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**Datasheet for the decision
of 12 March 2008**

Case Number: T 0668/05 - 3.3.01

Application Number: 99304407.2

Publication Number: 0967258

IPC: C09D 183/06

Language of the proceedings: EN

Title of invention:

Fluorosilicone primer free of volatile organic compounds

Applicant:

GENERAL ELECTRIC COMPANY

Opponent:

-

Headword:

Fluorosilicone primer compositions/GENERAL ELECTRIC

Relevant legal provisions:

EPC Art. 56

Relevant legal provisions (EPC 1973):

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Keyword:

"Inventive step (no) - alleged improved property not shown"
"Obvious solution"

Decisions cited:

T 0020/81, T 0164/83, T 0561/94

Catchword:

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Case Number: T 0668/05 - 3.3.01

D E C I S I O N
of the Technical Board of Appeal 3.3.01
of 12 March 2008

Appellant: GENERAL ELECTRIC COMPANY
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Representative: Herrmann, Uwe
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 3 January 2005
refusing European application No. 99304407.2
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: P. Ranguis
Members: J.-B. Ousset
C.-P. Brandt

Summary of Facts and Submissions

- I. This appeal lies from the decision of the examining division to refuse the European patent application No. 99304407.2 (European publication No. 0 967 258).
- II. The decision was based on a set of two claims, claim 1 reading as follows:
- "1.A primer solution comprising:
- (a) a primer composition comprising:
- (1) an epoxy substituted alkoxy silane;
 - (2) a titanium compound selected from the group consisting of titanium ortho alcoholates and titanium ortho esters; and
 - (3) a silicon compound selected from the group consisting of silicon ortho alcoholates and silicon ortho esters; and
- (b) a volatile silicone solvent selected from the group consisting of hexamethylcyclotrisiloxane, 1,1,3,3,5,5,7,7-octamethylcyclotetrasiloxane, decamethylcyclopentasiloxane, 1,1,1,3,3,3-hexamethyldisiloxane and siloxanes having the formula $(R^1_3SiO_{1/2})_2(R^2_2SiO)_n$ where R^1 and R^2 are independently monovalent hydrocarbon radicals having from one to ten carbon atoms and n varies from 1 to about 10."
- III. The examining division refused the present application for lack of inventive step on the basis of the following documents:
- (1) US-A-5 755 866
 - (2) EP-A-0 500 115.

The examining division considered the claimed subject-matter as novel vis-à-vis the cited prior art. However, neither a technical effect was shown by the addition of silicon ortho alcoholates/esters vis-à-vis document (1) nor by the addition of an epoxy substituted alkoxy silane vis-à-vis document (2). The provision of mere alternative primers was obvious for the person skilled in the art starting from document (1) and combining it with document (2) or vice versa.

IV. Oral proceedings before the board took place on 12 March 2008. One day before oral proceedings, the appellant filed once more, the set of claims refused by the examining division (see point II above) and an auxiliary request containing a single claim which reads:

"1. Use of a primer solution for improving the adhesion of fluorosilicone elastomers to substrates, wherein the primer solution comprises:

a) a primer composition comprising:

- (1) an epoxy substituted alkoxy silane;
- (2) a titanium compound selected from the group consisting of titanium ortho alcoholates and titanium ortho esters; and
- (3) a silicon compound selected from the group consisting of silicon ortho alcoholates and silicon ortho esters; and

b) a volatile silicone solvent selected from the group consisting of hexamethylcyclotrisiloxane, 1,1,3,3,5,5,7,7-octamethylcyclotetrasiloxane, decamethylcyclopentasiloxane, 1,1,1,3,3,3-hexamethyldisiloxane and siloxanes having the formula $(R^1_3SiO_{1/2})_2(R^2_2SiO)_n$ where R^1 and R^2 are independently monovalent hydrocarbon radicals

having from one to ten carbon atoms and n varies from 1 to about 10."

- V. The appellant's arguments submitted with the statement of grounds of appeal and during oral proceedings may be summarized as follows:

Document (1) disclosed primer compositions used to improve the adhesion of curable silicon elastomers on substrates but differed from the compositions of the present application in that they did not contain a silicon organic alcoholate or ortho ester. Moreover, there was no teaching in document (1) mentioning the use of fluorosilicone elastomers to be adhered on substrates by using the claimed primer composition. Document (2) disclosed primer compositions useful with silicone room temperature curing sealants or coatings differing from the ones of the present application in that they did not contain an epoxy substituted alkoxy silane. Furthermore, there was no teaching either in document (1) or in document (2) that the adhesion of fluorosilicone elastomers on substrate using the claimed composition would be improved.

- VI. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or the auxiliary request, both submitted by fax on 11 March 2008.
- VII. At the end of the oral proceedings, the decision of the board was announced.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Amendments*

The subject-matter of claim 1 results from the introduction into claim 1 of original claims 2-5. Since each claim 2-5 was dependent of its respective preceding claim, the new version of claim 1 resulting from this combination does not contravene the requirements of article 123(2) EPC.

3. *Novelty*

- 3.1 Document (1) describes primer compositions comprising:

- a) an organotitanate derivative falling within the definition of component "a)(2)" of claim 1 (see point II above).
- b) an epoxy substituted alkoxy silane derivative falling within the definition given for the component "a)(1)" of claim 1 (see column 2, lines 15-54).

Moreover, document (1) also mentions that these constituents can also be diluted (see column 2, lines 63-67). The nature of the said solvent is described in column 3, lines 27 to column 4, line 4 and more particularly column 3, lines 49 to column 4, line 5, which mentions solvents like

cyclodiorganosiloxanes or linear volatile silicones falling within the definition of component "b)" of claim 1.

The primer compositions of claim 1 of this request differ from the composition disclosed in document (1) due to the presence of a silicone ortho alcoholate or a silicone ortho ester derivative, namely component "a)(3)".

3.2 Document (2) discloses a primer composition comprising:

- a) a polydiorganosilixane, whose definition falls within the definition of component "b)" of claim 1
- b) a reactive compound selected from silanes and silicates, whose definitions fall within the definition of component "a)(3)" of claim 1; and titanates, whose definition falls within the definition of component "a)(2)" of claim 1 (see page 2, lines 41 to 44 and page 3, lines 5 to 24).

The primer compositions of claim 1 differ therefore from the composition disclosed in document (2) by the compulsory presence of an epoxy substituted alkoxy silane derivative, namely component "a)(1)".

3.3 Consequently, the claimed subject-matter fulfils the requirements of Article 54(2) EPC.

4. *Inventive step*

4.1 The current application relates to the provision of primer compositions to be applied on substrates in

order to improve the adhesion on said substrates of fluorosilicone elastomers (see page 1, paragraph 1 of the application). It should also be noted that silicone elastomers can also be applied (see page 3, lines 6-11).

- 4.2 According to the established jurisprudence of the boards of appeal, it is necessary, in order to assess inventive step, to identify the closest prior art, to determine in the light thereof the technical problem which the invention addresses and successfully solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art. This problem-solution approach ensures the assessment of inventive step on an objective basis and avoids an ex post facto analysis.
- 4.3 The first step is thus to identify the closest prior art. According to the established jurisprudence of the boards of appeal, the closest prior art is a prior art document disclosing subject-matter aiming at the same objectives as the claimed invention and having the most relevant technical features in common, i.e. requiring the minimum of structural modifications (see Case Law of the Boards of Appeal of the EPO, 5th edition 2006, Section I.D.3.1., "Determination of the closest prior art in general", page 121).
- 4.3.1 Document (1) discloses a primer composition suitable for use with room temperature vulcanizable silicone compositions that improves cohesion and adhesion of subsequently applied silicone sealant compositions (see column 2, lines 8-13). This document establishes an unequivocal correlation between "room temperature vulcanizable silicon compositions" and "room

temperature vulcanizable silicon elastomers" (see column 1, lines 13-14). Moreover, the fluorosilicone elastomers of the present application represent a subgroup of the generic expression "silicon elastomers" and do not differ, as far as the adhesion to a substrate is concerned, from the generic group of silicon elastomers. This is also acknowledged by the applicant in the description of the current application (see page 3, lines 6 to 8: "I have further discovered that primer compositions for enhancing the binding between elastomeric silicones such as fluorosilicone elastomers..").

- 4.3.2 Although document (2) also relates to primer compositions useful with different types of silicon room temperature curing sealants and coatings, the silicone elastomers are not mentioned.
- 4.3.3 The board thus concurs with the appellant, that document (1) represents the closest prior art, since it aims at the same objective as the claimed invention.
- 4.4 Hence, starting from document (1), the technical results achieved by the claimed subject-matter are to be determined for defining the objective technical problem to be solved.
 - 4.4.1 In view of document (1), the appellant submitted that the technical problem underlying the claimed subject-matter as defined in claim 1 could be seen in the provision of primer compositions having improved adhesive properties on substrates for fluorosilicone elastomers.

4.4.2 The appellant acknowledged during oral proceedings, that no experimental results showing this improved effect could be presented to the board in order to justify the presence of the alleged improvement vis-à-vis document (1). He, however, added that the content of the description was clear concerning the fact that an improvement of the adhesive properties was reached (see page 1, first paragraph and page 3, line 6, where it is stated "I have further discovered that primer compositions for enhancing the bonding between elastomeric silicone such as fluorosilicone elastomers and metal,...may be formulated..."). He also referred to the comparative example concerning a hydrocarbon solvent (volatile organic compound) based on primer composition commercially available from Dow Corning (see page 6, "A4040TM Control" of the application as filed).

4.4.3 These arguments are not convincing for the following reasons.

According to the jurisprudence of the boards of appeal any alleged but unsupported effect and/or advantage cannot be taken into consideration for the determination of the problem underlying the application (see T 20/81, OJ 1982, 217, point 3, last paragraph of the reasons; T 561/94, dated of 6 December 1996, not published in the OJ of the EPO, point 4.4 of the reasons).

4.4.4 In the present case, the reference back to a general sentence of the description, not related to any prior art, is considered as a mere allegation not supported

by evidence and cannot thus lead the board to conclude an improvement is present.

- 4.4.5 Furthermore, the examples according to the present application are all run in presence of 1,1,1,3,3,3-hexamethyldisiloxane as solvent, whereas A4040TM Control does not contain this solvent. Moreover, the examples of the present invention all contain an epoxysilane (e.g. gamma-glycidoxytrimethoxysilane), whereas this type of compound is not present in A4040TM Control. Therefore, the comparison of the A4040TM Control with the examples of the invention cannot show the impact of the process modification which distinguishes the claimed process from the closest prior art, namely the compulsory presence of a silicone ortho alcoholate or a silicon ortho ester derivative (see point 3.1 above).
- 4.4.6 Thus no comparative experiments were provided by the appellant to confirm the alleged improved properties of the claimed compositions vis-à-vis the closest prior art (see T 164/83, OJ EPO 1987, 149, point 8).
- 4.4.7 Since no beneficial or advantageous effect can be acknowledged vis-à-vis the closest prior art, i.e. document (1), the technical problem should thus be reformulated in less ambitious terms, that is to say, in the provision of alternative primer compositions useful to allow adhesion of fluorosilicone elastomers to substrates.
- 4.4.8 As a solution to this problem, the present invention proposes a process as defined in claim 1.

4.4.9 In view of the technical information provided in the description and more particularly the examples, the board considers that this technical problem has indeed been solved.

4.5 It remains to be assessed whether the proposed solution is obvious for the person skilled in the art in view of the cited prior art.

4.5.1 The appellant's argument relating to the absence of hint for the skilled person starting from document (1) to combine it with the teaching of document (2) to arrive at the claimed subject-matter without inventive skills is not convincing:

As set out above (see point 3.1), document (1) discloses a primer composition comprising an organotitanate, an epoxysilane and a non-reactive solvent such as a cyclodiorganosiloxane or a linear volatile silicone for the adhesion of silicone elastomers encompassing fluorosilicone elastomers to substrates. In the same technical field (see point 4.3.2), document (2) also discloses that an increase in the bonding can be achieved by using either a silane or silicate of formula $R_nSi(OZ)_{4-n}$ or titanates of formula $Ti(OR')_4$ (see page 3, lines 5-16) in order to solve the problem of adherence of silicone elastomers to substrates (see page 2, lines 2-3).

In this context, the board observes that this document does not make any difference between the expressions "silane" and "silicate" (see page 3, line 7 to 8). Actually, when n is zero, the silane is usually known as a tetraalkoxysilane or as an orthosilicate (see page 3, lines 15-16). Further on the same page, the

skilled person knows that the reactive compound allowing the increase of the bonding can be obtained by mixing silanes and titanates (see page 3, lines 25-26).

4.5.2 Hence, the person skilled in the art, seeking to solve the technical problem defined above, would have replaced without any inventive ingenuity the titanates of the primer compositions described in document (1) by a mixture of orthosilicates and titanates, according to the teaching of document (2) to arrive at the claimed subject-matter.

4.5.3 For these reasons, claim 1 of the main request does not involve an inventive step in the sense of article 56 EPC. Since the board only can only decide on a request as a whole, the present request is thus rejected.

First auxiliary request

5. *Amendments*

The subject-matter of claim 1 has been limited to the use of the primer composition as described in claim 1 of the main request. This limitation is supported by the content of the description as originally filed (see page 1, paragraph 1).

The requirements of article 123(2) EPC are thus met.

6. *Novelty*

For the same reasons as given for the main request (see point 3 above), novelty is acknowledged vis-à-vis documents (1) and (2). Moreover, this claim now

specifically relates to fluorosilicone elastomers, which are not mentioned explicitly in the cited prior art documents.

7. *Inventive step*

7.1 The restriction of the claimed subject-matter to an use does not change the issue as considered with the main request.

7.2 Actually, in the absence of any evidence showing an improvement over the closest prior art represented by document (1), the technical problem is seen in the use of an alternative primer composition to allow adhesion of fluorosilicone elastomers (see point 4.4.7).

7.3 It can be inferred from document (1), that the fluorosilicone elastomers are embraced by the generic term "vulcanizable silicone elastomers" found in document (1) (see column 1, lines 13 to 15) and that the primer compositions described therein aim at increasing the binding of these "vulcanizable silicone elastomers" to the substrate (see column 2, lines 8 to 11). Document (2), which also discloses primer compositions aiming at a good adhesion of silicone sealants to substrates (see page 2, lines 2 to 3), teaches that the reactive compound to increase the bonding can be a mixture of silanes and titanates (see page 3, lines 25 to 26).

Therefore, the person skilled in the art would have expected to obtain, without inventive skills, alternative primer compositions by replacing the organotitanates of document (1) by the mixture of orthosilicates and titanates of document (2) to arrive

at primer compositions which can be used for the
adhesion of fluorosilicone elastomers to substrates
(see point 4.5 above).

7.4 The requirements of article 56 EPC are thus not met.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

M. Schalow

P. Ranguis