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**Datasheet for the decision  
of 24 January 2024**

**Case Number:** T 1446/21 - 3.3.09

**Application Number:** 09741913.9

**Publication Number:** 2274370

**IPC:** C08J9/00

**Language of the proceedings:** EN

**Title of invention:**

COMPOSITIONS OF EXPANDABLE VINYL AROMATIC POLYMERS WITH AN  
IMPROVED THERMAL INSULATION CAPACITY, PROCESS FOR THEIR  
PREPARATION AND EXPANDED ARTICLES OBTAINED THEREFROM

**Patent Proprietor:**

versalis S.p.A.

**Opponents:**

Total Research & Technology Feluy  
Synthos S.A.

**Headword:**

Expandable polymers with improved thermal insulation/VERSALIS

**Relevant legal provisions:**

EPC Art. 56, 100(a), 111(2)

**Keyword:**

Inventive step - (no)

The present board is bound by the ratio decidendi of the first appeal decision relating to the distinguishing feature over closest prior art document D32

**Decisions cited:**

T 1545/08, T 1821/15, T 2337/16, T 0961/18, G 0002/21

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 1446/21 - 3.3.09

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.09**  
**of 24 January 2024**

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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
14 July 2021 concerning maintenance of the  
European Patent No. 2274370 in amended form.**

**Composition of the Board:**

**Chairman**           A. Haderlein  
**Members:**           M. Ansorge  
                          A. Jimenez

## Summary of Facts and Submissions

- I. Opponents 1 and 2 (appellants 1 and 2) lodged appeals against the opposition division's interlocutory decision holding the main request allowable.
- II. The present appeal is the second appeal concerning European patent Nr. 2274370. The decision in the first appeal case, T 1821/15, was taken by this board in a different composition.
- III. With their notices of opposition, opponents 1 and 2 had requested that the patent be revoked on the ground for opposition under Article 100(a) EPC (lack of inventive step), *inter alia*.
- IV. The opposition division decided, *inter alia*, that the subject-matter claimed in the main request did involve an inventive step in view of D32 as the closest prior art.
- V. Claims 1 and 7 of the main request read as follows:
- "1. Compositions of expandable vinyl aromatic polymers which comprise:
- a) a polymeric matrix obtained by polymerizing a base comprising 50-100% by weight of one or more vinyl aromatic monomers and 0-50% by weight of at least one co-polymerizable monomer;
- b) 1-10% by weight calculated with respect to the polymer (a), of an expandable agent englobed in the polymeric matrix;

c) 0.05-25% by weight, calculated with respect to the polymer (a), of an athermanous filler comprising coke, in particle form with an average diameter of the particles ranging from 0.5 to 100  $\mu\text{m}$  and with a surface area, measured according to ASTM D-3037/89 (BET), ranging from 5 to 20  $\text{m}^2/\text{g}$ ."

"7. Expanded extruded sheets of vinyl aromatic polymers comprising a cellular matrix of a vinyl aromatic polymer having a density ranging from 10 to 200  $\text{g}/\text{l}$ , an average cell dimension ranging from 0.05 to 1.00 mm and containing from 0.05 to 25% by weight of an athermanous filler comprising said coke in particle form with an average diameter of the particles ranging from 0.5 to 100  $\mu\text{m}$  and a surface area, measured according to ASTM D-3037/89 (BET), ranging from 5 to 20  $\text{m}^2/\text{g}$ ."

Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the feature "the composition being in the form of substantially spherical beads/granules with an average diameter ranging from 0.2 to 2 mm, in which said athermanous filler comprising coke is homogeneously dispersed" has been introduced at the end of the claim.

Claim 1 of auxiliary request 2 is identical to claim 7 of the main request.

VI. The following documents were cited in the present case:

- D9: Data sheet "Carbon Additives for Polymer Compounds", which includes data with respect to TIMREX<sup>®</sup> PC 40-OC Coke  
D32: WO 2007/119102 A2  
Document 2: Experimental report of the proprietor, testing coke (Asbury 4023), graphite

(Timcal PP10) and carbon black (Degussa  
Printex 85)

VII. The parties' relevant arguments, submitted in writing and during the oral proceedings, are set out in the reasons for the decision below.

VIII. Requests

The appellants requested that the decision be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed (main request) or, as an auxiliary measure, that the patent be maintained on the basis of auxiliary request 1 or auxiliary request 2 as filed on 16 December 2020.

## Reasons for the Decision

Main request

1. Binding effect of T 1821/15 (Article 111(2) EPC)
  - 1.1 As can be taken from Chapter V.A-10.4 of the 10<sup>th</sup> edition of the Case Law of the Boards of Appeal, the boards are bound by their own initial decision in subsequent appeal proceedings following remittal, if a second appeal relating to the same subject-matter is brought before them (a "self-binding" effect). The binding effect of the initial decision extends to all further findings made by the board in so far as they were decisive for the outcome of that decision and the facts have not changed (T 961/18; see also T 1545/08). However, a board is bound only in so far as the facts are the same and only to the extent of its legal assessment in the initial decision (T 2337/16). A board is not bound in this way where the facts underlying the initial decision have changed (Art. 111(2) EPC).
  - 1.2 Claim 1 of the main request in the present appeal is identical to claim 1 of the request assessed for novelty over D32 in the first appeal (referred to as the "new first auxiliary request" in point 8 of T 1821/15), and therefore the present (second) appeal relates to the same subject-matter as the first appeal. In addition, the facts have not changed between the first appeal and the second one. Thus, the present board is bound by the *ratio decidendi* of the first decision T 1821/15 (Article 111(2) EPC).



1.3 In the first appeal decision, the then competent board decided with respect to the novelty objection over D32 as follows (see point 8.2 of T 1821/15):

"This document discloses compositions of expandable vinyl aromatic polymers which are prepared by a mixture of ethylenically unsaturated monomers containing at least 25 wt.% of one or more styrenic monomers and from 0.01 to 10 wt.% of a particulate solid, the weight percentages based on the weight of the mixture (abstract; page 4, lines 7-16; claim 1). The particulate solid is selected from a list of materials including coke (page 12, line 22 to page 13, line 2; claim 4). The particulate solid has a particle size of from 0.001 to 5  $\mu\text{m}$  (page 13, lines 7-12; claim 5). However, as acknowledged by respondent 1, D32 does not disclose the surface area of the particulate solid."

1.4 In this context, the respondent argued that there was no guidance in the list of particulate solids provided in the paragraph bridging pages 12 and 13 of D32 for selecting coke, let alone coke having the claimed ranges for the average particle diameter and the BET surface area. This list was merely a "laundry list" of possible solids, without an explanation as to which materials had improved insulating properties.

1.5 However, in the view of the present board, the conclusion the then competent board reached in point 8.2 of T 1821/15 can only be understood such that it had decided that the only difference over D32 was that D32 did not unambiguously disclose, either explicitly or implicitly, the feature "surface area, measured according to ASTM D-3037/89 (BET), ranging from 5 to 20  $\text{m}^2/\text{g}$ " as specified in claim 1. The

remaining features of claim 1 are disclosed in combination in D32. In the present board's opinion, the conclusion made in point 8.2. of T 1821/15 cannot be understood in any other way. Thus, the respondent's argument that there is no guidance in D32 for selecting coke as the particulate solid, insofar as this intended to establish a further difference over D32, must fail. This argument will be addressed in the discussion of obviousness below.

- 1.6 In addition, it can be inferred from point 2.2.2 of T 1821/15 that the average particle diameter and the BET surface area mentioned in claim 1 relate to the coke defined in claim 1 and not to the more general term "athermanous filler". The present board is also bound by this conclusion.
- 1.7 As a consequence, in the following discussion of inventive step in view of D32 as the closest prior art, the only difference over D32 is the feature of the coke having a "surface area, measured according to ASTM D-3037/89 (BET), ranging from 5 to 20 m<sup>2</sup>/g", which is not unambiguously disclosed in D32.
2. Inventive step
  - 2.1 The appellants argued, *inter alia*, that the subject-matter of claim 1 of the main request did not involve an inventive step in view of D32 as the closest prior art. In the absence of any demonstrated improvement over D32 resulting from the distinguishing feature over D32, i.e. the BET surface area of the coke, the problem to be solved was merely the provision of an alternative composition of expandable polymers. Using coke having a BET surface area in the claimed range was an obvious alternative in view of D32.

- 2.2 The board concurs with this view for the following reasons:
- 2.2.1 It was common ground between the parties that D32 qualifies as the closest prior-art document in the present case. The board shares this view.
- 2.2.2 D32 discloses a composition of expandable vinyl aromatic polymers comprising coke as a particulate solid (see, for instance, claim 1 of D32). The materials of D32 can be used in construction and building applications that benefit from low thermal conductivity, light weight and improved insulation properties (see page 1, lines 10 to 14, of D32). As concluded in point 1 above, the only difference over D32 is that the BET surface area of the coke is not disclosed in D32.
- 2.2.3 The respondent argued that the claimed composition led to improved thermal insulating properties compared to those of D32. In its view, this could be derived from the examples of the patent and in particular from the experimental data (document 2) in which Asbury 4023 coke, which falls within the definition of the coke specified in claim 1, was compared to Timcal PP10 graphite and Degussa Printex 85 carbon black.
- 2.2.4 However, neither the examples of the patent nor the experimental report (document 2) is suited to demonstrate an improvement over D32 since none of these experiments tested a coke as disclosed on page 13, line 1, of D32. At best, these experiments could be used to demonstrate an improvement over carbon black or graphite as a filler for expandable compositions. However, since D32 discloses coke as a filler (see

point 1 above), the above-mentioned experiments are not capable of demonstrating an improvement originating from the only distinguishing feature over D32, i.e. the BET surface area of the coke. Thus, no improvement over D32, be it improved thermal insulation properties or improved foaming properties, can be acknowledged.

- 2.2.5 With respect to the respondent's argument regarding the allegedly improved foaming characteristics, the board shares the appellants' view that a skilled person would not infer that this effect is encompassed by the technical teaching and embodied by the same originally disclosed invention (see Headnote II. of G 2/21). Thus, in addition to the reason given in point 2.2.4 above, the respondent cannot rely on improved foaming characteristics in the present case. Moreover, improved foaming characteristics are merely an unfounded allegation which is not supported by any evidence.
- 2.2.6 As already stated in point 6.3 of the present board's communication pursuant to Article 15(1) RPBA, the conclusion reached in point 2.2.4 above is true irrespective of whether claim 1 were to be interpreted as comprising only some coke as the athermanous filler or as the athermanous filler being entirely coke (or as comprising coke in an effective amount or as the main component of the athermanous filler). In view of this assessment, the question of how to interpret the claim feature "0.05-25% by weight ... of an athermanous filler comprising coke", i.e. whether the numerical weight percent range relates to the athermanous filler or to the coke, is not relevant to the case at hand.
- 2.2.7 In view of the above, the objective technical problem is considered to be the provision of an alternative composition of expandable polymers.

2.2.8 With respect to the question of obviousness, the respondent argued that the relevant disclosure of D32 (the paragraph bridging pages 12 and 13) did not provide any teaching that the particulate solids mentioned therein led to improved insulating properties. In its view, the expression "any suitable particulate solid can be used in the present invention as long as it improves the insulating properties of the composition" (see page 12, lines 22 to 24, of D32) actually related to a research programme and did not contain any guidance as to which of the listed particulate solids were capable of achieving this effect. The list given in the paragraph bridging pages 12 and 13 of D32 was merely a "laundry list", without giving any guidance as to which of the solids might have the desired effect. In addition, it did not provide any teaching with respect to the specific coke having the BET surface area required in claim 1, let alone any hint that such a coke might have desirable and improved properties such as improved thermal insulation. In addition, the only example of D32 used carbon black as the athermanous filler. Moreover, the respondent argued that a suitable athermanous filler for expandable compositions must have other properties; in particular, it should be highly compatible with the polymer matrix so as to avoid impairment of mechanical properties and it should not be detrimental to the polymer expansion.

2.2.9 The board does not agree, since coke is disclosed in D32 as a filler of the expandable composition (see point 1 above). Thus, the respondent's argument that the only example of D32 uses carbon black as the athermanous filler and not coke must fail. Similarly, the argument that suitable athermanous fillers for

expandable compositions need to have other properties must also fail for the same reason.

- 2.2.10 The respondent's line of argument that the list of solids provided in the paragraph bridging pages 12 and 13 of D32 was merely a "laundry list" and that a research programme was necessary to find out which of the solids mentioned therein had thermal insulating properties must also fail. As concluded in point 1 above, coke is disclosed in D32 as a filler of the expandable composition; coke being an athermanous material. Thus, no further guidance is required in D32 since coke is disclosed therein as a filler of the expandable composition.
- 2.2.11 For the sake of completeness, it is noted that the average particle diameter is not a distinguishing feature over D32 either. Thus, the respondent's arguments relating to the influence and importance of the particle size of the coke are not convincing either.
- 2.2.12 The fact that coke as a filler is not mentioned on page 2, lines 8 to 11, of D32 as an athermanous material is not relevant since this passage of D32 merely relates to the background art and not to the invention underlying D32. The relevant part of D32 is the paragraph bridging pages 12 and 13, which relates to particulate solids for improving insulating properties.
- 2.2.13 The board cannot agree with the respondent's statement that it can only be argued with hindsight that the skilled person would have known from D32 to select coke and in particular coke having the claimed average particle diameter range and BET surface area range. As

outlined above, there is no requirement to select coke (in general) in the disclosure of D32, coke being disclosed as a filler of the expandable composition (see point 1 above).

- 2.2.14 In the absence of a demonstrated improvement resulting from the distinguishing feature (BET surface area) over D32, it is an obvious measure for a skilled person to contemplate using a coke having a BET surface area falling within the claimed range. To select a coke having such a BET surface area would be an arbitrary choice for a skilled person having knowledge of D32. For instance, D9 supports the fact that a coke having the required BET surface existed in the prior art. Selecting coke having the required BET surface area as defined in claim 1 is a routine measure for a skilled person, which does not require further guidance. The claimed subject-matter is therefore an obvious alternative in view of the teaching of D32.

Thus, the subject-matter of claim 1 of the main request does not involve an inventive step over D32 as the closest prior art.

- 2.2.15 The same applies to claim 7 of the main request, which is directed to expanded extruded sheets containing an athermanous filler comprising coke which is defined almost identically to the athermanous filler of claim 1 (except for a missing comma; see also point 2.2.2, page 16, lines 5 to 9, of T 1821/15). The respondent did not submit any arguments as to why the expanded extruded sheets of claim 7 of the main request might have to be judged differently in view of D32 as the closest prior art. The board also fails to see why claim 7 of the main request could be judged differently from claim 1.

Thus, the subject-matter of claim 7 of the main request does not involve an inventive step over D32 as the closest prior art either.

#### Auxiliary requests

3. Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the feature "the composition being in the form of substantially spherical beads/granules with an average diameter ranging from 0.2 to 2 mm, in which said athermanous filler comprising coke is homogeneously dispersed" has been introduced.

The respondent did not submit any arguments as to why this limitation of claim 1 of auxiliary request 1 might lead to a different inventive-step ruling in view of D32 as the closest prior art. The board does not see why it could be judged differently from claim 1 of the main request either. In particular, the additional feature is not considered to confer any limitation over D32, which discloses resin beads having a diameter falling within the claimed range (see page 22, lines 23 to 30).

Thus, it is concluded that the subject-matter of claim 1 of auxiliary request 1 does not involve an inventive step in view of D32 as the closest prior art.

4. Claim 1 of auxiliary request 2 is identical to claim 7 of the main request. For the reasons set out in point 2.2.15 above, the subject-matter claimed in auxiliary request 2 does not involve an inventive step in view of D32 either.



**Order**

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

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



K. Götz-Wein

A. Haderlein

Decision electronically authenticated