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**Datasheet for the decision  
of 29 November 2011**

**Case Number:** T 1942/09 - 3.3.03  
**Application Number:** 99940933.7  
**Publication Number:** 1112311  
**IPC:** C08K 5/21, C08L 27/12  
**Language of the proceedings:** EN

**Title of invention:**  
Curable perfluoroelastomer composition

**Patentee:**  
DUPONT DOW ELASTOMERS L.L.C.

**Opponent:**  
3M Innovative Properties Company

**Headword:**

-

**Relevant legal provisions:**  
EPC Art. 54, 56, 83, 84, 123(2)(3)

**Keyword:**  
"Amendments - extended subject-matter: yes (main request;  
auxiliary requests I-II); no (auxiliary request IIIA)"  
"Clarity, sufficiency of disclosure, novelty, inventive step:  
yes (auxiliary request IIIA)"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 1942/09 - 3.3.03

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.03  
of 29 November 2011

**Appellant:** 3M Innovative Properties Company  
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**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted  
3 August 2009 concerning maintenance of  
European patent No. 1112311 in amended form.

**Composition of the Board:**

**Chairman:** B. ter Laan  
**Members:** O. Dury  
C.-P. Brandt

## Summary of Facts and Submissions

I. The appeal by the opponent lies against the interlocutory decision of the opposition division announced on 24 June 2009 and posted on 3 August 2009 to maintain European patent No. EP 1 112 311 B1, based on application No. 99 940 933.7, corresponding to the international application published as WO 00/009603 A1, in amended form.

II. The application as filed contained 11 claims of which claims 1, 7, 8, 10 and 11 read as follows:

"1. A curable composition comprising  
A. a perfluoroelastomer comprising copolymerized units of  
(1) tetrafluoroethylene, (2) a perfluorovinyl ether selected from the group consisting of perfluoro(alkyl vinyl) ethers, perfluoro(alkoxy vinyl) ethers, and mixtures thereof, and (3) a cure site monomer selected from the group consisting of nitrile-containing fluorinated olefins and nitrile-containing fluorinated vinyl ethers; and  
B. a compound, other than an ammonium salt of an organic or inorganic acid, that decomposes at temperatures between 40°C and 330°C to produce ammonia."

"7. A composition of any one of Claims 1 to 6 further comprising C) a curative other than a compound that decomposes to produce ammonia."

"8. A composition of Claim 7 wherein the curative is selected from the group consisting of organotin

compounds, bis(aminophenol) compounds,  
bis(aminothiophenol) compounds and tetraamines."

"10. A composition of Claim 8 wherein the curative is  
diaminobisphenol AF."

"11. A composition of Claim 8 wherein the curative is  
3,3'-diaminobenzidine."

Claims 2-6 and 9 were dependent claims directed to  
embodiments of the composition of claims 1 and 8,  
respectively.

The passages on page 6, line 22 to page 7, line 4 and  
on page 7, lines 9-19 of the application as filed read,  
respectively :

"The first embodiment of this invention is a curable  
composition comprising A) a perfluoroelastomer as  
defined above and B) a compound, other than an ammonium  
salt, that decomposes at temperatures between 40°C and  
330°C, preferably between 90°C - 220°C, to produce  
ammonia. The ammonia-generating compounds are utilized  
as curing agents for the perfluoroelastomers.  
Illustrative examples of such ammonia producing  
compounds include aldehyde ammonia condensation  
products (...); (...) such as hexamethylenetetramine;  
carbamates (...); urea; urea hydrochloride; thiourea;  
amides (...); metal ammine complexes (...); ammonia-Lewis  
acid adducts; carboxamides (...); biuret; unsubstituted  
amidines (...)."

"In a second embodiment of the invention, the curable  
composition further comprises C) a curative other than

a compound that decomposes at temperatures between 40°C and 330°C to produce ammonia. In this embodiment, the compound that decomposes to produce ammonia acts as a cure rate accelerator for another curative, rather than as the major curative for the perfluoroelastomer as it does in the first embodiment of the invention. The same compounds that decompose to produce ammonia that are used in the first embodiment above can be used here in the second embodiment."

- III. The granted patent was based on claims 1-11 as originally filed.
- IV. A notice of opposition against the patent was filed on 15 July 2004, in which the revocation of the patent in its entirety was requested on the grounds of Art. 100 (a) EPC (lack of novelty as well as lack of an inventive step) and Art. 100 (b) EPC.
- V. With the decision under appeal the patent was maintained on the basis of the main request comprising 11 claims of which claim 1 read (amendments as compared to claim 1 of the application as filed shown in **bold**) :
- "1. A curable composition comprising
- A. a perfluoroelastomer comprising copolymerized units of
- (1) tetrafluoroethylene, (2) a perfluorovinyl ether selected from the group consisting of perfluoro(alkyl vinyl) ethers, perfluoro(alkoxy vinyl) ethers, and mixtures thereof, and (3) a cure site monomer selected from the group consisting of nitrile-containing fluorinated olefins and nitrile-containing fluorinated vinyl ethers; and

B. a compound, other than an ammonium salt of an organic or inorganic acid, that decomposes at temperatures between **90°C** and **220°C** to produce ammonia."

Claims 2-11 were identical to claims 2-11 of the application as filed, respectively.

The decision under appeal was based, *inter alia*, on the following documents:

- D1: US-A-5 677 389
- D5: Polymer Science USSR, Vol. 21, pages 1434-1441, 1980
- D6: US-A-5 637 648
- D7: US-A-5 565 512
- D8: US-A-4 281 092
- D9: J. Macromol. Sci.-Chem. A8(3), pages 499-520, 1974
- D11: US-A-3 317 484
- Exhibits 1-4: test reports filed by the opponent with letter of 28 August 2006

In its decision, the opposition division considered that the main request fulfilled the requirements of Art. 123 (2)(3) EPC and that the amendments did not introduce a lack of clarity in the sense of Art. 84 EPC. It was further held that the patent in suit contained enough information to carry out the invention without undue burden (Art. 83 EPC). Novelty was acknowledged considering that it had not been shown that the fluoropolymer compositions disclosed in the documents of the prior art relied upon by the opponent contained a compound that decomposes at temperatures between 90°C

and 220°C to form ammonia. Finally, D7, which disclosed compositions containing ammonium salts of organic or inorganic acids as curing agents, was seen as the closest prior art. It was not considered to be obvious to use a compound B as defined in claim 1 of the patent in suit as an alternative curing agent to the ammonium salts of D7. That conclusion was reached taking into account *inter alia* the teaching of each of D5, D9 and D11, all dealing with the crosslinking of fluoropolymers comprising nitrile groups using ammonia as curing agent.

VI. On 28 September 2009, the opponent (appellant) lodged an appeal against the above decision. The prescribed fee was paid on the same day. With the statement setting out the grounds for the appeal, received on 16 November 2009, the appellants requested that the patent be revoked and that the appeal fee be reimbursed. The appellants further submitted, *inter alia* :

D19: Experimental Report dealing with a C4 bis-amidrazone illustrated in "Scheme 1" (1 page)

D20: Jander G. and Blasius E., "Lehrbuch der analytischen und präparativen anorganischen Chemie", S. Hirzel Verlag, Stuttgart, 1989, 13. Auflage, page 243.

VII. By letter of 6 April 2010, the respondent (patent proprietor) filed comments on the statement of grounds of appeal and requested the dismissal of the appeal (main request) or, alternatively, the maintenance of the patent in amended form according to any of

auxiliary requests I-V. An additional test report (D23) was filed simultaneously.

VIII. During the oral proceedings held on 29 November 2011 new auxiliary requests I, II, IIIA, IVA and VI were submitted by the respondent and auxiliary requests I-IV then on file were withdrawn.

Auxiliary request I (claims 1-10) differed from the main request, *inter alia*, in that claim 7 was amended to read (amendments as compared to claim 7 as filed shown in **bold**, deletions in ~~striketrough~~):

"7. A composition of any one of Claims 1 to 6 further comprising C) a curative ~~other than a compound that decomposes to produce ammonia~~ **selected from the group consisting of organotin compounds, bis (aminophenol) compounds, bis (aminothiophenol) compounds and tetraamines.**"

Auxiliary request II (claims 1-10) differed from the main request in that claim 7 was amended as follows (amendments as compared to claim 7 as filed shown in **bold**):

"7. A composition of any one of Claims 1 to 6 further comprising C) a curative other than a compound that decomposes to produce ammonia, **wherein the curative is selected from the group consisting of organotin compounds, bis (aminophenol) compounds, bis (aminothiophenol) compounds and tetraamines.**"



In addition, claims 8-10 corresponded to claims 9-11 as granted, respectively and were amended so as to depend on claim 7.

Auxiliary request IIIA (claims 1-6) differed from the main request in that claim 1 was amended to read (amendments as compared to claim 1 as filed shown in **bold**):

"1. A curable composition comprising  
A. a perfluoroelastomer comprising copolymerized units of  
(1) tetrafluoroethylene, (2) a perfluorovinyl ether selected from the group consisting of perfluoro(alkyl vinyl) ethers, perfluoro(alkoxy vinyl) ethers, and mixtures thereof, and (3) a cure site monomer selected from the group consisting of nitrile-containing fluorinated olefins and nitrile-containing fluorinated vinyl ethers; and  
B. a compound, other than an ammonium salt of an organic or inorganic acid, that decomposes at temperatures between **90°C** and **220°C** to produce ammonia, **which is selected from the group consisting of aldehyde ammonia condensation products; hexamethylene tetramine; carbamates; urea; urea hydrochloride; thiourea; amides; metal amine complexes; ammonia-Lewis acid adducts; carboxamides; biuret; and unsubstituted amidines.**"

Claims 2-6 were identical to original claims 2-6. During the oral proceedings, the appellants withdrew their request for reimbursement of the appeal fee and further submitted the following document:

D24 :Advanced Organic Chemistry, 4th Edition, Jerry  
March, section 6-13 (3 pages)

IX. The appellant's arguments may be summarised as follows:

*Main request and auxiliary requests I-II*

Amendments

- (a) The limitation of claim 1 of the main request to a temperature range of between 90 and 220°C was not disclosed in the application as filed for the subject-matter of claims 7 to 11.
- (b) The expression "other than a compound that decomposes to produce ammonia" in original claim 7 was to be read in the light of claim 1 as "other than a compound that decomposes at temperatures between 40°C and 330°C to produce ammonia". Applying the same reading to claim 7 of either the main request or auxiliary request II, implied that the curatives C defined therein were now amended to curatives "other than a compound that decomposes at temperatures between 90°C and 220°C to produce ammonia". The amendment of the temperature range made in claim 1, which corresponded to a limitation of the original definition given for compound B, thus led to an extension of the definition of compound C in claim 7 of the main request as well as auxiliary request II as compared to original claim 7.

As a consequence, the main request and auxiliary request II did not meet the requirements of both Art. 123 (2) and (3) EPC.

- (c) The amendment made in claim 7 of auxiliary request I consisted in the deletion of a limiting feature originally disclosed, which led to an extension of subject-matter (Art. 123 (3) EPC).

#### *Auxiliary request IIIA*

#### Amendments

- (d) The amendments of claim 1 resulted from the combination of two independent passages of the application as filed which did not comply with Art. 123 (2) EPC.

#### Clarity

- (e) In the absence of any information regarding the reaction conditions, the feature "a compound that decomposes at a temperature between 90°C and 220°C to produce ammonia" was not clear.
- (f) It was not clear whether the term "amides" encompassed organic or inorganic compounds or both.
- (g) There was no accepted definition for the term "aldehyde-ammonia condensation product". Since claim 1 also mentioned hexamethylene tetraamine, which according to D24 was an aldehyde-ammonia condensation product", it was unclear which compounds were encompassed by the latter.

- (h) It was unclear how "unsubstituted amidines" were to be unambiguously distinguished from substituted amidines.

Sufficiency of disclosure

- (i) The patent did not provide any method or any explanation regarding the experimental conditions under which the requirement of claim 1 that compound B "decomposes at temperatures between 90°C and 220°C to produce ammonia" should be carried out and how this feature should be determined. Furthermore, the respondent had explained during the opposition proceedings that specific conditions were required and that a minimum amount of ammonia would have to be produced for the invention to work. The patent in suit, however, failed to disclose that information.
- (j) The patent in suit neither explained the purpose of the production of ammonia nor showed that ammonia was indeed produced when compounds B were heated at temperatures between 90°C and 220°C. The teaching of the patent in suit, which contained a single working example, was limited to the use of urea as a co-curing agent. Considering the broad classes of compounds B defined in claim 1 and the lack of information provided in the patent in suit about which compounds satisfied the requirement set out in claim 1, the skilled person had to perform a research program to find out which compounds could suitably be used as compound B.

Therefore, it was not possible to prepare a composition as claimed.

Inventive step

- (k) Considering paragraph [0017] of the patent in suit, no particular technical problem was solved over the whole scope of the claim. Consequently, the subject-matter of claim 1 could not be inventive and application of the problem-solution approach was not necessary.
- (l) Nevertheless applying the problem-solution approach and considering that the problem to be solved according to the patent in suit was to provide improved curatives as compared to the known ammonium salts, each of documents D1, D6, D7 or D8 represented a suitable closest prior art document.
- (m) Test report D23 had been late filed and did not provide a proper comparison between the claimed composition and the prior art since the amount of urea curative (illustrative of claim 1) was twice the amount of ammonium trifluoroacetate (comparative) on a molecular level. Therefore D23 was not relevant and should not be admitted in the proceedings.

In the absence of any evidence demonstrating an improvement of the claimed curative B over the ammonium salts according to the prior art, the problem effectively solved was merely to provide alternative curable compositions.

There was also no evidence on file relating to any other problem that might have been solved, in particular of the (in)solubility of curatives B in polymers A according to claim 1. The problem of (in)solubility should neither be considered for selecting the closest prior art nor for the formulation of the problem to be solved.

- (n) The solution claimed, which resided in the use of a compound B as defined in claim 1 as a curative, was obvious in the light of the teaching of either D5, which disclosed the use of ammonia as curing agent for perfluoroelastomers containing nitrile groups or of D20, which showed that it was known in the art that the ammonium salts of the prior art decompose under heat to produce ammonia.

X. The respondent essentially argued as follows:

*Main request and auxiliary requests I-II*

Amendments

- (a) The claimed fluoroelastomer compositions could comprise either compound B or a combination of compounds B and C. Claim 1 encompassed both embodiments, claim 7 was only directed to the second one. The application as filed taught that the same compounds B could be used in both embodiments. It was agreed that the expression "other than a compound that decomposes to produce ammonia" in original claim 7 was to be read as "other than a compound that decomposes at

temperatures between 40°C and 330°C to produce ammonia". However since the definition of compound C in claim 7 of the main request had not been amended and the same compounds B could be used in both embodiments, there was no new combination of compounds B and C so that Art. 123 (2) EPC was complied with. Also, the subject-matter claimed fell within the scope of claim 1 as granted (Art. 123 (3) EPC).

- (b) The amendment made in claim 7 of auxiliary request I aimed at deleting a functional, non limiting feature. Compounds C could be specified by their sole structures, as derivable from the description and examples. Art. 123(2) and (3) EPC were complied with.
- (c) Claims 7-10 of auxiliary request II corresponded to claims 8-11 as originally filed, fulfilling the requirements of Art. 123(2)(3) EPC.

*Auxiliary request IIIA*

Amendments

- (d) The amendments of claim 1 corresponded to the combination of preferred features related to the definition of compounds B in a single paragraph of the application as filed so that Art. 123 (2) EPC was complied with.

The amendment further amounted to a limitation of the subject-matter claimed in the patent in suit (Art. 123 (3) EPC).

### Clarity

- (e) The expression "decomposes at temperatures between (...) to produce ammonia" was already present in granted claim 1. The clarity objection was, therefore, not admissible.
- (f) There was no reason to read the term "amides" differently from its usual definition.
- (g) The term "aldehyde-ammonia condensation product" was well known in the art (D24).
- (h) The term "unsubstituted amidines" had its normal meaning that none of the hydrogen of the amidine should be substituted as also illustrated by the examples of the application as filed.
- (i) The requirements of Art. 84 EPC were, thus, met.

### Sufficiency of disclosure

- (j) The skilled person knew how to establish whether or not a compound decomposed to produce ammonia.
- (k) Several examples of compound B were illustrated in the patent in suit.
- (l) Methods of decomposition of compounds under heat were usual in the art as demonstrated by the experiments carried out without difficulty in Exhibits 1-4 by the appellant.



- (m) The appellant had not provided any evidence establishing that the skilled person would not be in a position to carry out the invention. The requirements of Art. 83 EPC were satisfied.

Inventive step

- (n) Only documents D1 and D7 addressed the problem of solubility of ammonium salt curatives, to which the patent in suit provided a solution. D7 shared more technical features with claim 1 than did D1. Neither D6 nor D8 dealt with ammonium salts. Therefore, D7 was the closest prior art document.
- (o) The problem to be solved resided in the provision of perfluoroelastomer compositions having an enhanced cure rate as compared to those with ammonium salts.
- (p) D23 was filed with the rejoinder to the statement of grounds of appeal i.e. as early as possible during the appeal proceedings. It provided a fair comparison between a composition illustrative of claim 1 and a composition according to the closest prior art. Therefore D23 should be admitted into the proceedings.

D23 showed that the problem had been successfully solved by using a compound B as defined in claim 1 as a curative. The comparison was made using the same amount by weight of curative.

(q) Paragraph [0017] of the patent in suit stated in general terms that difficulties in curing could arise under certain conditions but not that they would mandatorily occur. There was no evidence on file that the problem identified above would not be solved under any condition.

(r) Starting from D7 as the closest prior art the skilled person would have had no motivation to use a compound B as defined in claim 1 as a curative. None of the documents on file gave a hint in that direction. The subject-matter claimed was therefore not obvious.

XI. The appellant (opponent) requested that the decision under appeal be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed and the patent be maintained on the basis of the main request as filed with the letter dated 6 April 2010, or auxiliary requests I, II, IIIA, IVA, all filed during the oral proceedings of 29 November 2011, or auxiliary request V as filed with the letter dated 6 April 2010, or auxiliary request VI as filed during the oral proceedings of 29 November 2011.

XII. The Board announced its decision at the end of the oral proceedings.

## Reasons for the Decision

1. The appeal is admissible.

### *Main request*

2. Amendments
  - 2.1 Claim 1 corresponds to the combination of claim 1 as originally filed with a single passage of the original description (page 6, lines 22 to 27) relating to the preferred temperature range for the decomposition temperature. This amendment fulfils the requirements of Art. 123 (2) EPC.
  - 2.2 The compositions according to claim 7 contain a compound C defined as "a curative other than a compound that decomposes to produce ammonia". Claims 10 and 11, depending on claim 7, further exemplify compound C as being either diaminobisphenol AF or 3,3'-diaminobenzidine. Those compounds, which both contain  $\text{NH}_2$  radicals and hydrogen atoms, are susceptible to decompose to produce ammonia under heat as also demonstrated by the appellant in Exhibit 1, which shows that diaminobisphenol AF decomposes to produce ammonia when it is heated at  $300^\circ\text{C}$ . Hence, present claim 7 and claims 10-11 are inconsistent with each other.

Both parties agreed that the skilled person would understand that the expression "other than a compound that decomposes to produce ammonia" in claim 7 as granted was to be read as "other than a compound B that decomposes at temperatures between  $40^\circ\text{C}$  and  $330^\circ\text{C}$  to produce ammonia". The Board sees no reason to depart

from this view, which makes sense, is in line with the wording of claim 1 and is further confirmed by the first sentence of the passage on original page 7, lines 9-19. Hence, compound C in claim 7 is defined in a negative relationship to compound B according to claim 1, i.e. C is not B. As a consequence, the scope of claim 7 is directly affected by any modification of the definition of compound B according to claim 1. In particular, narrowing the temperature range of "between 40°C and 330°C" to "between 90°C and 220°C" for compound B leads to a broadening of the definition of C in claim 7: instead of being a compound that decomposes at temperatures lower than 40°C or higher than 330°C as originally disclosed, compound C according to claim 7 of the main request now is a compound that decomposes at temperatures lower than 90°C or higher than 220°C to produce ammonia. Hence, a compound that decomposes at 300°C to produce ammonia was excluded from the definition of C according to claim 7 as originally filed but is now included according to claim 7 of the main request. There is, however, no basis for a combination of compounds B and C thus defined in the application as filed. Therefore, the requirements of Art. 123 (2) EPC are not met and the main request is not allowable.

*Auxiliary request I*

3. Amendments

- 3.1 The four groups of compounds recited in claim 7 are identical to the list given in original claim 8 which, by reference to original claim 7, contained the further limiting feature "other than a compound that decomposes

to produce ammonia" (i.e. at temperatures between 40°C and 330°C; see point 2.2 above). That feature is not present in claim 7 of auxiliary request I. Due to the absence of this limiting feature, claim 7 may now comprise as compound C any compound encompassed by original claim 8, including those that decompose to produce ammonia at temperatures between 40°C and 330°C. There is no basis in the application as filed for such a broadening of the definition.

- 3.2 The passage on page 3, lines 9-13 of the application as filed is part of the summary of the invention and is to be read together with the preceding paragraph, which recites the wording of claim 1 as originally filed. Hence, this passage makes reference to compound B according to original claim 1.

The compounds illustrated on pages 8-9 of the application as filed are compounds C used in the second embodiment as originally disclosed on page 7, lines 9 to page 10, line 25, which concern compounds "other than a compound that decomposes at temperatures between 40°C and 330°C to produce ammonia" (page 7, lines 9-12 and 35-36). Hence, the argument of the respondent that the deletion in claim 7 of the expression "other than a compound that decomposes to produce ammonia" was supported by pages 8-9 of the application as filed cannot be followed.

- 3.3 Since, in view of the above, auxiliary request I does not meet the requirements of Art. 123 (2) EPC, it is not allowable.

*Auxiliary request II*

4. Amendments

Although the wording of each of claims 7-10 is identical to that of claims 8-11 as originally filed, respectively, due to the amended temperature range of claim 1 the same arguments apply as for the main request. Therefore, auxiliary request II does not fulfil the requirements of Art. 123 (2) EPC.

*Auxiliary request IIIA*

5. Amendments

5.1 The basis for claim 1 of auxiliary request IIIA is claim 1 as originally filed amended by narrowing the range used to define the decomposition temperature of B from "between 40°C and 330°C" to "between 90°C and 220°C" and restricting the definition of B to a list of various classes of compounds.

5.2 The amended temperature range corresponds to the preferred range disclosed on page 6, line 26 of the application as filed with regard to the range defining the decomposition temperature of B. The list of compounds corresponds to the complete list given on page 6, line 31 to page 7, line 4 of the application as filed. The list serves as an illustration of the ammonia producing compounds mentioned in the preceding passage. Therefore, the combination of those features is directly and unambiguously derivable from the application as filed (Art. 123 (2) EPC).

- 5.3 The same is valid regarding dependent claims 2-6.
- 5.4 Both amendments further amount to a limitation of the definition of compounds B as granted so that Art. 123 (3) EPC is also complied with.
6. Clarity
- 6.1 The clarity objections of the appellant were raised for the first time during the oral proceedings before the Board. They concern terms and expressions that had been present partly in the claims as granted and partly in auxiliary request I as filed with letter dated 6 April 2010 in reply to the appeal. Therefore, those objections could and should have been raised much earlier in the proceedings. The admissibility of those objections was, however, not objected to during the proceedings.
- 6.2 The temperature indication had been present in granted claim 1 so that the argument of the appellant that the claim lacked clarity because no measurement method was indicated cannot be accepted.
- 6.3 The term "amide" is commonly used in chemistry. The fact that different kinds of compound may be included by that term (e.g. organic and inorganic amides) is not an issue of clarity. The term should merely be read in its broadest sense.
- 6.4 The same is valid regarding the term "aldehyde-ammonia condensation product", which is to be read as encompassing any product obtained by condensation of aldehyde(s) and ammonia. The fact that the compound

"hexamethylenetetramine", which may be considered as an "aldehyde-ammonia condensation product" is recited *per se* in claim 1 does not prevent the skilled person to determine which compounds correspond to each of those terms. Hence, the presence of both terms in claim 1 does not render the scope of the subject-matter claimed unclear.

6.5 The normal meaning of the term "unsubstituted" is that the hydrogen atoms present in the compound, in this case amidines, are not substituted. Since this is in line with each of the illustrative examples given in the passage on page 7, lines 3-4 of the application as filed, corresponding to paragraph [0016] of the patent in suit, there is no reason to suppose that the term would mean anything else in the patent in suit.

6.6 Therefore the requirements of Art. 84 EPC are met.

## 7. Sufficiency of disclosure

7.1 Even though the patent in suit does not provide a method or give any explanations regarding the exact experimental conditions under which the requirement of the decomposition to ammonia should be fulfilled, except the temperature, components A and B as defined in claim 1 are further specified in paragraphs [0007]-[0015] and [0016] of the patent in suit as well as in the examples. According to paragraph [0029] and to the examples of the patent in suit, those compositions may be prepared using standard techniques. The patent in suit, thus, enables the skilled person to choose appropriate compounds for preparing the claimed composition using common methods. There is no evidence



on file that runs counter to that information provided in the patent in suit and that would render questionable that the skilled person is in a position to prepare a composition according to claims 1-6.

- 7.2 It is considered that methods of determination of ammonia production at temperatures between 90°C and 220°C are conventional and belong to the usual knowledge of the skilled person working in the field of chemistry. The claims do not require the use of any specific measuring method or the formation of any minimum amount of ammonia, in fact do not even require that the composition be cured ("curable composition"). Therefore, the question whether sufficient ammonia for curing is formed is not an issue of sufficiency.

Apart from that, there is neither evidence on file that different methods for measuring decomposition to ammonia would lead to significantly different results in the sense of whether or not a compound B would produce ammonia when heated at temperatures between 90°C and 220°C nor that an ambiguity in the determination method would render the skilled person unable to carry out the invention. Also, there is no evidence that a test to determine the decomposition to ammonia would be complicated to be carried out, or that it would amount to an undue burden. In that respect, it is noted that the appellants were able to perform measurements on ammonia decomposition, as reported in Exhibits 1-4 and in D19.

- 7.3 The classes of compounds B defined in claim 1 may be broad (see e.g. "amides"). However, the patent in suit provides e.g. in claims 2-5 and in paragraph [0016]

some guidance which compounds B may successfully be used to carry out the invention. The test to be performed to determine whether or not a compound falls under the definition of B according to claim 1 consists of mere heating at temperatures between 90 and 220°C and in analysing the decomposition products thus produced. There is neither evidence on file that this test is complicated to be carried out, nor that it would amount to an undue burden. The argument of the appellant that the skilled person would have to perform a research program in order to determine which compounds B may successfully be used can, thus, not be followed.

7.4 In view of the above, the requirements of Art. 83 EPC are fulfilled.

8. Novelty

8.1 It remained undisputed that none of the documents cited in the proceedings discloses a composition comprising a perfluoroelastomer A and a compound B as defined in claim 1.

8.2 The Board sees no reason to depart from this view. In particular D6, which was cited against novelty with regard to claim 1 of the main request, discloses curable compositions comprising i) perfluoroelastomers according to compound A of claim 1 and ii) e.g. a C4-bisamidrazone (claim 3 and examples 1-2), which was shown in D19 to be a compound that decomposes at temperatures between 90°C and 204°C to produce ammonia. Said C4-bisamidrazone, however, does not fall under any

of the classes of compounds recited in claim 1 to define compound B.

8.3 The subject-matter of claims 1-6 is, therefore, novel.

9. Inventive step

9.1 Closest prior art

9.1.1 The patent in suit relates to a curable perfluoroelastomer composition and aims at providing compositions that do not require the use of ammonium salts of organic or inorganic acid as curing agents for the perfluoroelastomer (paragraph [0005] of the patent in suit).

9.1.2 Curable perfluoroelastomer compositions are known from D7 which both parties, as well as the opposition division, considered to be the closest prior art document.

D7 discloses the use of an ammonium salt of an organic or inorganic acid as curing agent (claims 1, 4 and 5), ammonium polyfluorocarboxylates being particularly preferred in view of their dispersibility in the fluorine containing elastomers (col. 1, lines 27-32). D7 further aims at providing curable compositions of fluorine containing elastomer having nitrile groups as crosslinkable groups, whereby the obtained vulcanisation products have good heat and solvent resistance (col. 1, lines 5-10 and 40-48).

9.1.3 The appellant also mentioned D1, D6 and D8 as appropriate starting points.

D1 discloses the use of organic or inorganic ammonium salts as accelerators in combination with other, mandatory curatives (claims 1, 12-16). It aims at providing curable perfluoroelastomer compositions having excellent processability and which, when cured, have good thermal stability and chemical resistance (col. 1, lines 5-10). D1, hence, although it deals with the same problem as D7, does not have more features in common with the subject-matter now being claimed. Therefore it is not considered as representing a better starting point than D7.

D6 and D8 both deal with curable perfluoroelastomer compositions but do not deal with ammonium salts of organic or inorganic acid as curing agents and, thus, are not concerned with the problem posed by the patent in suit.

9.1.4 Under these circumstances, D7 is the closest prior art document.

9.2 Problem to be solved

The problem addressed by the patent in suit is to provide compositions of perfluoroelastomers having nitrile groups exhibiting an improved cure rate as compared to compositions comprising curatives according to D7 (paragraphs [0002]-[0005] of the patent specification).

### 9.3 Solution

The solution to the above problem resides in the compositions defined in present claim 1, which contain as curative a compound B as defined therein. As the perfluoroelastomers disclosed in D7 correspond to compound A of claim 1, the distinguishing feature of said claim 1 over D7 resides therefore in compound B.

### 9.4 Success of the solution - Problem effectively solved

9.4.1 The patent in suit contains no comparison to the closest prior art D7.

9.4.2 D23 was submitted by the respondent with its first response to the statement of grounds of appeal i.e. in accordance with Art. 12 of the Rules of Procedure of the Boards of Appeal. Considering that D23 was submitted approximately one and a half year before the oral proceedings before the Board of Appeal took place, the appellants had sufficient time to take it into account and to perform counter experiments.

D23 compares the cure characteristics of an example according to the subject-matter now being claimed to that of a control composition differing therefrom in that an ammonium salt according to D7 is used as curative. D23 is considered as *prima facie* pertinent for the present decision and is therefore admitted into the proceedings.

9.4.3 Document D23 shows that using urea, i.e. a compound B according to claim 1, as curative for compositions of a perfluoroelastomer A according to claim 1 leads to

shorter curing times and improved processability, than when using an equivalent weight of ammonium trifluoroacetate, which is one of the preferred curatives disclosed in D7. The parameters reported in D23 are, though not exactly the same, similar to the parameters listed in paragraph [0033] of the patent in suit, and also serve to evaluate the cure rate of the perfluoroelastomer compositions. Hence, the results shown in D23 can be accepted as evidence for the technical effect due to the use of compounds B as claimed. This effect is directly derivable from the patent in suit (and from the application as filed) and may be taken into account for the assessment of the inventive step.

In D23 the effect has been shown for an equivalent weight of both curatives. According to paragraph [0005] of the patent in suit the solubility in perfluoroelastomers of curatives plays a role in their effectiveness, which, as argued by the respondent, was based on weight rather than molecular amounts. This was not contested by the appellant. Therefore the argument of the appellant that D23 did not represent a fair comparison to the closest prior art cannot be followed.

- 9.4.4 Although the improvement in terms of cure rate has only been shown in relation to the use of a single compound B according to claim 1 (i.e. urea) as curative as compared to a single ammonium salt according to D7 (ammonium trifluoroacetate), there is no evidence on file that the effect is not present for other pairs of compound B/ammonium salt. There is no reason to believe that the claimed effect would not be present over the whole scope of the claim.

9.4.5 In view of the above, the Board is satisfied that the technical problem as defined in section 9.2 above has been effectively solved.

9.5 Obviousness

9.5.1 It remains to be decided whether or not it was obvious to solve the above identified problem by modifying the compositions of D7 in such a way as to arrive at present claim 1, i.e. whether or not it was obvious, starting from D7, to use as curative a compound B as defined in claim 1.

9.5.2 In this regard, each of D5, D9 and D11 teaches that compositions comprising perfluoroelastomers A according to claim 1 may be cured under heat in the presence of ammonia, the latter being either produced *in situ* by decomposition of residual amounts of the dispersant used to prepare the fluoropolymers (D5: page 1437, bottom paragraph; Scheme 1; page 1439; page 1440, paragraph below Fig. 5) or being introduced in the fluoropolymer composition (D9: page 518: Scheme 32; D11: col. 1, line 56 to col. 2, line 30; examples 45-46).

D8 further teaches that the vulcanisation of perfluoropolymers containing nitrile groups is accomplished by heating them in the presence of substances known to promote the formation of triazine rings by trimerization of nitriles (page 8, lines 54-57).

Document D20, which was also relied upon by the appellant, merely teaches that ammonium salts decompose under heat to produce ammonia (page 243, section 1).

None of the documents cited in the proceedings, in particular those specified above, discloses the use in a perfluoroelastomer composition of a compound falling under the definition of B as defined in present claim 1. Therefore, there is no information in the prior art that such compounds might be used in order to improve the curing properties of perfluoroelastomer compositions, so that the subject-matter of claim 1 is not obvious.

9.6 The appellants have further raised an objection of lack of an inventive step which was not based on the problem-solution approach (see section IX (k)). However, even if no problem is apparently solved, it may always be formulated in a less ambitious way e.g. as the provision of further compositions as alternative to those of the prior art. By not following the problem-solution approach, the appellant disregarded the cited prior art and failed to assess the obviousness of the solution proposed by the patent in suit to the problem effectively solved in the light of the cited prior art. The argument was, thus, not followed.

9.7 Therefore, the subject-matter of claim 1 complies with the requirements of Art. 56 EPC. Since claims 2-6 are dependent on claim 1, those, too, fulfil the requirements of Art. 56 EPC.

10. Auxiliary request IIIA being allowable there is no need to consider the other auxiliary requests.



**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 in order to maintain the patent on the basis of auxiliary request IIIA as filed during the oral proceedings of 29 November 2011 and after any necessary consequential amendment of the description.

The Registrar:

The Chairman:

E. Görgmaier

B. ter Laan