject matter compared to the disclosure of the application as original filed.
- 2.5 Since the effect of the amendment is to restrict the scope of the claims to those components specifically mentioned, excluding other, not mentioned components, this amendment further does not entail any broadening of the scope of protection conferred by the claims.
- 2.6 Accordingly the Board concludes that the amendments undertaken meet the requirements of Art. 123(2) and (3) EPC.

3. *Art. 54 EPC*

No novelty objections were raised against the subject-matter of the operative claims.

Nor has the Board any objections of its own.

Consequently the claimed subject matter is held to be novel.

4. *The patent in suit, the technical problem*

4.1 The patent is directed to laminating adhesives for retort pouches, which adhesives are free or substantially free of organic solvents. It is explained that retort pouches for sterilizing food or medicinal substances are typically formed of two or more layers of polymeric film, the inner layer being food- or medicine compatible and heat sealable. A second layer is adhered to the outside of the inner layer to provide packaging strength (patent in suit, paragraphs [0001] to [0003]).

4.2 Thus the adhesive, as specified in operative claim 1 is a 100% solids two part adhesive composition whereby the first part consists of specified proportions by weight of:

- a hydroxyl terminated polyester, which is liquid at 20°C, and has a defined hydroxyl functionality and hydroxyl number;
- an epoxy resin which is solid at 20°C, having specified epoxy equivalent weight and hydroxyl number and which is dissolved in the polyester;
- a component identified as an "isocyanate cure catalyst" which can however be present in an amount of 0% by weight.

The second part consists of a multi-functional isocyanate having defined isocyanate functionality. This part is present in such an amount that the ratio of NCO functionality to hydroxyl functionality of the first component is from 0.9 to 3.0.

- 4.3 According to paragraph [0013] of the patent the adhesive sustains a good bond between polymeric materials at typical retort conditions, e.g. 121°C at 103 kPa for one hour.
- 4.4 In paragraph [0015] it is explained that an important advantage of the adhesives is that even at 100% solids the viscosities are low, typically 6000 cps or below at 25°C, or 950 cps or below at 50°C. In the following paragraph it is explained that low viscosity adhesives are advantageous compared to higher viscosity adhesives which first have to be heated to higher temperatures in order to obtain commercially acceptable (low) coating weights. It is explained that high viscosity adhesives entail a number of disadvantages, e.g. since further heating of urethane adhesives might lead to side reactions and evaporation of isocyanate and due to the possibility of misting of the adhesive on the roll at high running speeds.
- 4.5 The examples of the patent in suit provide a comparison between a composition containing all three specified polymeric components, i.e. polyester, epoxy and polyisocyanate (example 1) and a comparative composition from which the epoxy has been omitted (example 2). This evidence shows that the composition according to the claims exhibits better performance on retort treatment than the comparative composition, as

determined, after retort treatment, by improved bond strength and the absence of blistering.

4.6 Accordingly this evidence establishes that the problem as set out in the patent in suit is effectively solved by the claimed measures.

5. *The prior art*

5.1 D1, which was considered to represent the closest state of the art in the decision under appeal also relates to an adhesive composition for food packaging which provides bonds having very good bond strength, heat resistance and hot water resistance, especially between a metal foil and a plastic film (description, first paragraph). At page 8, lines 9-11 it is disclosed that the adhesive compositions of D1 can serve as composite laminate film adhesives in the manufacture of retortable food packaging materials, with particular reference to highly acidic foods.

According to page 2, line 28ff and claim 1 of D1 the adhesive comprises a polyisocyanate, a polyol, an oxy acid of phosphorus or derivative thereof, a carboxylic acid or anhydride and an epoxy resin.

The various components employed in the composition of D1 are discussed starting at page 2 line 37.

The polyol component, discussed starting at page 3 line 8 can be one having 2 to 6, preferably 2 to 4 functional groups. These polyol compounds can be selected from a range of classes of compounds including polyester polyols, polyether polyols, polyetherester polyols, polyesteramide polyols and acrylic polyols. D1 discloses that the adhesive can be employed as either a "one-can" or "two-can" formulation (page 4,

line 40ff). In the "two-can" type - discussed starting at page 4, line 56, the isocyanate component serves as the curing agent and the polyol forms the main component. These are mixed together just prior to use. The oxy acid of phosphorus or derivative thereof may be present in either of these components, although it is preferable to add this to the mixture of polyol, carboxylic acid or anhydride and epoxy resin. The two-can type adhesive generally provides higher curing speed and superior adhesion characteristics (page 5 lines 6-10).

At page 5 line 11ff it is taught that when the adhesive forming composition has a viscosity of 100-10,000 cps, preferably 100-5,000 cps in a temperature range of "ordinary" temperature to 140°C, preferably to 100°C it can be used without using any solvent. If the composition has a higher viscosity then it may be diluted with an organic solvent.

Of the examples of D1 only two, examples 5 and 9, employing "Main Component C" and "Main Component F" respectively relate to solventless compositions (cf D1, page 6 lines 7-15 and 30-35 respectively).

The polyester employed in "Main Component C" - designated "Polyol B" - is stated to have a molecular weight of about 2,500 (D1, page 6 line 7). However the hydroxyl functionality and hydroxyl number of this polyester are not disclosed. In any case, prior to combining this with the other components of the adhesive formulation it is reacted with phthalic anhydride (D1, page 6 lines 11 and 12). The properties of the resulting product are not disclosed and it has not been shown that these can be calculated from the information that is provided in D1.

The resulting product is then combined with Epikote

1002 (a solid epoxy resin which is also employed in the examples of the patent in suit) and phosphoric acid. In the adhesive composition of Example 5 this "Main Component C" is combined with "Polyisocyanate D"- a trimer of hexamethylene diisocyanate (D1, page 6, line 55ff and Table 1).

However the ratio of NCO/OH groups is not disclosed, nor has it been shown that this can be calculated from the data given in D1 (see above re nature of the polyester component).

The other solventless composition - that of example 9, derived from "Main Component F" employed "Epikote 828", which, it was submitted by the appellant/patent proprietor at the oral proceedings before the Board is a liquid epoxy resin.

The data of Table 3 of D1 show that the adhesive of example 5 demonstrates good resistance to retort sterilisation, and does not undergo delamination. Consequently D1 is concerned with the same technical field as the patent in suit, i.e. retortable pouches for food use and also addresses the same problem as the patent in suit, i.e. the provision of retortable compositions (D1, col. 1, lines 25-28 and 30).

It furthermore lies closer to the claimed subject-matter than the comparison offered in the examples and comparative examples of the patent in suit (effect of the presence of the epoxide).

- 5.2 D2 also relates to an adhesive composition based on a polyol, an epoxide and an isocyanate compound. According to the first paragraph of D2 the aim is to provide adhesives which give fast curing bonds of high adhesiveness and having high heat resistance. According to col. 1 lines 33 to 42 and col. 4 lines 13ff these

are in particular useful for bonding sheet moulding compounds.

The adhesives can be formulated as two component systems (col. 1 lines 52-54).

The polyol compound can be *inter alia* a polyester polyol (col. 2 lines 6 to 42, in particular lines 41 and 42),

The emphasis is however on polyhydroxy polyethers (col. 2 lines 28ff). In the examples however either polyether polyols or dimerized linoleic acid capped with ethylene glycol are employed.

It is not disclosed that the diol compound is liquid at 20°C.

The epoxy resin, discussed in the description starting at col. 2 line 45, is not required to be solid at 20°C. In the examples it is not disclosed whether the epoxide is solid or liquid.

The claims of D2 do not specify the ratio of hydroxy groups to isocyanate groups.

In contrast to D1, D2 is not concerned with pouches for foods or medicines and does not contain any discussion of retortable compositions.

6. *The closest prior art*

6.1 As follows from the foregoing section, the only document which addresses the same technical field, and the same problem within that technical field as the patent in suit is therefore D1 (see section 5.1, above).

6.2 The argument of the respondent/opponent that D2 could be regarded as an alternative closest state of the art and that the technical problem should thus be formulated in terms of improving adhesion of solvent

free adhesives to various substrates, also at elevated temperatures (section VI.(b), above), is not convincing for the following reasons:

- 6.2.1 D2, although it does refer to the provision of adhesives providing bonds having high heat resistance, e.g. at 400°F or higher (col. 1 line 33), does not specify the further conditions under which this heat resistance is to be exhibited.
- 6.2.2 In particular it contains no reference - either explicit or implicit - to retort pouches or retort conditions.
- 6.2.3 On the contrary, the focus of D2 is on providing adhesives for a different field of application, namely sheet moulding compounds (col. 1, lines 35-40 and col. 4 lines 13-21). Consequently D2 fails to mention even in principle the crucial technical effect underlying the patent in suit.
- 6.2.4 Thus in view of the specific teaching and evidence of the examples of the patent in suit (reported in section 4, above) there is no justification for construing the technical problem more broadly e.g. as to provide good film adhesion in general with no reference to the specific problem of retort pouches, as canvassed by the respondent/opponent at the oral proceedings (see section IX.(b), above).
- 6.3 Accordingly, the Board is satisfied that the decision under appeal was correct in identifying D1 as the closest prior art.
The most relevant teaching of this document is

Example 5 (see section 5.1, above).

7. *The technical effect compared to the teaching of D1*

In the course of the appeal proceedings the appellant/patent proprietor provided two sets of experimental data intended to take account of the disclosure of D1.

7.1 Together with the statement of grounds of appeal a report was submitted in which, it was stated example 5 of D1 had been repeated i.e. an adhesive based on "Main Component C" of D1 (see sections V.(a) and (c), above). As a comparison a composition was prepared based on this example of D1, however omitting the following components:

- phosphoric acid;
- the anhydride and
- the silane coupling agent (which component is not a mandatory component of D1 and consequently is not part of the invention thereof).

This results showed that the effects of omitting the indicated components were:

- a significant reduction in viscosity;
- a slight decrease in adhesion before retort treatment; and
- an increase in adhesion after retort treatment.

However since the hydroxyl number and hydroxyl number of the polyester employed in the experiments has not been reported, it has not been shown that this polyester corresponds to that of the operative claims. Further, it is not reported whether this is liquid at

20°C. It has also not been shown that the ratio NCO/OH of the composition was within the scope of the claims. Consequently all that this report establishes is that when working generally according to the example of D1 but omitting certain of those components disclosed therein as essential, in particular the anhydride and the phosphoric acid, an improvement in the adhesion properties after retort is obtained. These data however provide no information about compositions employing the components as specified according to the operative claim and hence do not constitute a relevant comparison with the patent in suit or therefore demonstrate a relevant technical effect.

7.2 In the second experimental report, submitted with the letter of the appellant/patent proprietor of 3 November 2009 (see section VIII, above) compositions employing *inter alia* a polyester polyol corresponding to the specification of part I) A) of operative claim 1 were prepared.

7.2.1 These experiments were summarised in a table:

Appendix 3

	Polyester Polyol	Phthalic Anhydride	H3PO4	EPON 1002F	viscosity of polyol mixture @ 20C	polyisocyanate 21% NCO	NCO/OH ratio	Adhesion before retort test	Adhesion after retort test
Experiment 3	40g	5g	0.1g	10g	14,820cps	42g	1.3	874 g/in film tear	288 g/in
Experiment 4	40g	5g	0g	10g	14,820 cps	42g	1.3	1215 g/in film tear	206 g/in, adhesive split
Experiment 5	40g	0g	0g	10g	4,950cps	50g	1.3	779 g/in, film tear	595 g/in, film tear

Thus "Experiment 3" was intended to represent a repetition of "Main Component C"/example 5 of D1 however employing a polyester within the scope of

operative claim 1, and excluding the silane coupling agent.

"Experiment 4" was designed to demonstrate the effect of omitting the phosphoric acid whilst retaining the phthalic anhydride, while "Experiment 5" was intended to demonstrate the effect of omitting both the anhydride and the phosphoric acid, i.e. corresponded to the subject-matter of the operative claims.

All examples reported in the declaration employed a ratio of NCO/OH of 1.3 which, as explained in paragraph 3 of the declaration meant that different mass amounts of NCO were required in each composition.

Further, as submitted at the oral proceedings (see section IX.(b), above) the amount of anhydride employed was stated to have been calculated to ensure maintenance of an OH/NCO ratio within the scope of the operative claims.

7.2.2 According to Art. 56 EPC, as applied in T 35/85 of 16 December 1986 (not published in the OJ EPO) an applicant or patent proprietor can discharge the onus of proof by voluntarily submitting comparative tests with newly prepared variants of the closest state of the art making identical the features common with the invention in order to have a variant lying closer to the invention so that the advantageous effect attributable to the distinguishing features of the invention is thereby more clearly demonstrated (T 35/85 Reasons 4).

7.2.3 Accordingly these examples correspond to the construction considered in T 35/85 since these constitute a "hybrid" between the teaching of the patent in suit and that of D1. Specifically they employ

some parameters required by the patent in suit, notably the properties of the polyester and the OH/NCO ratio, while incorporating those components of D1 which are excluded from the present claims, but presented in D1 as essential to the invention thereof.

The evidence of these data is that the compositions containing one or both of the components required by D1 but excluded by the present claims (i.e. experiments 3 and 4) exhibit significantly worse, i.e. higher viscosity than that according to the operative claims. Regarding the adhesion, it is apparent that the initial adhesion, i.e. prior to retort testing is lower for the composition according to the present claims than for the compositions containing one or both of the additional components required by D1. However after retort treatment the adhesion of the composition according to the operative claims is superior to that of either of the comparative compositions.

- 7.3 This evidence therefore establishes that adhesive compositions according to the operative claims, i.e. containing the specified hydroxyl terminated polyester but omitting those components taught as essential in D1 exhibit superior resistance to retort conditions than compositions containing the same polyester together with those essential components taught by D1.

8. *The objective technical problem, its solution*

In view of the foregoing analysis, the objective technical problem with respect to closest prior art D1 can be formulated, as in the patent in suit, as being the provision of improved adhesives for retortable pouches, in particular in that said adhesives exhibit

improved resistance to retort conditions.

This problem was solved according to the operative claims by means of the adhesive composition as claimed.

9. *Obviousness*

9.1 As explained above, D1, both in the specific examples, in particular example 5 and in its more general teachings fails to disclose:

- the required ratio of NCO/OH groups;
- the required properties of the polyester.

Further in contrast to the claims of the patent in suit the compositions of D1 contain as mandatory components compounds which are excluded from the operative claims, namely:

- a carboxylic acid or anhydride thereof and
- a phosphorus oxy acid,

whereby the first of these would no longer be present *per se* in the adhesive composition but would result in modification of the polyester thereof.

Accordingly there was no teaching in D1 which would have led the skilled person to select the claimed combination of components for any reason, let alone specifically to solve the objective technical problem. Further it would be inconsistent with the teaching of D1 to discard part of the core teaching thereof, namely the mandatory presence of the phosphorus oxy acid compound and the anhydride.

It is therefore concluded that the subject-matter claimed is not obvious in the light of the teachings of D1.

9.2 Even a combination of the teachings of D2 and D1 as canvassed by the respondent/opponent (see sections VI.(b) and IX.(b), above) would not lead to the claimed subject matter.

As explained above, the emphasis of D2 is on adhesives for sheet moulding compounds. There is no discussion in D2 of adhesives for retortable pouches in general or of improving resistance to retort conditions in particular. Hence in a first step it is not even apparent that the skilled person would necessarily have considered the teachings of D2 in the light of the problem underlying the patent in suit. In any case, D2 does not disclose the components of the adhesives as required by the operative claims. Even if the skilled person would have nevertheless considered the teachings of D1 and D2 in combination it would have been necessary to import selectively certain of the teachings of the examples of D1 into D2, e.g. the nature of the epoxide compound. However this would not have provided the necessary polyester compound, nor the ratio of the OH/NCO. Further such a step would still have necessitated discarding an essential part of the teaching of D1 (the presence of the anhydride and the phosphorus oxy acid).

9.3 It is therefore concluded that the subject matter of the operative claims meets the requirements of Art. 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the following basis:
 - claims 1 to 12 filed with the statement of grounds of appeal,
 - description page 2 filed with the statement of grounds of appeal, and
 - page 3 of the patent specification.

The registrar:

The Chairman:

E. Görgmaier

R. Young