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**D E C I S I O N**  
**of 18 September 2003**

**Case Number:** T 0875/01 - 3.2.3

**Application Number:** 97104622.2

**Publication Number:** 0851064

**IPC:** E02D 3/12

**Language of the proceedings:** EN

**Title of invention:**

Method for increasing the bearing capacity of foundation soils  
for buildings

**Patentee:**

Uretex S.r.l., et al

**Opponent:**

Kappa Zeta S.a.s. del Geometra Rodolfo Kauber e C.

**Headword:**

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**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step - yes"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0875/01 - 3.2.3

**D E C I S I O N**  
of the Technical Board of Appeal 3.2.3  
of 18 September 2003

**Appellant:** Kappa Zeta S.a.s. del Geometra Rodolfo  
(Opponent) Kauber e C.  
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**Representative:** Faraggiana, Vittorio, Dr. Ing.  
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**Respondent:** Uretek S.r.l.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 12 March 2001  
rejecting the opposition filed against European  
patent No. 0851064 pursuant to Article 102(2)  
EPC.

**Composition of the Board:**

**Chairman:** C. T. Wilson  
**Members:** J. B. F. Kollar  
J. P. B. Seitz

## Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal, received on 2 May 2001, against the decision of the opposition division, dispatched on 12 March 2001, to reject the opposition against the European patent No. 0 851 064. The fee for the appeal was paid on 2 May 2001. The statement of grounds of appeal was received on 17 July 2001.

II. Claim 1 of this patent reads as follows:

"1. A method for increasing the bearing capacity of foundation soils for buildings comprising: providing a plurality of holes (1) spaced from each other deep in the soil; injecting into the soil, through said holes, a substance (3) which expands as a consequence of a chemical reaction; producing compaction of the soil contiguous to the injection zone due to the expansion of said substance injected into the soil, characterized in that it further comprises the step of constantly monitoring the level of the soil and/or building overlying the injection zone to detect the moment when the building and/or the soil surface, overlying said injection zone, begins to raise which is the moment in which the compaction of the soil has reached levels generally higher than the required minimum value, and in that the expansion of the injected substance is very fast with a potential increase in volume of the expanded substance being at least five times the volume of the substance before expansion."

III. Opposition had been filed against the patent as a whole in accordance with Article 100(a) EPC on the grounds that the subject-matter of the patent was not novel (Articles 52(1) and 54 EPC) or lacked an inventive step (Articles 52(1) and 56 EPC). To support his objections the opponent referred to the following documents amongst others:

A3: US-A-2627169

A5: DE-A-3 332 256

B3: Quarry and Construction Ed. PEI, Parma, August 1996, pages 119 to 121

B4: Le Strade, June 1995, pages 447 to 449

B12: Modulo, No. 206, November 1994, page 128.

IV. In the statement of grounds of appeal the appellant argued that the subject-matter of claim 1 of the patent lacked novelty in view of the Urettek technique as disclosed in B3 and B4. The appellant furthermore objected to lack of inventive step of claim 1 in the light i.a. of document B12.

V. In response to a communication pursuant to Article 11(2) RPBA in which the board considering A5 to be the closest prior art set out its provisional opinion on the case with respect to the issues of novelty and inventive step the respondent (patentee) submitted three sets of claims as first, second and third auxiliary requests.

VI. During the oral proceedings held on 18 September 2003 the parties formulated their requests as follows:

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

The respondent requested that the appeal be dismissed (main request). He auxiliary requested that the decision under appeal be set aside and the patent be maintained on the basis of one of the three auxiliary requests all filed on 11 August 2003.

VII. The arguments of the parties in the oral proceedings can be summarized as follows:

(a) appellant

- novelty of the claimed method is not disputed, however, inventive step;
- A5 has to be seen as the nearest prior art disclosing a method for injection of an expandable substance into a plurality of holes in the foundation in order to increase the bearing capacity of the foundation soils in accordance with the preamble of claim 1 of the patent in suit; a method for ground consolidation introducing cementitious material under pressure into the soil is also known from A3; however, the characterising features of claim 1 are missing in A5 or A3;
- B12 relates to the "Uretek" method of injecting of an expandable substance having similar properties as the substance of claim 1 has into the building

foundation for the purpose of lifting said building; the "Uretek" technique is described also in B3 and B4; this technique makes use of advanced laser level control means for monitoring of level of the building overlying the injection zone to detect the lifting of about 1 to 2 mm of the overlying structure, which indication is sufficient for knowing that the ground voids have been filled up;

- the provision of the means used in the "Uretek" method for monitoring the lifting level of the structure leads automatically to detecting the moment in which the compaction of the soil has reached levels generally higher than the required minimum value;
- as a result of the foregoing observations the subject-matter of claim 1 of the main request has to be seen as being obvious in the light of the combination of the teaching of document A5 and the "Uretek" technique described in B12, B3 and B4.

(b) respondent

- A5 teaches injecting an expandable substance in the soil layer underlying a structure and forms the nearest prior art;
- the object of the invention is to improve the injecting method of the prior art and to provide a method allowing the determination of an adequate consolidation of the foundation soils;

- the improvement is reached by the steps claimed in claim 1 based on the inventive idea of finding the moment in which the compaction of the soil has reached the required level;
- it is admitted that the "Uretek" technique according to document B12, B3 and B4 also relates to a method for increasing the bearing capacity of building foundations but basically relates to injecting of expandable substances directly under the plates or the foundation of the building in order to lift overlying structures to the required height;
- the lifting of the overlying building is not intended in the patent in suit; the method according to claim 1 resides in the determination of the moment the building overlying the injection zone starts to rise which is the moment to stop the injection;
- there is no hint in the documents describing the "Uretek" technique in the direction of the method of claim 1 of the patent in suit so that the combination of the teaching of said documents with the method of A5 constitutes an *ex-post-facto* objection;
- summarising, the subject-matter of claim 1 as granted (main request) is not rendered obvious by the revealed prior art.

## Reasons for the Decision

1. The appeal is admissible.
2. Main request - Article 100(a) in connection with Articles 52(1) to 57 EPC.
  - 2.1 It was agreed throughout the proceedings that document A5 relating to a method for increasing the bearing capacity of foundation soils for buildings forms the nearest prior art. Claim 1 is delimited over A5. Since the appellant has not provided any document which would anticipate all the features of the independent claim 1 the requirements of Article 54 EPC are satisfied. The crucial issue to be decided is thus the issue of inventive step.
  - 2.2 From A5 no arrangements can be seen for allowing the determination of an adequate consolidation of the foundation soils so that the object to be solved by the invention can be seen in improvement of the known method in this respect.
  - 2.3 The solution to this object is achieved with the combination of features laid down in claim 1, the inventive idea of which being based on the step of constantly monitoring the level of the soil and/or building overlying the injection zone to detect the moment when the building and/or the soil surface, overlying said injection zone, begins to rise which is the moment in which the compaction of the soil has reached levels generally higher than the required minimum value.



- 2.4 This solution provides for the assessment of the reaching of a required compactness level and of a satisfactory bearing capacity of the foundation soils.
- 2.5 A5 is irrelevant in respect of the claimed solution since a skilled person considering the teaching of A5 is not led to the aforementioned characterising step.
- 2.6 It is true, however, that the step of monitoring the level of the soil overlying the injection zone *per se* is clearly known from B12; this document describes injecting expanding resins under the structure subjected to a settlement according to a method known as the "Uretek" technique (cf. paragraph 3 ff. of the English translation). What can be derived from B12 is moreover that a continuous injection gives rise to lifting of the overhanging structure and, thanks to an advanced laser level control, a very high accuracy of the lifting can be achieved.
- 2.7 The teaching of B3 and B4 which also relates to the "Uretek" technique is similar to B12 since again an expandable resin is injected under the structure that suffers from a collapse.
- 2.8 The "Uretek" technique according to the documents B12, B3 and B4 teaches that expandable substances should be injected directly under the foundation of the building in order to lift plates or buildings from the sunken to levelled condition. The material is injected immediately under the surface in an existing void until a given defect is corrected and the structure is lifted to a specific level as can be seen from Figures at

page 128 of B12 and photos reproduced at pages 120 and 448 of B3 and B4, respectively.

- 2.9 The claimed invention goes, however, in a different direction from B12, B3 and B4 since it does not require lifting of the structures overlying the injection zones but relates rather to a method of treating the foundation by injecting an expandable substance deep in the soil with the purpose of increasing the bearing capacity of the foundation soils. The monitoring of the level of the soil according to claim 1 as granted is concerned with detecting the moment when the building begins to rise and the injection of the expandable substance is stopped whereas the prior art teaches the control of the lifting of the overhanging structure to the required height.
- 2.10 In absence of any hint in the cited prior art to the first characterising feature of claim 1 related to the aforementioned detecting step any appellant's arguments of its obviousness are the result of an inadmissible *ex-post-facto* analysis based on knowing the claimed invention.
- 2.11 Under these circumstances the board comes to the conclusion that the subject-matter of claim 1 of the main request is not rendered obvious by A5, B12, B3 and B4 and general technical knowledge even seen in combination.
- 2.12 The other documents cited in the proceedings likewise give no hint to the subject-matter of claim 1. Their teaching could therefore neither *per se* nor in combination with the teaching of the documents

disclosed in the foregoing paragraphs lead the skilled person to a method according to claim 1.

2.13 The subject-matter of claim 1 of the patent in suit therefore involves an inventive step within the meaning of Article 56 EPC.

2.14 Claims 2 to 10 are dependent on claim 1 and relate to embodiments of the invention so that they too are therefore patentable.

3. *Auxiliary requests*

The respondent's main request being allowable it is not necessary to deal with the merits of his auxiliary requests.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

A. Counillon

C. T. Wilson