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Datasheet for the decision of 28 January 2015

Case Number: T 2107/11 - 3.3.03

Application Number: 05850479.6

Publication Number: 1838750

IPC: C08G59/56, C08G59/62, C08G59/18

Language of the proceedings: EN

Title of invention:
COATING SYSTEM

Patent Proprietor:
Huntsman Advanced Materials (Switzerland) GmbH

Opponent:
Momentive Specialty Chemicals Research Belgium

Headword:

Relevant legal provisions:
EPC Art. 56, 114(2)

Keyword:
Inventive step - (yes) (Main request)
Late-filed document - admitted
(no) (not prima facie highly relevant)

Decisions cited:
T 1002/92

Catchword:

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Case Number: T 2107/11 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 28 January 2015

Appellant: (Opponent)	Momentive Specialty Chemicals Research Belgium Avenue Jean Monnet 1 1348 Ottignies Louvain-la-Neuve (BE)
Respondent: (Patent Proprietor)	Huntsman Advanced Materials (Switzerland) GmbH Klybeckstrasse 200 4057 Basel (CH)
Representative:	Bohest AG Holbeinstrasse 36 4051 Basel (CH)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 28 July 2011 concerning maintenance of the European Patent No. 1838750 in amended form.**

Composition of the Board:

Chairman	O. Dury
Members:	M. C. Gordon
	C. Vallet

Summary of Facts and Submissions

I. The appeal lies from the interlocutory decision of the opposition division posted on 28 July 2011 according to which European patent number EP-B1-1 838 750 (granted on European patent application number 05850479.6, derived from international application number PCT/EP2005/057055, published under the number WO 2006/067195) could be maintained in amended form on the basis of the main request.

II. The patent was granted with a set of 14 claims, whereby claims 1 and 14 were independent and read as follows:

"1. A curable composition comprising a) an epoxy resin containing on average more than one epoxy group per molecule, and b) as curing agent a hybrid hardener, whereby said hardener is a blend of b1) an aminic compound selected from aliphatic, cycloaliphatic, araliphatic amines, imidazoline group-containing amidoamines based on mono- or polybasic acids, adducts of said amines or amidoamines made from cyclic carbonates, whereby said aminic compound contains, on average per molecule, at least two reactive hydrogen atoms bound to nitrogen atoms, and b2) a polyphenol novolac, and wherein the polyphenol novolac is used in an amount of from 30% to 45% by weight, based on the total weight of the hardener blend b1) and b2).

14. Use of a hardener blend b) as curing agent, whereby said hardener is a blend of b1) an aminic compound selected from aliphatic, cycloaliphatic, araliphatic amines, imidazoline group-containing amidoamines based on mono- or polybasic acids, adducts of said amines or amidoamines made from cyclic carbonates, whereby said aminic compound contains, on average per molecule, at

least two reactive hydrogen atoms bound to nitrogen atoms, and b2) a polyphenol novolac, and wherein the polyphenol novolac is used in an amount of 30-45 wt%, preferably from 35-45 wt%, based on the total weight of hardener blend comprising components b1) and b2)."

Claims 2-11 were dependent claims directed to preferred embodiments of the composition of claim 1.
Claim 12 was directed to a cured material derived from the composition of any of claims 1-11. Claim 13 was directed to the use of a composition according to any of claims 1-11 to provide coatings and adhesives.

III. A notice of opposition against the patent was filed on 12 May 2009 in which revocation of the patent on the grounds of Art. 100(a) EPC (lack of novelty, lack of inventive step) was requested.
Inter alia the following documents were cited in support of the opposition:

D3: US-B1-6 649 729
D6: EP-A-0 253 339

IV. The decision of the opposition division was based on a set of claims forming a main request, filed by telefax of 5 October 2009.
Claims 1 and 14 differed from claims 1 and 14 of the patent as granted in that the phrase
"and wherein the hardener is liquid at a temperature of 20 +/- 5°C"
was introduced at the end.

V. According to the decision, the main request met the requirements of Art. 123(2) and (3) EPC as well as Rule 80 EPC.

Regarding Art. 54 EPC, *inter alia* the claimed subject-matter was distinguished from the disclosure of D3 by the definition of the minimum amount of novolac present in the hardener blend.
The closest prior art was represented by the teaching of D3.
Based on the data of the examples of the patent, the technical problem was to improve the chemical resistance to dilute acids.
The claimed solution to said problem was not obvious because D3 provided no incentive to provide hardeners having a novolac content in the claimed range. D6 did not address the problem of increasing chemical resistance. Therefore, the patent was to be maintained in amended form according to the main request.

VI. On 27 September 2011 the opponent lodged an appeal against the decision, the prescribed fee being paid on the same date.

VII. The statement of grounds of appeal was submitted on 22 November 2011. It was requested that the decision of the opposition division be set aside and that the patent be revoked in its entirety.

A further document:
D7: US—4 454 265
was cited.

VIII. The patent proprietor - now the respondent - replied on 11 April 2012 and requested the dismissal of the appeal (main request). 10 sets of claims forming 1st-10th auxiliary requests were submitted.

IX. On 7 October 2014 the Board issued a summons to attend oral proceedings.

X. In a communication dated 15 October 2014 the Board set out its preliminary opinion on the case.
Inter alia it was observed that the Board interpreted the appellant's submission on novelty to the extent that the findings of the decision under appeal were not disputed.

XI. By letter of 18 December 2014 the appellant/opponent confirmed that novelty was not challenged.
It was also stated that the appellant would not be represented at the oral proceedings.

XII. By letter of 19 January 2015 the respondent/patent proprietor amended the auxiliary requests such that the previously filed second and third auxiliary requests became the first and second auxiliary requests, and were attached as annexes. All other auxiliary requests were withdrawn.

XIII. Oral proceedings were held on 28th January 2015.

XIV. The arguments of the appellant can be summarised as follows:

The problem to be solved by the patent in suit was as set out in paragraphs [0002] and [0003], i.e. to provide hardeners for epoxies which exhibited a rapid curing rate especially at low temperatures while maintaining or even improving the chemical resistance of the cured compositions. According to claim 1 cyclic carbonates could be part of the hardener composition.

The patent explained that the cyclic carbonate reduced

the crosslink density, which could lead to lower chemical resistance. Therefore, cyclic carbonates did not provide a solution to the problem set out in the patent.

The closest prior art was D3, the technical problem of which was related to that of the patent in suit, i.e. the acceleration of amine/epoxy curable compositions to achieve good cure at low temperature.
The solution of D3 was to use an amine and phenolic resins as hardener compositions.
The difference between D3 and the claimed subject-matter was the amount of phenolic resin used.

D7 taught epoxy-phenolic coatings designed for the interior of food and beverage containers. The document taught that levels of phenolic resin of 30-45 wt% resulted in an increase in resistance to acid food i.e. resistance to acetic acid. The combination of D3 and D7 rendered the claimed subject-matter obvious.

D6 addressed the problem of low temperature curing of epoxy systems and was directed to a curable epoxy system with an amine and containing a cyclic carbonate or the adduct of an amine and the carbonate. It was already known that the presence of phenolic compounds e.g. Mannich bases accelerated the curing of epoxy systems. Thus the combination of D3 and D6 also rendered the claimed subject-matter obvious.

XV. The arguments of the respondent can be summarised as follows:

As shown in Tables 12, 13 and 14-17 of the patent the specified content of polyphenol novolac resulted in improved chemical resistance compared to compositions

containing 25 wt% polyphenol novolac, i.e. the upper limit disclosed in D3.

D3 taught away from the claimed amount of novolac. Further D3 did not address the objective problem underlying the patent, hence it was questionable if the skilled person would even consult D3.

D6 was silent with respect to the amount of polyphenol novolac and also did not address the problem of chemical resistance. Hence a combination of D3 and D6 would not lead to a finding of obviousness

Regarding adducts of amines and cyclic carbonates it was required that the adduct be formed before curing, either by preparing the adduct in advance or by *in situ* reaction. The data of Table 3, entries 1-3, Table 6, entries 4, 5 and all entries of Table 8 showed that the speed, and hence extent of curing was identical whether or not an adduct was employed and was not influenced by the manner of incorporation of the adduct, i.e. whether preformed or formed *in situ*. The identical progress of curing implied identical corrosion resistance of the resulting cured compositions. There was no data showing that the adducts did not solve the problem compared to the closest prior art. In particular, no data in this respect had been advanced by the appellant.

The late filed D7 was not *a priori* relevant. *Inter alia* it did not relate to chemical resistance as considered in the patent in suit, did not involve an aminic compound as defined in the operative claims and related to different coatings, namely high temperature curing aqueous systems. Consequently it should not be admitted to the procedure.

XVI. The appellant (opponent) requested in writing that the decision under appeal be set aside and that the European Patent number 1 838 750 be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed, or, in the alternative, that the patent be maintained in amended form on the basis of one of the first or second auxiliary requests, as annexed to the letter dated 19 January 2015.

Reasons for the Decision

1. The appeal is admissible.

2. Main request

2.1 Art. 54 EPC

As derivable from the statement of grounds of appeal (section 2. Novelty, last sentence of first paragraph) and explicitly confirmed by the appellant (section XI) novelty has not been challenged. The Board sees no reason to deviate from that view.

2.2 Art. 56 EPC

2.2.1 Closest prior art

The patent in suit relates, according to paragraphs [0001]-[0003], to curable coating compositions for use in the fields of civil engineering, marine architectural and maintenance.
In particular the patent is directed to compositions which provide a very fast cure rate even at temperatures close to 0°C e.g. 3°C and which result in

coatings which are toxicologically safe (paragraphs [0006] and [0007]).

Such compositions are known from D3 which discloses curable mixtures comprising one or more epoxy resins, one or more hardeners selected from amines, imidazoline group containing aminoamides and their adducts with glycidyl compounds, a phenolic compound (novolac) as accelerator and optionally solvents, fillers etc. The list of amine hardeners given in D3 at column 2 line 63 to column 3 line 2 corresponds broadly to the list of amines specified in operative claim 1.
The phenolic compounds (novolacs) are employed, according to the claims and examples of D3 in an amount of 1-25% by weight based on the hardener.

According to the introduction of D3 the compositions are used in industry for coating and improving metallic and mineral surfaces, which technical field corresponds to that set out in the introduction of the patent in suit.
Furthermore D3 teaches that the novolac accelerating agents are unaffected by water.
The problem addressed by D3 is to provide rapid curing (column 1, lines 18-22), whereby toxicological properties are also of concern (column 1, lines 49-60).
Corrosion resistance is not addressed in D3.
By common consent among the parties, and in the view of the opposition division, the closest prior art is represented by the teaching of D3.
The Board can identify no grounds for disagreeing with this assessment.

2.2.2 The technical problem to be solved.

According to paragraph [0007] of the patent and the

submissions of the respondent, the problem to be solved is to provide fast epoxy systems which have a good cure speed at low temperatures - as low as 3°C - and are toxicologically safe, i.e. low amine content. Furthermore according to paragraph [0008] of the patent it is required that the cured compositions exhibit good corrosion or chemical resistance towards dilute acids like acetic acid.

2.2.3 The solution to the problem

The problem is solved by the provision of a curable composition according to operative claim 1 and/or by the use of a hardener blend according to operative claim 14.

The subject-matter claimed differs from that disclosed in D3 by the defined content of polyphenol novolac with respect to the hardener blend, being 30-45% by weight according to the operative independent claims, compared to 1-25 % by weight based on the hardener according to D3.

2.2.4 Success of the solution

(a) The examples presented in Tables 12-15 of the patent relate to curable systems consisting of an epoxy resin (Araldite GY250), an amine hardener (either m-xylylenediamine (MXDA) or trimethylhexamethylenediamine (TMD)) and a polyphenol based novolac resin (Supraplast 3616) in an amount of either 25 wt% (Tables 12, 13), corresponding to the teaching of D3 or 41 wt% and 40 wt% (Tables 14, 15), corresponding to the subject-matter of the operative independent claims:

Table 12: Chemical resistance of MXDA containing 25 wt% novolac resin Supraplast 3616

Epoxid / Hardener	Araldite GY250: MXDA/Supraplast				75/25:		80.43 p. / 19.57 p.									
Duration (d, w,m)	1d	3d	1w	2w	1m	2m	3m	4m	5m	6m	7m	8 m	9m	10m	11	12
$C_6H_4(CH_3)_2$	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
C_2H_5OH 95%	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
CH_3COOH 10%	■	■	⌘	⌘	⌘	⌘	□	□	□	□	□	□	□	□	□	□
CH_3COOH 5%	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 13: Chemical resistance of TMD containing 25 wt% novolac resin Supraplast 3616

Epoxid / Hardener	Araldite GY250: TMD / Supraplast				75/25:		77.74 p. / 22.26 p.									
Duration (d, w,m)	1d	3d	1w	2w	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11	12m
$C_6H_4(CH_3)_2$	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
C_2H_5OH 95%	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
CH_3COOH 10%	⌘	⌘	⌘	□	□	□	□	□	□	□	□	□	□	□	□	□
CH_3COOH 5%	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘

Table 14:

Chemical resistance of MXDA containing 41 wt% novolac resin Supraplast 3616																
Epoxid / Hardener	Araldite GY250: MXDA/Supraplast				59/41:		76.36 p. / 23.64 p.									
Duration (d, w,	1d	3d	1w	2w	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m
$C_6H_4(CH_3)_2$	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
C_2H_5OH95%	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
CH_3COOH 10%	■	■	■	■	■	■	⌘	□	□	□	□	□	□	□	□	□
CH_3COOH 5%	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 15:

Chemical resistance of TMD containing 40 wt% novolac resin Supraplast 3616																
Epoxid/ Hardener	Araldite GY250: TMD / Supraplast 3616					60/40:			73.64 p. / 26.36 p.							
Duration (d, w, m)	1d	3d	1w	2w	1m	2m	3m	4m	5m	6m	7m	8m	8m	10m	11m	12m
$C_6H_4(CH_3)_2$	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
C_2H_5OH 95%	■	■	■	■	■	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘	⌘
CH3COOH 10%	■	■	■	■	■	■	⌘	⌘	□							
CH3COOH 5%	■	■	■	■	■	■	■	■	■	■	■	⌘	⌘	⌘	⌘	⌘

coating surface is either ■ = resistant to, ⌘ = attacked by, or □ destroyed by the chemical

These data demonstrate that with hardener blends containing polyphenol novolac at levels within the scope of the claims, namely 40 wt% (Table 15) or 41 wt% (Table 14) the resistance of the coatings

cured at 23°C (cf. paragraph [0069] of the patent in suit) to solvents, in particular dilute acetic acid is improved compared to otherwise identical compositions however containing the polyphenol novolac at the level of 25 wt% (Tables 13 and 12 respectively), i.e. corresponding to the maximum permitted according to D3.
These data show that, depending on the amine employed, resistance to ethanol is also improved.

Regarding the embodiment "adducts of said amines or amidoamines made from cyclic carbonates", which has been specifically addressed by the appellant (see section XIV, above), no evidence has been advanced that such compositions would not solve the above technical problem.

On the contrary, Table 8 of the patent demonstrates compositions employing such carbonate adducts of amines:

Table 8: Properties of a preliminary modified (pre-reacted) hybrid hardener MXDA/TMD with propylene carbonate and further blended with Supraplast 3616 compared to an unmodified hybrid hardener MXDA/TMD/Supraplast 3616 combined with GY 250 or a mixture of GY 250 with propylene carbonate.

Formulation	6	7	8	9	10	11	12	13
Epoxy resin mixture: AralditeGY 250 / propylene carbonate [97.3/2.7][1)]	---	---	78.19	78.19	---	---	---	---
Epoxy resin mixture: AralditeGY 250 / propylene carbonate [95/5][1)]	---	---	---	---	74.24	74.24	---	---
Ep resin AralditeGY 250[1)]	75.12	75.12	---	---	---	---	77.81	77.81
Hardener G[1)]	24.88	24.88	---	---	---	---	---	---
Hardener H[1)]	---	---	21.81	21.81	22.76	22.76	22.19	22.19
Solvent mixture 1-butanol: xylene 4: 1[1)]	---	8.40	---	6.00	---	5.60	---	8.32
Viscosity of formulation at 25°C[2)]	12300*	1020	4300	1040	3200	1030	7600	1280
Cure properties								
Full cure at 0°C (hours)[3)]	4	10	5	8	5	8	4	6
Dust free at 0°C (hours)[4)]	4	9	5	6	5	7	4	6
Full cure at 5°C (hours)[3)]	3	7	4	6	3	6	3	5

According to example 6 a composition based on Araldite GY-250 and an adduct hardener, designated "G" which is the reaction product of 90 wt% MXDA, 10 wt% TMD and propylene carbonate which adduct is blended with 30 wt% Supraplast 3616 is employed (as explained in paragraph [0063] and Table 7 of the patent in suit). Example 12 reports a substantially identical composition in which

however the hardener, designated "H" is not an adduct but a blend of 90 wt% MXDA and 10 wt% TMD, i.e. the same proportions as employed in the preparation of Hardener G, and 35 wt% of Supraplast 3616. The results show that the speed of curing and hence by implication the extent of curing is largely unaffected when the amines are in the form of such adducts as compared to being present as free amines.
Examples 8-11 of Table 8 further demonstrate compositions whereby the epoxy resin is blended with propylene carbonate and the hardener blend H with the result that the adduct corresponding to that employed in example 6 is formed *in situ* upon mixing. Comparison of the results of examples 8-11 with those of examples 6 and 7 in which the amine hardener adduct is formed in advance shows that the progress of the curing, as indicated by the time to full cure, dust free time and full cure time is essentially unaffected by the mode of preparation of the adducts.

The patent states at page 11 lines 1-2 that the modification of adding the monofunctional carbonate could reduce somewhat the crosslinking density of the system, which could lead to reduced chemical resistance. However there is no evidence that this is the case in general. Furthermore no evidence has been advanced to demonstrate that, even if the chemical resistance were to be so reduced the reduction would be such that there would be no improvement compared to compositions containing the polyphenol novolac in amounts of 25 wt%, the maximum disclosed in the closest prior art D3.
Consequently the Board has no grounds for

concluding, as urged by the appellant/opponent, that the embodiment whereby adducts of amines and carbonates are employed as the hardener would not solve the technical problem defined above.

(b) The operative independent claims cover, in addition to the embodiments discussed above, a large number of different classes of aminic compounds, whereas the examples demonstrate two amines only (and carbonate adducts thereof). However in the absence of any evidence to the contrary, there is no reason to consider that the technical problem identified above is not solved on the whole scope of the claims, in particular for the other amines specified in feature b1) of operative claims 1 and 14.

(c) In the light of these data the problem effectively solved compared to D3 can be formulated as to provide cured compositions with improved corrosion resistance to acidic media.

2.2.5 Obviousness

D3 refers in the introductory paragraph generally to the problem of "improving" surfaces without specifying the nature of the improvement. As noted above, corrosion as addressed by the patent in suit is not discussed in D3.

Consequently D3 itself does not provide any pointers to solving the problem of improving resistance to acidic media in general. Furthermore, D3 does not provide any incentive to employ phenol novolacs in the amounts according to the operative claims for any other reason.

Therefore, in the light of the teaching of D3 the subject matter claimed, as a solution to the problem of providing a curable composition (claim 1) or the use of the defined hardener blend (claim 14) for increasing the resistance of the coating materials to acidic media, does not emerge in an obvious manner.

2.2.6 Regarding the obviousness of said solution specifically with respect to the adducts of cyclic carbonates, the appellant had invoked D6 in combination with D3. D6 addresses cyclic carbonates as components of curable epoxy systems. The compositions and curing systems of D6 however differ from those according to the operative independent claims because they do not employ novolacs as curing agents. Furthermore D6 addresses a different problem to the patent in suit in namely the problem of improving the interlayer adhesion of the coatings, which is achieved, according to the teaching of D6 by including the cyclic carbonate.
D6 thus relates to a different technical problem and to different compositions to the patent in suit and D3.

Consequently the combination of D6 and D3 cannot provide any pointers to the claimed solution to the technical problem solved with respect to D3.

2.2.7 Objection raised on the basis of the combination of D3 and D7

Admissibility of D7 to the procedure:

(a) Document D7 was invoked for the first time with the statement of grounds of appeal.

The appellant provided no justification for filing

the document at this late stage of the procedure.

(b) Pursuant to the pertinent case law, in particular decision T 1002/92 (OJ EPO 1995, 605) evidence filed in appeal proceedings which goes beyond that presented with the notice of opposition should only be admitted if such new evidence is *prima facie* highly relevant to the extent that it can reasonably be expected to change the eventual result and prejudice maintenance of the contested patent.

(c) D7 relates according to the abstract and to paragraphs [0001] and [0002] to thermosetting aqueous compositions for coating of food and beverage containers. The problem which D7 addresses is, according to lines 26-29 of column 1, that known thermosetting aqueous compositions based on amine-functional epoxy resin and phenoplast curing agent lack uniformly fine particle size and have unfavourable coating rheology for roll coat applications.
The epoxy resin employed in D7 is an adduct of a diglycidyl ether of a bisphenol adducted with a diprimary amine having a single secondary amine group. A phenol-formaldehyde resin curing agent is employed as the hardener. According to the example curing is effected by baking the composition at 350-400°F (177-204°C) for 10-15 minutes, as compared to curing for a time measured in hours or days at temperatures of 0°C or 3°C as set out in paragraphs [0006] and [0007] and demonstrated by the examples of Table 6, or at 23°C as employed for the examples of tables 12-15 of the patent in suit.

Consequently D7 relates to
- a different type of composition
- for different use
- curable under different conditions to the compositions of the patent in suit
- addresses a different problem to the patent in suit
- employs a different curing agent to that specified in operative claim 1.

(d) Under these circumstances D7 is not *prima facie* highly relevant in the sense of T 1002/92.

Consequently D7 is not admitted to the proceedings (Art. 114(2) EPC).

2.2.8 The conclusion is thus that the independent claims of the main request, and therefore the claims depending thereon, satisfy the requirements of Art. 56 EPC.

3. The main request of the respondent/patent proprietor is therefore allowable with the consequence that the appeal of the opponent is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

B. ter Heijden O. Dury

Decision electronically authenticated