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**Datasheet for the decision  
of 10 June 2010**

**Case Number:** T 0401/06 - 3.3.05

**Application Number:** 00941998.7

**Publication Number:** 1114004

**IPC:** C04B 28/02

**Language of the proceedings:** EN

**Title of invention:**

Concrete admixture

**Patentee:**

Construction Research & Technology GmbH

**Opponent:**

BK Giulini GmbH

**Headword:**

Concrete accelerator/CRT

**Relevant legal provisions:**

EPC Art. 54, 56, 84, 123(2), 108

EPC R. 99

**Keyword:**

"Admissibility of the appeal: yes"

"Admissibility of a new claims request filed at the oral proceedings in the absence of the other party: yes"

"Added subject-matter: no"

"Clarity and support by the description: yes"

"sufficiency of disclosure: yes"

"Novelty: yes"

"Inventive step: yes - evidence for a particular effect in the application"

**Decisions cited:**

T 0133/92, T 0771/92, T 0414/94

**Catchword:**

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Case Number: T 0401/06 - 3.3.05

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.05  
of 10 June 2010

**Appellant:** BK Giulini GmbH  
(Opponent) Giulini Str. 2  
D-67065 Ludwigshafen (DE)

**Representative:** -

**Respondent:** Construction Research & Technology GmbH  
(Patent proprietor) Dr.-Albert-Frank-Strasse 32  
D-83308 Trostberg (DE)

**Representative:** -

**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
7 February 2006 concerning maintenance of  
European patent No. 1114004 in amended form.

**Composition of the Board:**

**Chairman:** G. Raths  
**Members:** B. Czech  
C. Vallet

## Summary of Facts and Submissions

- I. The appeal is from the decision of the opposition division concerning maintenance of European patent No. 1 114 004 in amended form.
- II. In the contested decision the opposition division found that the patent as amended according to the main request then on file met the requirements of Articles 123(2) and (3), 83 and 84 EPC and that the claimed subject-matter was novel and inventive in view of the cited prior art, which included the following documents:

D1: EP 0 946 451 B1,

D5: "Grundlagen, Rohstoffe und Rezepturen", 1991, Verlag für chem. Industrie, H. Ziolkowsky KG, Augsburg; pages 166 and 167, and

D6: EP 0 812 812 A1.

Independent claims 1 and 8 (filed with letter dated 20.07.2004) according to the main request allowed by the opposition division read as follows (**amendments** to the claims as granted emphasised by the board):

- "1. An accelerating admixture for sprayed concrete, comprising*
- (a) the reaction product of aluminium hydroxide with an organic acid;*
  - (b) aluminium sulphate; and*
  - (c) at least one alkanolamine,*

**wherein the admixture has the following composition, given as percentages by weight:**

<b>C<sub>1</sub>-C<sub>6</sub> alkanolic acid</b>	<b>1-10</b>
<b>aluminium hydroxide</b>	<b>1-30</b>
<b>aluminium sulphate</b>	<b>30-60</b>
<b>alkanolamine</b>	<b>0.1-12</b>
<b>water</b>	<b>to 100%"</b>

*"8. A layer of hardened concrete applied by spraying to a substrate via a nozzle, hardening having been accelerated by the addition at the nozzle of an accelerating amount of an accelerating admixture according to any one of claims 1-4."*

III. In its statement of grounds of appeal the appellant expressed reservations concerning the clarity of the terms "aluminium hydroxide" and "aluminium sulphate" without, however, giving a reasoned argumentation. It maintained its request for revocation of the patent on the ground that subject-matter of claim 1 held allowable by the opposition division lacked novelty and was not inventive. In support of its argumentation, it relied on documents D1, D5, D6, on the further document

D7: DE 196 25 853 A1,

and on a table schematically showing the chemical reactions allegedly occurring in aqueous systems comprising compounds respectively mentioned as components in the patent in suit, in document D1 and in document D7.

IV. In its reply, the respondent argued that the appeal was inadmissible because the statement of grounds of appeal

had not been filed within the time limit foreseen by Article 108 EPC. Having regard to the objections raised by the appellant, the respondent submitted that the specific combination of features according to claim 1 was neither disclosed in D1 nor in D7 and that the cited prior art, including D5 and D6, did not suggest the improvements obtained when using the admixture according to the invention.

V. The parties were summoned to oral proceedings in accordance with the auxiliary requests of both parties. In a communication issued in preparation for the oral proceedings, the board inter alia gave its positive preliminary opinion concerning the admissibility of the appeal. It also commented on the meaning of the terms of claim 1 then on file and the ambit of the latter. Moreover, the board questioned the novelty of a hardened concrete layer according to product-by-process type claim 8 of the request then on file. It also pointed out that the patent specification D1 was late-published and corresponded to published application

D1': WO 98/18740.

VI. With its letter dated 7 June 2010, the appellant merely informed the board that it would not be attending the oral proceedings and asked the board to decide according to the pending requests.

VII. Oral proceedings were held on 10 June 2010 in the absence of the appellant. In the course of the oral proceedings, the respondent expressly withdrew its earlier request concerning the rejection of the appeal as inadmissible. The issues of allowability of the

amendments, clarity and support by the description, and sufficiency of disclosure were extensively dealt with, and the respondent ultimately filed a set of further amended claims 1 to 6 as its new main request replacing all previous requests.

Independent claim 1 according to this request reads as follows (**amendments** to claim 1 as allowed by the opposition division emphasised by the board):

*"1. An accelerating admixture for sprayed concrete, comprising*

- (a) the reaction product of aluminium hydroxide with an organic acid;*
- (b) aluminium sulphate; and*
- (c) at least one alkanolamine,*

**said accelerating admixture being obtainable by a method using the following components, given as percentages by weight:**

<b>formic or acetic acid</b>	1-10
aluminium hydroxide	1-30
aluminium sulphate	30-60
<b>alkanolamine selected from the group consisting of diethanolamine, triethanolamine and methyldiethanolamine</b>	<b>0.1-12, provided that diethanolamine is used in an amount of 1 - 12, diethanolamine is used in an amount of 0.1 - 4, and methyldiethanolamine is used in an amount of 1 - 8,</b>
water	to 100%,

*wherein said method comprising [sic] the addition of alkanolamine, aluminium sulphate and organic acid to water, heating and then adding aluminium hydroxide."*

VIII. Arguments of the parties

Having regard to the claims allowed by the opposition division, the **appellant** essentially argued as follows:

The subject-matter of claim 1 lacked novelty. On the one hand, admixtures as claimed were known from document D1, taking into account common general knowledge in the field of concrete accelerators as illustrated by document D5. On the other hand, document D7 disclosed admixtures which were identical to those claimed in terms of the reaction products they contained.

The presence of an inventive step had to be denied. The accelerating effect of alkanolamines was known from documents D5 and D6. Since the skilled person would consider both of these documents, the claimed subject-matter was obvious in view of the combinations of documents D1 and D5 or of documents D1 and D7.

Having regard to the claims filed as new main request during the oral proceedings, the **respondent** essentially argued as follows:

The amendments to the claims as granted were based on the disclosure of the application as filed and were not objectionable under Article 84 EPC.



The claimed subject-matter was novel, if only because D1/D1' did not disclose the amounts of alkanolamine (sulphate) to be used and D7 did not disclose an admixture comprising in combination an alkanolamine and formic or acetic acid. Although both documents mentioned components of the claimed composition, there was no direct and unambiguous disclosure of the claimed accelerating admixture, since several choices had to be made within the respective broader teachings of both documents.

The claimed subject-matter was also inventive since it was not obvious in view of the prior art that the specific formulation according to claim 1 would lead to improved setting times in comparison to commercially available accelerators of the type disclosed in D1/D1'.

- IX. The appellant requested in writing (in its statement of the grounds of appeal) that the decision under appeal be set aside and the European patent be revoked.

The respondent requested that the contested decision be set aside and that the patent be maintained on the basis of the request filed at the oral proceedings.

## **Reasons for the Decision**

### *Admissibility of the appeal*

1. At the oral proceedings, the respondent expressly withdrew its earlier objection as regards the admissibility of the appeal. The board is satisfied that the notice of appeal and the statement of grounds

of appeal meet the requirements of Article 108 and Rule 99 EPC despite some clerical errors in the statement of grounds of appeal.

The appeal is, therefore, admissible.

### *Procedural aspects*

2. The set of claims according to the present main request is based on the set of claims accepted by the opposition division. The further amendments constitute an attempt to address the concerns expressed in the board's communication by defining more precisely the subject-matter of claim 1 and by deleting former claim 8. The board therefore takes the view that the appellant could not be taken by surprise by the amendments made at the oral proceedings. In the present case, the board thus saw no reason for not admitting the new main request or for delaying the proceedings any further. In accordance with Article 15(3) RPBA and established case law, the board took its decision on the basis of the present main request despite the absence of the appellant at the oral proceedings (see e.g. decisions T 133/92, point 7 of the Reasons; T 771/92, point 7 of the Reasons; T 414/94, point 2 of the Reasons).

### *Amendments*

3. Allowability under Article 123(2) and (3) EPC
  - 3.1 The amendments to the claims restrict their ambit and find a basis in the application as filed. Concerning the disclosure, in the application as filed, of the

features added to claims 1 and 3, reference is made to the following parts of the published PCT application (WO 00/78688 A1):

Regarding the preference for formic and acetic acid: dependent claim 2.

Regarding the relative amounts specified: page 2, lines 22 to 29 (left and middle column of the table), page 3, lines 1 and 2.

Regarding the preferred alkanolamines and their respective effective amounts: page 3, second paragraph.

Regarding the reference to the method for the preparation of the admixture (materials, steps and order of steps):

claim 5; page 3, lines 24 and 25; the example: page 4, line 29 to page 4, line 2.

- 3.2 The amendments thus meet the requirements of Article 123(2) and (3) EPC.
4. Clarity and support by the description (Article 84 EPC)
  - 4.1 In writing, the appellant expressed some reservations as regards the clarity of claim 1, albeit without substantiating them. The board, which cannot deal with such unsubstantiated objections, is however satisfied that no objections under Article 84 EPC arise from the amendments to the claims according to the present request.
  - 4.2 In particular, it can clearly be inferred from claim 1 as amended that the relative amounts (in %) recited

therein relate to starting materials used in the method by which the claimed admixture is obtainable.

4.3 Regarding the term "aluminium sulphate", it is noted that there are indications in the description (paragraph [0008]) of the patent in suit concerning various possible "grades" of aluminium sulphate that may be used. Hence, the board does not share the view of the opposition division (point 4.2 of the reasons of the contested decision) that the aluminium sulphate referred to in the claims is necessarily of the so-called "17% grade". But even though the meaning of "aluminium sulphate" is somewhat broad, this does not amount to a lack of clarity.

4.4 Similar considerations apply to the term "aluminium hydroxide". The term may be somewhat broad with regard to the degree of crystallinity or the impurities (carbonate) content of the aluminium hydroxide, but it is clear to the skilled person that the aluminium hydroxide to be used must be of a type which is reactive with formic or acetic acid in the context of the preparation method referred to in claim 1.

#### *Sufficiency of disclosure*

5. The board is also satisfied that the claimed invention is disclosed in a manner sufficiently clear and complete to be carried out by a person skilled in the art (Article 83 EPC). Since in its statement of grounds of appeal the appellant has not maintained its earlier objections based on the ground of opposition according to Article 100(b) EPC, a detailed reasoning need not be given in this respect.

*Novelty*

6. Document D1'

6.1 Document D1' is the published patent application corresponding to published patent D1 and belongs to the prior art pursuant to Articles 54(2) EPC. D1' relates to a solidifying and hardening accelerator for hydraulic binders. The accelerator of D1' is obtainable by reacting the components (a) to (e), listed in the first part of claim 1 of D1', in water at a temperature of up to 150°C, the resulting end-product being a solution wherein the molar ratios of aluminium to sulphate and of aluminium to organic acid lie within specific numerical ranges.

6.2 However, it is expressly indicated in the second part of claim 1 of D1' that the claimed product may also be obtainable by reacting only some (see "eine Auswahl" in sub-section "1." of the claim) of the components (a) to (e), or only some of the components (a) to (d) (see sub-section "2." of the claim). The number of components to be used according to D1' is thus far from being clear.

6.3 Moreover, according to the examples of D1' supposedly illustrating the preparation of the accelerator claimed in D1', only three (examples 1 to 5 and 7) or four (example 6) of the recited five components (a) to (e) are brought to reaction, and according to example 6 of D1' magnesium sulphate is added as component (e) to the solution obtained by reacting three of the components. None of the examples of D1' thus describes a preparation process wherein four components (a) to (d)

meeting the definitions given in claim 1 thereof are mixed and reacted.

6.4 Hence, there is no direct and unambiguous disclosure in D1' of an aqueous admixture specifically comprising a reaction product of aluminium hydroxide (i.e. one of the components mentioned as component "a" in claim 1 of D1'), an organic acid (component "c" according to claim 1 of D1'), of aluminium sulphate (i.e. one of the components mentioned as component "b" in claim 1 of D1') and an alkanolamine sulphate (i.e. a component that is encompassed by the definition of component "e" in claim 1 of D1' in view of page 3, lines 8 to 9 from the bottom), let alone in the concentration ranges of present claim 1.

6.4.1 In particular, although D1' mentions the possible use of diethanolamine or triethanolamine sulphates as component "e", it neither contains indications as to useful amounts thereof nor an example illustrating that possibility.

6.4.2 Example 6 of D1' illustrates an admixture containing a magnesium sulphate as component "e", i.e. an inorganic compound substantially differing from an organometallic sulphate of an alkanolamine. Therefore, although the amount of magnesium sulphate used is specified in said example 6 of D1', no specific information concerning the amounts of di- or triethanolamine to be used can be inferred therefrom.

6.4.3 Under the section heading "Triethanolamin", document D5 (published in 1991) briefly reviews several earlier studies carried out by different researchers and

concerning the effect of triethanolamine on the setting and hardening of concrete. In the passage of D5 referred to by the appellant (page 166, second full paragraph of said section) it is mentioned that the effect of adding 0.1 to 1.0% triethanolamine was investigated, but the time spans referred to (20 to 30 minutes, past two days) are not those of interest when aiming at accelerating the initial setting of sprayed concrete. The board also notes that on the one hand an accelerating effect of triethanolamine is stated to have been known for a long time (page 166, first paragraph of said section), but that on the other hand other authors referred to in D5 consider triethanolamine as a hardening accelerator and not as a setting accelerator (page 167, second full paragraph).

6.4.4 For the board, in view of the heterogeneous and relatively unspecific elements of information reported in D5, the contents of the quoted passage are not suitable for establishing a kind of common general knowledge which would imperatively lead the skilled person reading D1' to understand that the triethanolamine amine or diethanolamine components mentioned must be added in amounts as specified in present claim 1.

6.5 Summarising, D1' does not directly and unambiguously disclose accelerating admixtures comprising alkanolamines in the amounts specified in present claim 1 according to the new main request and hence falling within the ambit of said claim.

7. Document D7
- 7.1 D7 relates to an accelerating admixture for sprayed concrete, which admixture comprises (a) a component selected from aluminium hydroxide and hydroxysulphate and (b) an acid component which does not substantially react with component (a). Preferably, component (b) is a weak organic acid, and more preferably a C1 to C6 alkanolic acid. Reference is made to claims 1, 2 and 4 of D7.
- 7.2 As optional components of the admixture, D7 inter alia mentions alkanolamines, preferably di- and triethanolamine, which may be added in amounts of from 0.1 to 5% based on the total mixture (D7, page 2, lines 64 to 67).
- 7.3 Only four examples (Nos. 8, 20, 22 and 24) out of thirty-six actually contain di- or triethanolamine. Moreover, none of the admixtures according to the thirty-six examples of D7 comprises formic or acetic acid, let alone in combination with an alkanolamine.
- 7.4 Moreover, having regard to the components making up the admixture, several choices must be made within the total information disclosed in D7 in order to arrive at subject-matter falling within the ambit of present claim 1.
- 7.5 Therefore, D7 does not directly and unambiguously disclose an accelerating mixture falling within the ambit of claim 1 according to the new main request of the respondent.



8. The board is also satisfied that none of the other documents cited by the parties and belonging to the prior art to be considered discloses such an accelerating mixture.
  
9. The subject-matter of independent claim 1 and, consequently, of claims 2 to 3 dependent thereon is thus novel over the cited prior art. Consequently, independent claim 4, relating to a method of preparing the accelerating admixture of claims 1 to 3, and independent claims 5 and 6, relating to methods comprising spraying concrete with the addition of the said accelerating admixture, are also novel by virtue of the back-references to claims 1 to 3.

The claims thus meet the novelty requirement of Articles 52(1) in conjunction with Article 54(1) and (2) EPC.

*Inventive step*

10. The invention concerns an accelerating admixture for sprayed concrete.
  
11. The board considers D1' to constitute the most suitable starting point for the assessment of inventive step, since this document, like the patent in suit, relates to an accelerating admixture for sprayed concrete obtainable by reacting several components and comprising dissolved aluminium, sulphate and organic acid residues, preferably formic acid residues, and also mentions alkanolamines in sulphate form as optional components.

12. The technical problem underlying the patent in suit in the light of D1' consists in the provision of a particularly effective accelerating admixture for sprayed concrete (see page 2, lines 19 to 20 of the patent in suit).

13. As a solution to said technical problem the patent now proposes an accelerating admixture which according to claim 1 of the request filed at the oral proceedings is characterised in that it comprises

- (a) the reaction product of aluminium hydroxide with an organic acid;
- (b) aluminium sulphate; and
- (c) at least one alkanolamine,

said accelerating admixture being obtainable by a method using the following components, given as percentages by weight:

formic or acetic acid	1-10
aluminium hydroxide	1-30
aluminium sulphate	30-60
alkanolamine selected from the group consisting of diethanolamine, triethanolamine and methyldiethanolamine	0.1-12, provided that diethanolamine is used in an amount of 1 - 12, diethanolamine is used in an amount of 0.1 - 4, and methyldiethanolamine is used in an amount of 1 - 8,
water	to 100%,

said method comprising the addition of alkanolamine, aluminium sulphate and organic acid to water, heating and then adding aluminium hydroxide.

14. It has to be verified whether this problem has actually been solved.

14.1 The effectiveness of the admixtures as claimed is illustrated by the comparative experimental data reported in the patent in suit (see the two tables in paragraphs [0027] and [0029]). In these tables, the accelerator type I is formulated according to the invention. It was common ground between the parties that type II ("MEYCO") stands for an accelerator according to document D6 containing aluminium sulphate, alkanolamine and stabilisers, but no formiates or other organic acid salts, and type III ("F100") for an accelerator according to D1' containing formic ions and aluminium sulphate but no alkanolamine (see minutes of the oral proceedings before the opposition division, page 8, last paragraph and page 9, first paragraph).

14.2 The two tables of the patent in suit show the results of tests performed with mortars and pastes. The first table relating to the mortar tests shows the measured initial setting times, times to 1 mm penetration and final setting times. The table relating to the paste tests shows the initial and final setting times achieved. For both Portland cement types A (Siggenthal) and B (Schwenk), the use of the admixture according to the invention (type I) gives results which are improved compared to the use of a commercial accelerator of the type III in the same relative amount of 5% solids by weight of cement, in terms of at least one of the setting times measured (initial setting time, time to 1 mm penetration and/or final setting time), whilst being at least equal in terms of the other setting times. Moreover, the test results show that the claimed

accelerator is also improved compared to a commercial accelerator of type II.

14.3 Considering these data and the absence of evidence and/or arguments from the appellant to the contrary, the board concludes that the stated technical problem is indeed solved by accelerating admixtures as claimed.

15. Hence, it remains to be assessed whether the claimed solution to the stated technical problem is obvious in view of the cited prior art.

15.1 In document D1' itself, there is no hint to use accelerating admixtures having the specific composition recited in claim 1. Although D1' discloses compositions comprising some of the components used in the formulation of the accelerator according to the patent in suit, there is no guidance in D1' concerning the choices to be made amongst the various possible components, relative amounts and reaction conditions, in order to obtain particularly short setting times.

15.2 Nor does any of the other documents invoked by the appellant suggest that components known as such from D1' would lead to a relative improvement of the setting times when used in an admixture differing from the ones exemplified in D1' and being formulated as specifically indicated in present claim 1:

15.2.1 D5 merely refers to studies concerned with accelerating effects due to triethanolamine (see point 6.4.3 above).

15.2.2 D6 is silent on the use of an organic acid as a component of the accelerator and teaches away from the

addition of aluminium hydroxide as a component (see page 2, lines 18 to 20). Moreover, it is primarily concerned with the avoidance of an undesirable drop in final strength, whilst the "acceleration of cure is up to normal standards" (see page 3, lines 17 to 21).

15.2.3 D7 mentions alkanolic acids, aluminium hydroxide, aluminium hydroxysulphate and alkanolamines as components of accelerating mixtures. However, it actually teaches away from reacting the acid component with the aluminium compound (see claim 1 of D7) and gives no hint to use specifically formic or acetic acid in combination with an alkanolamine component.

15.2.4 Hence, the skilled person not knowing the present invention and aiming for an accelerator particularly effective in terms of the setting times achievable had no motivation to modify the formulations disclosed in the examples of D1' in a manner to obtain an admixture falling within the ambit of present claim 1.

15.3 The board is satisfied that none of the other documents cited in the opposition proceedings provides a pointer towards the claimed solution.

16. Independent claim 4 relates to a method of preparing the inventive accelerating admixture of claims 1 to 3, and independent claims 5 and 6 relate to methods comprising spraying concrete with the addition of the said inventive accelerating admixture. Consequently, by virtue of the back-references to claims 1 to 3, the subject-matter of claims 4 to 6 is also based on an inventive step.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.
  
2. The case is remitted to the department of first instance with the order to maintain the patent on the basis of claims 1 to 6 according to the request filed at the oral proceedings and a description to be adapted.

The Registrar

The Chairman

C. Vodz

G. Rath