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Datasheet for the decision of 11 March 2026

Case Number: T 0528/24 - 3.3.03

Application Number: 19151649.1

Publication Number: 3680284

IPC: C08J9/00, C08J9/10

Language of the proceedings: EN

Title of invention:
HIGHLY FIRE-RESISTANT EXPANDED POLYMERIC MATERIAL

Patent Proprietor:
Armacell Enterprise GmbH & Co. KG

Opponent:
Kaimann GmbH

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 13(2)

Keyword:
Inventive step - all requests (no)
Amendment after notification of communication - exceptional circumstances (no)

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Case Number: T 0528/24 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 11 March 2026

Appellant: (Opponent)	Kaimann GmbH Hansastraße 2-5 33161 Hövelhof (DE)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Respondent: (Patent Proprietor)	Armacell Enterprise GmbH & Co. KG Zeppelinstrasse 1 12529 Schönefeld OT Waltersdorf (DE)
Representative:	Vossius & Partner Patentanwälte Rechtsanwälte mbB Siebertstrasse 3 81675 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 13 February 2024 rejecting the opposition filed against European patent No. 3680284 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	D. Semino
Members:	O. Dury
	M. Millet

Summary of Facts and Submissions

I. The appeal of the opponent lies against the decision of the opposition division rejecting the opposition lodged against European Patent No. 3 680 284.

II. The following documents were, among others, cited in the decision under appeal:

D3: Rubber Technology, Compounding and Testing for Performance, Edited by J. S. Dick, Carl Hanser Verlag, Munich, 2001, pages 325-343 and 489-503
D4: EP 3 006 491 A1
D7: Z. Ding et al., J. Appl. Polym. Sci., 2017, 134, 44929, pages 1-9
D12: L. A. Hollingbery and T. R. Hull, Polym. Degrad. Stab., 2010, 95, pages 2213-2225
D18: Experimental report in view of D4 to D7
D19: Experimental report showing ternary synergism
D25: Declaration of M. J. Anderson and M. A. Bezener, signed on 4 October 2023 and 17 October 2023

III. In this decision, the opposition division held, among others, that the subject-matter of the claims as granted involved an inventive step when document D7 was taken as the closest prior art. Further considering that none of the other objections raised by the opponent were successful, the opposition was rejected.

IV. The opponent (appellant) lodged an appeal against this decision.

V. With the rejoinder to the statement of grounds of appeal, the respondent (patent proprietor) filed several sets of claims as auxiliary requests 1 to 9.

VI. The parties were summoned to oral proceedings and a communication pursuant to Article 15(1) RPBA dated 17 September 2025 setting out specific issues to be discussed at the oral proceedings was then sent to the parties.

VII. With letters of 11 December 2025 and 20 February 2026, the respondent filed further submissions.

VIII. With letter of 10 February 2026, the appellant argued that the respondent's submissions filed with letter of 11 December 2025 contained additional facts and evidence which constituted an amendment to the respondent's case and requested that these new facts and evidence should not be admitted into the proceedings.

IX. Oral proceedings were held on 11 March 2026 in the presence of both parties.

At the beginning of the oral proceedings the respondent indicated that they did not pursue their request that had been made in writing that, should the appeal not be dismissed, the case be remitted to the opposition division on the basis of any of the auxiliary requests 1 to 9.

In reply to a question by the Chairman the respondent further stated that, with regard to inventive step starting from document D7, they would no longer rely on the evidence and submissions based thereon that were made in their letter of 11 December 2025, whose

admittance had been objected to by the appellant. Both parties further agreed that, in these circumstances, the question of inventive step based on D7 as the closest prior art could be addressed without it being necessary to decide on the admittance of any documents and evidence (minutes: middle of page 2).

When the question of inventive step of claim 1 of auxiliary request 2 was addressed, the appellant argued that the line of defence put forward by the respondent on the day of the oral proceedings was an amendment to the respondent's appeal case and requested that it should not be admitted into the proceedings (minutes: middle of page 3 to top of page 4). In addition, towards the end of the oral proceedings, the appellant withdrew their request that had been made in writing that auxiliary requests 6 to 9 should not be admitted into the proceedings (minutes: bottom of page 4).

X. The **final requests** of the parties were as follows:

(a) The appellant requested that the decision under appeal be set aside and that European patent No. 3 680 284 be revoked.

(b) The respondent requested that the appeal be dismissed (main request) or, in the alternative, that the patent be maintained in amended form on the basis of any of auxiliary requests 1 to 9 filed with the rejoinder to the statement of grounds of appeal.

XI. Claim 1 of the **main request** (patent as granted) read as follows:

"1. An expanded polymeric material consisting of at

least 300 phr, but less than 1200 phr, ingredients in total by mass, the expanded polymeric material comprising:

100 phr rubber,

expandable graphite,

at least one alkaline earth metal component selected from alkaline earth metal carbonates, alkaline earth metal hydroxides, hydrates of either, and combinations thereof, wherein the at least one alkaline earth metal component contains more than 60 wt.-% of a total of hydrated magnesium carbonate and magnesium calcium carbonate, and

a component containing silica or silicate."

XII. Claim 1 of **auxiliary request 1** differed from claim 1 of the main request in that:

- The amount of expandable graphite was specified to be from 5 to 200 phr;

- The amount of the at least one alkaline earth metal component was specified to be from 50 to 500 phr;

- The amount of the component containing silica or silicate was specified to be from 5 to 200 phr.

XIII. Claim 1 of **auxiliary request 2** differed from claim 1 of auxiliary request 1 in that the definition of the component containing silica or silicate was amended as follows (additions as compared to claim 1 of auxiliary request 1 in **bold**):

"5 to 200 phr of a component containing silica or silicate, **wherein the component containing silica or silicate is a component consisting of silica and/or silicate.**"

XIV. Claim 1 of **auxiliary request 3** differed from claim 1 of auxiliary request 1 in that the definition of the component containing silica or silicate was amended as follows (additions as compared to claim 1 of auxiliary request 1 in **bold**):

"5 to 200 phr of a component containing silica or silicate, **wherein the component containing silica or silicate contains 25 to 100% by weight of SiO_2, as determined by elemental analysis using Atomic Absorption Spectroscopy (AAS).**"

XV. Claim 1 of **auxiliary request 4** differed from claim 1 of auxiliary request 1 in that the definition of the at least one alkaline earth metal component was amended as follows (additions as compared to claim 1 of auxiliary request 1 in **bold**):

"50 to 500 phr of at least one alkaline earth metal component selected from alkaline earth metal carbonates, alkaline earth metal hydroxides, hydrates of either, and combinations thereof, **which is a compound or mixture of compounds containing at least one alkaline earth metal ion, at least one hydrogen carbonate or carbonate ion and at least one hydroxyl group or water molecule,** wherein the at least one alkaline earth metal component contains more than 60 wt.-% of a total of hydrated magnesium carbonate and magnesium calcium carbonate."

XVI. Claim 1 of **auxiliary request 5** differed from claim 1 of auxiliary request 1 in that the definition of the at least one alkaline earth metal component was amended as follows (as compared to claim 1 of auxiliary request 1, additions are indicated in **bold**, deletions in ~~strikethrough~~):

"50 to 500 phr of at least one alkaline earth metal component ~~selected from alkaline earth metal carbonates, alkaline earth metal hydroxides, hydrates of either, and combinations thereof, wherein the at least one alkaline earth metal component contains more than 60 wt. % of a total of hydrated magnesium carbonate and magnesium calcium carbonate~~ **which is a mixture of huntite and hydromagnesite.**"

XVII. Claim 1 of **auxiliary requests 6 and 7** corresponded to claim 1 of auxiliary request 2 further amended as claim 1 of auxiliary requests 4 and 5, respectively.

XVIII. Claim 1 of **auxiliary requests 8 and 9** corresponded to claim 1 of auxiliary request 3 further amended as claim 1 of auxiliary requests 4 and 5, respectively.

XIX. The parties' submissions, insofar as they are pertinent, may be derived from the reasons for the decision below. The points of dispute were as follows:

- The question of inventive step of the subject-matter of claim 1 of the main request and of claim 1 of each of auxiliary requests 1 to 9 when document D7 was taken as the closest prior art.

- The admittance of the respondent's line of defence put forward during the oral proceedings in respect

of inventive step of auxiliary request 2.

Reasons for the Decision

Main request - Patent as granted

1. Claim interpretation

1.1 In the present decision, the features of granted claim 1 are referred to using the same numbering F1 to F7 as in the decision under appeal (point 2 of the reasons), defined as follows:

F1: An expanded polymeric material

F2: consisting of at least 300 phr, but less than 1200 phr, ingredients in total by mass, the expanded polymeric material comprising:

F3: 100 phr rubber,

F4: expandable graphite,

F5: at least one alkaline earth metal component selected from alkaline earth metal carbonates, alkaline earth metal hydroxides, hydrates of either, and combinations thereof,

F6: wherein the at least one alkaline earth metal component contains more than 60 wt.-% of a total of hydrated magnesium carbonate and magnesium calcium carbonate, and

F7: a component containing silica or silicate.

1.2 The appellant disagreed with the respondent (and the opposition division) regarding the interpretation of feature F6, specifically the wording of granted claim 1 stating that the alkaline earth metal component "contains more than 60 wt.% of a total of hydrated magnesium carbonate and magnesium calcium carbonate". While the respondent considered this wording to require the presence of *both* hydrated magnesium carbonate and magnesium calcium carbonate in the claimed expanded polymeric material (rejoinder: point 4.1; point 3.4.1.2.5.e of the reasons of the contested decision), the appellant argued that the requirement was fulfilled if *either* hydrated magnesium carbonate or magnesium calcium carbonate was present (statement of grounds of appeal: point 3.2.1). Although the Board shares the appellant's interpretation for the reasons given in points 6.4 and 6.5 of the communication pursuant to Article 15(1) RPBA, this issue is ultimately not relevant for the present decision. Therefore, there is no need to address the interpretation of feature F6 any further in the present decision.

1.3 The parties also disagreed on the interpretation of several other features of granted claim 1 (see section 6 in whole of the communication). However, as none of these issues is relevant for the present decision, the Board also does not need to deal with them any further.

2. Inventive step

2.1 Closest prior art and distinguishing features

2.1.1 It was common ground, in particular during the oral proceedings before the Board, that D7 constitutes a suitable document to be taken as the closest prior art and that the example "EC/5%EG/5%OMMT/5%MH" disclosed in table I thereof was particularly relevant and could be taken as starting point for the assessment of inventive step. This example is hereinafter referred to as "the relevant example of D7".

2.1.2 Both parties also agreed that said relevant example of D7 was directed to the preparation of an expandable polymeric material comprising:

- A total of 163 parts of rubbers according to above feature F3 (see table on pages 34-35 of the statement of grounds of appeal);

- 5 wt.% (9.1 phr) expandable graphite according to above feature F4;

- 5 wt.% (9.1 phr) magnesium hydroxide, which is an "alkaline earth metal component selected from alkaline earth metal carbonates, alkaline earth metal hydroxides, hydrates of either" as defined in above feature F5, but which does not meet the requirements defined in feature F6;

- 5 wt.% (9.1 phr) organically modified montmorillonite according to above feature F7.

2.1.3 In light of the list and amounts of ingredients in table I of D7, it was also undisputed that the subject-

matter of claim 1 as granted differs from the relevant example of D7 at least in that the total amount of ingredients is higher (above feature F2).

2.1.4 During the oral proceedings before the Board, the parties further agreed that the subject-matter of claim 1 as granted further differs from the relevant example of D7 in that the at least one alkaline earth metal component must contain, in addition to or instead of magnesium hydroxide, more than 60 wt.% of a total of a hydrated magnesium carbonate and a magnesium calcium carbonate (feature F6). In that regard, the concerns originally raised in writing by the respondent regarding the combined reading of features F5 and F6, which had been indicated to be not convincing in the Board's communication (point 6.4, with reference to the last full paragraph on page 63 of the rejoinder), were not pursued further during the oral proceedings.

2.1.5 The Board sees no reason to deviate from these assessments. Therefore, the expanded polymeric material according to granted claim 1 differs from the relevant example of D7 in the following features:

a) It contains a higher total amount of ingredients (feature F2);

b) The at least one alkaline earth metal component comprised therein should contain, in addition to or instead of magnesium hydroxide, more than 60 wt.% of a total of hydrated magnesium carbonate and magnesium calcium carbonate (as specified in features F5/F6).

2.2 Problem effectively solved over the closest prior art

2.2.1 Although the interpretation of feature F6 was contentious between the parties (see point 1.2 above), it was undisputed that granted claim 1 encompasses embodiments in which the at least one alkaline earth metal component defined therein either comprises more than 60 wt.% of a mixture of hydrated magnesium carbonate and magnesium calcium carbonate or consists of a mixture of hydrated magnesium carbonate and magnesium calcium carbonate. Therefore, **the assessment of inventive step is hereinafter confined to these specific embodiments of granted claim 1 in which the at least one alkaline earth metal component according to above features F5/F6 consists of either a mixture of hydrated magnesium carbonate and magnesium calcium carbonate or of a mixture of magnesium hydroxide together with these two components in the required amount.**

Distinguishing feature a) - Feature F2

2.2.2 The appellant's view that above distinguishing feature a) was not related to any technical effect (statement of grounds of appeal: point 6.3.1.2, top of page 36) was not contested by the respondent. The Board sees no reason to deviate from this view. In particular, the Board agrees with the appellant that above feature F2 does not impose that more fire retardants are present than in the relevant example of D7 because the term "ingredients" specified therein encompasses any material present in the expanded polymeric material being claimed. Therefore, as argued by the appellant, no technical effect can be acknowledged for distinguishing feature a) because undefined components cannot account for any specific

technical effect.

Distinguishing feature b) - Feature F6

2.2.3 In the decision under appeal, the opposition division considered that in light of the experimental data in the patent in suit and in D19, the technical effect achieved by the presence of a mixture of hydrated magnesium carbonate and magnesium calcium carbonate (feature F6) in addition to expandable graphite and silica or silicate was an unexpected improvement in fire retardancy resulting from a ternary synergistic effect brought by the combination of this mixture of components. Therefore, according to the opposition division, the objective technical problem was how to modify the composition of the relevant example of D7 in order to drastically improve fire spread resistance, fire penetration resistance and char integrity (reasons: points 3.4.1.3.2 and 3.4.1.3.3).

2.2.4 The respondent agreed with the findings of the opposition division and further argued, especially during the oral proceedings before the Board, that in light of the examples of the patent in suit and the experimental data contained in D18, D19 as well as the content of D25, the problem effectively solved over the closest prior art resided in the provision of an expanded polymeric material exhibiting a ternary synergism in terms of enhanced fire resistance, whereby said ternary synergism arose from the combination of the three components expandable graphite, alkaline earth metal component and component containing silica or silicate defined in above features F4, F5/F6 and F7, respectively. In this respect, the respondent considered that ternary synergism was achieved when these three components are present and the resulting

fire resistance is much higher than what could be expected by the sum of binary synergisms (see e.g. rejoinder: page 12, first four full paragraphs; page 13, last full paragraph; page 72, first full paragraph; letter of 20 February 2026: page 6, penultimate paragraph). According to the respondent, this ternary synergism was in particular illustrated by the figures on page 10 ("Half-Normal Plot"), page 11 ("Pareto Chart") and page 12 ("Cube Display") of D19.

2.2.5 In the statement of grounds of appeal, the appellant disagreed with the formulation of the technical problem proposed by the respondent. Considering that neither the experimental data of the patent in suit, nor those of D18 or D19 demonstrated a technical effect related to above distinguishing feature b), the appellant argued that the problem effectively solved over the relevant example of D7 resided in the mere provision of a further expanded polymeric material (statement of grounds of appeal: sections 6.3.1.2 and 6.3.1.3).

Patent in suit and experimental report D19

2.2.6 The Board shares the appellant's view that neither the experimental data of the patent in suit, nor those of D19 are related to a comparison of expanded polymeric materials that differ only in above distinguishing feature b), i.e. experiments in which magnesium hydroxide is replaced either in part or in total by a mixture of hydrated magnesium carbonate and magnesium calcium carbonate in the required amount. Therefore, these data are already for this reason not suitable to demonstrate that any effect is effectively achieved as compared to the closest prior art.

2.2.7 D19 is an experimental report aimed at studying the interaction with respect to fire retardancy properties of expandable polymeric materials comprising:

- 5 phr expandable graphite (according to feature F4); and/or

- 50 phr of the huntite-hydromagnesite mixture Ultracarb ARM 04 (D19: top of page 2; it was uncontested that this mixture meets the requirements defined in both features F5 and F6); and/or

- 5 phr silica (according to feature F7).

In this report, the fire retardancy of expandable polymeric materials differing only in comprising either a single one of these three components, combinations of any two of these components or the combination of all three components is compared. D19 contains data directed to both a mathematical methodology aimed at measuring the strength of the interactions between the three materials as well as experimental data.

a) The Board agrees with the respondent that the data of D19 (in particular the figures on pages 10, 11 and 12) and the declaration D25 support the respondent's argument that the specific combination of components used in D19 (5 phr expandable graphite/50 phr Ultracarb ARM 04/5 phr silica) shows a ternary synergism in terms of fire retardancy. In particular, while it is derivable from the figures on pages 10 and 11 of D19 that the combination of the three components is the strongest variable, the figure on page 12 of D19 (together with its interpretation in the four paragraphs following it) shows that the composition

comprising the three components exhibits a much better fire retardancy than a composition comprising any combination of two of these components. This is confirmed by the declaration of two experts in D25 that the data in D19 demonstrate a ternary synergism that is much more than a sum of the respective binary synergisms (see points 4 and 5 of D25, especially the end of point 4.5).

b) However, D19 fails to provide any comparison between the subject-matter according to granted claim 1 and the closest prior art.

c) It is established case law that an unexpected effect demonstrated in a comparative test can be taken as an indication of inventive step on condition that the nature of the comparison with the closest state of the art is such that the alleged advantage or effect is convincingly shown to have its origin in the distinguishing feature or combination of distinguishing features of the invention as compared with the closest state of the art (Case Law of the Boards of Appeal of the EPO, 11th edition, 2025, I.D.4.3.2). It is also established case law that tests comparing the invention with the prior art have to be conducted in such a way that any effect can be attributed to the distinguishing feature. However, it is also permitted – and might even be necessary – to modify prior art embodiments in line with the invention to such a degree that the only remaining difference is the feature distinguishing the claim. Thus, comparative tests do not always have to be carried out using the closest prior art which means that intrinsic comparative tests can be used as evidence of an effect. What is ultimately of relevance is not only whether a causal link between a distinguishing feature over the closest prior art and

an effect is demonstrated within the framework of a comparative test submitted by the patent proprietor, here the respondent. It also counts whether the variant of the closest prior art selected as a reference (or comparative) example for the comparative test is representative of the closest prior art, in the sense that the effect shown to be caused by the distinguishing feature in the context of the comparative test could also be expected to take place within the framework of the closest prior art despite the existence of differences vis-à-vis the reference example of the comparative test (Case Law, *supra*, I.D.4.3.2, see in particular the reference to T 1323/17).

c1) In view of the above, while the respondent is correct that a direct comparison with the closest prior art is not a necessary requirement in order to acknowledge an effect (letter of 11 December 2025: middle of page 7 to middle of page 8), they are also right that what is ultimately relevant is that it should be shown that the alleged effect is demonstrated to originate from the distinguishing feature of the invention compared with the closest prior art (here above distinguishing feature b)). In the present case, the Board arrived at the conclusion that the latter condition is not met for the following reasons.

c2) Considering that D19 does not contain any data related to compositions comprising magnesium hydroxide as "at least one alkaline earth metal component" according to feature F5, it does not address at all above distinguishing feature b). Therefore, it is highly questionable already for that reason that D19 may be suitable to show that any effect may be causally related to said distinguishing feature b).

c2) In addition, it can be inferred from the whole disclosure of D7 that the relevant example of D7 comprising the three components expandable graphite/ magnesium hydroxide/organically modified montmorillonite exhibits the best fire retardant properties compared with the other compositions studied therein and specified in table I (D7: table II; page 5/9, right hand side column, second full paragraph; page 6/9: right hand side column, first paragraph). Furthermore, it is disclosed in D7 that this particularly good fire retardancy is achieved because of the synergies not only between expandable graphite and organic montmorillonite but also between magnesium hydroxide and expandable graphite as well as between magnesium hydroxide and organic montmorillonite (page 5/9: paragraph below figure 3; see also page 5/9: left hand side column, last six lines). Therefore, D7 discloses that the relevant example thereof already exhibits, due to the combination of the three components expandable graphite/magnesium hydroxide/ organically modified montmorillonite, very good fire retardant properties. On that basis, since D19 neither provides a direct comparison of the ternary system studied therein with the relevant example of D7, nor any data related to above distinguishing feature b), it cannot be concluded that the effect shown e.g. in figure 12 of D19 demonstrates or at least renders credible that superior flame retardant properties, let alone significantly enhanced flame retardancy in terms of a ternary synergism as relied upon by the respondent, were shown to be causally related to above distinguishing feature b) and that this effect would be necessarily achieved in the context of the closest prior art.

c3) The Board further considers that this conclusion is confirmed by the fact that, as pointed out by the appellant (letter of 10 February 2026: page 6, third and fourth paragraphs; oral proceedings before the Board), it can be inferred from the application as filed (claim 1; paragraphs 27, 31 and 72) that, according to the respondent themselves, the ternary synergism they are relying upon would also occur in the context of the relevant example of D7 that comprises a combination of expandable graphite (feature F4), magnesium hydroxide as sole alkaline earth metal component (feature F5) and organically modified montmorillonite (feature F7). In this regard, it is specifically indicated in paragraph 72 of the application as filed that "(t)he present inventors have surprisingly found that the combination of a) expandable graphite, b) the at least one alkaline earth metal component, and c) the component containing silica or silicate leads to surprisingly improved flame spread resistance, fire penetration resistance and char integrity, which is believed to be a synergistic effect resulting from the combination of these three components. As can be seen from the experiments in the present application, only if each of these three components is present, were each of flame spread resistance, fire penetration resistance and char integrity at the highest level (5). If even one of these three components was absent, none of the flame spread resistance, fire penetration resistance and char integrity reached levels of more than 3. This synergism is thus highly surprising and would not have been expected based on the prior art." In addition, paragraphs 27 and 31 of the application as filed specifically disclose that the alkaline earth metal component may consist of a single component such as magnesium hydroxide. Accordingly, in the absence of any

counter-evidence on file, there is no reason to expect that the ternary combination of ingredients used in the relevant example of D7 (expandable graphite/magnesium hydroxide/organically modified montmorillonite) does not lead to a ternary synergism in terms of fire retardancy relied upon by the respondent. Also, in view of the evidence on file, the fire retardant properties of the expandable polymeric materials prepared in D19 and in D7 cannot be compared and the data of D19 are not suitable to demonstrate that any effect (especially in terms of fire retardancy) can be attributed to above distinguishing feature b).

c4) In the Board's view, this conclusion is also confirmed by the fact that, as pointed out by the respondent themselves (rejoinder: page 14, first to third full paragraphs), the three components studied in D19 (expandable graphite/huntite-hydromagnesite/silica) do not exhibit the same type of two-components-interactions as the three corresponding components of D7 (expandable graphite/magnesium hydroxide/organically modified montmorillonite). Whereas D7 teaches that each binary combination of components is synergetic (page 5/9: end of paragraph below figure 3), this is not the case for the three components used in D19, for which the combinations of silica with either expandable graphite or huntite-hydromagnesite are shown to exhibit an antagonistic effect in terms of fire retardancy (also referred to by the respondent as antisynergetic binary interaction). Accordingly, even if D19 shows a ternary synergism related to the three specific components used therein, it is not suitable to demonstrate an improvement in fire retardancy over the relevant example of D7, in particular an improvement that is causally related to above feature b).

d) For all these reasons, the Board considers that D19 does not demonstrate that the claimed expanded polymeric materials exhibit a ternary synergism in terms of enhanced fire resistance as compared to the relevant example of D7.

Experimental report D18, either alone or in combination with D19

2.2.8 In D18, the fire retardant properties of expanded polymeric materials according to example D7-6a (illustrative of the relevant example of D7) and examples D7-6b to D7-6d (in which various amounts of a mixture of huntite and hydromagnesite according to features F5/F6 as an additional component were used, whereby only the total amounts of ingredients used in examples D7-6c and D7-6d are according to feature F2 of claim 1 as granted) are compared. In particular, examples D7-6a to D7-6c concern compositions comprising the same amounts of expandable graphite, organic montmorillonite and magnesium hydroxide, whereby compositions D7-6b and D7-6c additionally comprise either 50 phr or 120 phr of the huntite/hydromagnesite mixture. Therefore, composition D7-6b and D7-6c both differ from the one of example D7-6a in above distinguishing feature b), whereby the expanded polymeric material prepared in example D7-6c is further in accordance with claim 1 as granted.

a) However, as pointed out by the appellant (statement of grounds of appeal: page 38, first full paragraph), the total amount of components according to above feature F5/F6 present in compositions D7-6b and D7-6c is significantly higher than that according to example D7-6a. In other words, compositions D7-6b and D7-6c not only differ from the composition D7-6a that

illustrates the closest prior art in above distinguishing feature b) but also in that a different total amount of alkaline earth metal component (features F5/F6) is used. In these circumstances, these examples of D18 are only suitable to demonstrate that an improvement in fire retardancy is achieved when an alkaline earth metal component such as huntite/ hydromagnesite is added to the composition of the closest prior art but not when huntite/hydromagnesite is used instead of at least part of the magnesium hydroxide while keeping the same amount of these fire retardant materials. Accordingly, the improvement in terms of fire retardancy shown in these examples of D18 cannot be held to be causally related to above distinguishing feature b), contrary to the respondent's view (rejoinder: page 54, paragraph below the table; see also the statement of grounds of appeal: page 37, last paragraph to page 38, second full paragraph).

b) The respondent argued that since the Board was inclined to acknowledge a ternary synergism on the basis of D19 when assessing inventive step in view of D4 as the closest prior art, this effect could not be disregarded when the starting point is the relevant example of D7 (letter of 11 December 2025: bottom of page 20 to top of page 21; oral proceedings before the Board). In addition, said ternary synergism would be present independently of whether or not additional components, in particular magnesium hydroxide, would be present (letter of 11 December 2025: page 10, last full paragraph; oral proceedings before the Board).

b1) However, for the reasons indicated above, the Board concluded that it was not credible, in view of the evidence on file, that an improvement in terms of fire retardant properties over the relevant example of D7

may be causally related to above distinguishing feature b). In addition, it was undisputed that the combination of fire retardant components according to above features F4, F5/F6 and F7 present in the relevant example of D7 is different from the component(s) present in the relevant example of D4 (in which only a huntite/hydromagnesite mixture was used) that was considered by the parties (also in appeal) as starting point for the assessment of inventive step over D4 (see e.g. point 3.4.1.2.1 of the contested decision). In these circumstances, there is no reason to consider that any conclusion drawn from the data in D19 regarding the formulation of the problem to be solved and the obviousness of the solution must be identical when assessing inventive step in view of either D7 or D4. For this reason, the respondent's argument is rejected.

b2) In addition, the Board considers that, although the fire resistance of example D7-6a (illustrative of the relevant example of D7 and comprising magnesium hydroxide as sole alkaline earth metal component according to above feature F5) is inferior to the one of examples D7-6b and D7-6c (composition of example D7-6a further comprising, in addition to magnesium hydroxide, a very large quantity of either 50 or 120 phr of a mixture of huntite and hydromagnesite according to the components specified in above feature F6), the fire resistance achieved in these three examples is, in the Board's view, not so different that it necessarily demonstrates a ternary synergism as argued by the respondent (see D18: top of page 10, time until failure for examples D7-6a, D7-6b and D7-6c is 00:37, 01:35 and 02:01 minutes, respectively).

General considerations

2.2.9 The respondent argued that the Board should take into account that whereas they had prepared a multitude of costly comparative experiments in D18 and D19 (completed by D25), the appellant had not provided any experiments of their own. In addition, the appellant had relied on a very large number of documents as closest prior art to increase the complexity of the case, to the detriment of the respondent/patent proprietor (letter of 11 December 2025: paragraph bridging pages 18 and 19; pages 22-23).

a) In that respect, the Board shares the view of the appellant that, in the present case, only two different lines of attack on inventive step advanced by the appellant were ultimately relevant, namely that based on D7 and that based on D4. Although additional documents had been considered as suitable closest prior art by the appellant, it follows from the contested decision (point 3.4.1.3), the statement of grounds of appeal (point 6.2.3) and the Board's communication (point 11) that these objections were in essence identical to that starting from D4.

b) It is further apparent from the contested decision (points 3.4.1.2 and 3.4.1.3), the statement of grounds of appeal (points 6.2 and 6.3) and the Board's communication (points 9 and 10) that the assessment of inventive step based on D4 differed in substance from that based on D7. Therefore, since it is established case law that if the skilled person has a choice between several workable routes, i.e. routes starting from different documents, which might lead to the invention, the rationale of the problem and solution approach requires that the invention be assessed

relative to all these possible routes, before an inventive step can be acknowledged (Case Law, *supra*, I.D.3.1, see in particular the sixth paragraph), it is entirely appropriate that the appellant provided two different lines of attacks during the opposition and appeal proceedings. In particular, the Board does not consider that this amounted to an abuse of the procedure.

c) In addition, it was the respondent's own decision to carry out experimental data such as those reported in D18 or D19 (including the mathematical methodology) and to provide additional information such as D25 in support of their line of defence. However, only the relevance of these experiments is ultimately of importance to the Board. The fact that these experiments may have been cumbersome and/or costly cannot play a role (respondent's letter of 11 December 2025: page 22, first to third paragraphs; oral proceedings before the Board).

d) For these reasons, the respondent's considerations indicated in point 2.2.9 above are not relevant.

2.2.10 In view of the above, the problem of providing enhanced fire retardancy resulting from a ternary synergism related to components according to above features F4, F5/F6 and F7 relied upon by the respondent was not shown to be credibly solved over the closest prior art. Therefore, the problem effectively solved over the relevant example of D7 resides in the mere provision of another expanded polymeric material with good fire resistance properties.

2.3 Obviousness

2.3.1 The question remains to be answered if the skilled person, desiring to solve the problem indicated in point 2.2.10 above, would, in view of the closest prior art, possibly in combination with other prior art or with common general knowledge, have modified the disclosure of the closest prior art in such a way as to arrive at the claimed subject matter.

Distinguishing feature a) - Feature F2

2.3.2 The appellant's view that above distinguishing feature a) was obvious (statement of grounds of appeal: point 6.3.1.4, bottom of page 40 to top of page 41) was not contested by the respondent. The Board also sees no reason to deviate from this view. In particular, the Board agrees with the appellant that it would be obvious to increase for instance the fire retardancy of the expandable polymeric materials being claimed by increasing, in commonly used amounts, the quantity of fire retardants contained therein. In doing so, the skilled person would arrive without inventive activity to an expandable polymeric material satisfying feature F2 as defined above.

Distinguishing feature b) - Feature F6

2.3.3 Regarding distinguishing feature b), it is agreed with the appellant that it is derivable from D12 (abstract; figure 2; section 3; page 2223, last paragraph) that a mixture of huntite/hydromagnesite as disclosed therein was known as a fire retardant at the filing date of the patent in suit. It was undisputed that such a mixture comprised both components specified in feature F6. As pointed out by the appellant (oral proceedings before the Board), it is in particular explicitly stated in D12 (page 2223: end of point 13 and last paragraph of

point 14) that mixtures of hydromagnesite and huntite provide fire retardant properties as good as or better than (...) magnesium hydroxide in non-halogen as well as halogen containing compounds. In these circumstances, it is obvious to solve the problem posed indicated in above point 2.2.10 by using a sufficient amount of huntite/hydromagnesite instead of at least part of the magnesium hydroxide present in the composition according to the relevant example of D7, thereby meeting the requirements of above feature F6 (both in terms of the required nature of both components and the total amount thereof).

2.3.4 The respondent argued that the skilled person knew that magnesium hydroxide had better fire retardancy properties than a mixture of huntite and hydromagnesite. Therefore, the skilled would have had no incentive to replace any of the magnesium hydroxide in the relevant example D7 by a huntite/hydromagnesite mixture, let alone to add any, with the expectation of obtaining a ternary synergistic composition (rejoinder: paragraph bridging pages 63-64).

a) However, the respondent's view regarding the fire retardancy of magnesium hydroxide vs. huntite/ hydromagnesite mixtures is not in line with the disclosure of points 13 and 14 of D12 mentioned in point 2.3.3 above (see above point 2.3.3). Therefore, this argument is rejected.

b) In addition, considering that the problem to be solved by above distinguishing feature b) resides in the provision of a further expanded polymeric material with good fire resistance properties as an alternative to the relevant example of D7 (since the ternary synergistic effect relied upon by the respondent is not

taken into account for the formulation of the problem effectively solved over the closest prior art), this argument cannot succeed.

2.3.5 Although the respondent considered that some passages of D12 could have hindered the skilled person from combining hydromagnesite with organically modified montmorillonite as used in D7 (rejoinder: page 68, last three paragraphs), they also pointed out that these passages were not related to mixtures of huntite and hydromagnesite with organically modified montmorillonite (rejoinder: top of page 69). The Board agrees with the latter consideration and, for that reason, is also of the opinion that the disclosure of D12 mentioned by the respondent would not have prevented the skilled person from combining the teaching of D7 with that of D12 as indicated in above point 2.3.3.

2.3.6 For these reasons the subject-matter of claim 1 as granted does not involve an inventive step when document D7 is taken as the closest prior art.

2.4 In view of the above, the main request is not allowable.

Auxiliary request 1

3. Inventive step

3.1 Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that specific amounts of expandable graphite, of the at least one alkaline earth metal component and of the component containing silica or silicate are mentioned.

3.2 It was common ground between the parties, in particular during the oral proceedings before the Board that, as a consequence of the amendments made, the subject-matter of claim 1 of auxiliary request 1 further differs from the disclosure of the relevant example of D7 (in comparison to claim 1 of the main request) only in that the at least one alkaline earth metal component (features F5/F6) must be present in an amount of from 50 phr to 500 phr.

3.3 There was also agreement between the parties that said distinguishing feature meant that the expandable polymeric material being claimed contained more fire retardant ingredients, which would be expected to lead to improved fire retardancy. This was in particular acknowledged by the appellant (see e.g. statement of grounds of appeal: point 7.1.2.2) and the Board sees no reason to deviate from this view.

3.4 Regarding the obviousness of the solution, the Board shares the appellant's view that increasing the amount of the at least one alkaline earth metal component as defined in claim 1 of auxiliary request 1 to e.g. 50 phr is common in the art as evidenced by D3 (chapter 22.3.4.2, top of page 493) or D12 (page 2214: middle of left hand column; page 2217: left hand column, middle of last paragraph). Given these circumstances and the conclusion reached in point 2.3 above regarding the obviousness of claim 1 of the main request, the subject-matter of claim 1 of auxiliary request 1 is also obvious.

3.5 Therefore, the subject-matter of claim 1 of auxiliary request 1 does not involve an inventive step when the relevant example of D7 is taken as the closest prior art and, for that reason, auxiliary request 1 is not

allowable.

Auxiliary request 2

4. Admittance of the respondent's line of defence put forward during the oral proceedings before the Board

4.1 Claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 in that it is specified that the component containing silica or silicate "is a component consisting of silica and/or silicate".

4.2 During the oral proceedings before the Board, the respondent argued that this amendment constituted an additional distinguishing feature over the disclosure of D7. According to the respondent, an organically modified montmorillonite according to D7 was not a component consisting of silica and/or silicate according to claim 1 of auxiliary request 2. In addition, since the use of an organically modified montmorillonite was an essential feature of D7, it was questionable whether D7 was a suitable document to be taken as the closest prior art for auxiliary request 2. Also, independently of the formulation of the problem effectively solved, it could not be obvious to modify the teaching of D7 by using a non-organically modified montmorillonite. Therefore, according to the respondent, the subject-matter of claim 1 of auxiliary request 2 involved an inventive step when D7 was taken as the closest prior art (minutes: page 3, starting from the middle).

4.3 The appellant objected that this line of defence was an amendment to the respondent's appeal case and requested that it should not be admitted into the proceedings

(minutes: bottom of page 3).

4.4 In this regard, the Board shares the view of the appellant that the respondent's line of defence in respect of claim 1 of auxiliary request 2 indicated in above point 4.1 was submitted for the first time during the oral proceedings before the Board. Although the respondent had submitted in writing that the disclosure of D7 was directed to organically modified montmorillonite (letter of 11 December 2025: point 2.3, end of first paragraph), they had not argued that this would further distinguish the subject-matter of claim 1 of auxiliary request 2 from the disclosure of D7 (as compared to the higher-ranked requests). The other written submission relied upon by the respondent during the oral proceedings to argue that their line of defence had already been put forward in writing was page 69 of the rejoinder. However, this passage is directed to the disclosure of organically modified montmorillonite disclosed in point 11 of D12 (and not to D7). In addition, it also fails to contain any argument that an organically modified montmorillonite according to D7 (page 2/9: right hand column, four first lines; this component is referred to as organic montmorillonite and abbreviated OMMT throughout D7) would not be a component consisting of silica and/or silicate according to claim 1 of auxiliary request 2. On the contrary, the sole argument put forward in writing by the respondent in respect of claim 1 of auxiliary request 2 was that the amendment made (as compared to claim 1 of auxiliary request 1) aimed at distinguishing the subject-matter being claimed from the cited prior art documents where a huntite/ hydromagnesite mixture was mentioned, such as in D4 (rejoinder: page 79, last full paragraph). In these circumstances, the Board considered that the

respondent's line of defence put forward during the oral proceedings before the Board was an amendment to the respondent's case (see Article 12(2) and (4) RPBA).

4.5 Since this new line of defence was put forward during the oral proceedings before the Board, its admittance is governed by Article 13(2) RPBA, according to which any amendment to a party's appeal case made after notification of a communication under Article 15(1) RPBA is, in principle, not taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned.

4.5.1 The respondent neither gave any cogent reasons, nor claimed the existence of any exceptional circumstances that would have justified the submission of their new line of defence for the first time during the oral proceedings before the Board. Also the Board cannot recognise any such exceptional circumstances. In addition, the Board took into account that the appellant had already argued at the outset of the appeal proceedings (statement of grounds of appeal: point 7.2.4.2, first paragraph) that the amendment made in claim 1 of auxiliary request 2 did not constitute an additional distinguishing feature as compared to claim 1 of auxiliary request 1. This view had further been explicitly indicated in point 14 of the Board's communication that had been sent to the parties well in advance of the oral proceedings (17 September 2025 vs. 11 March 2026). In this passage of the communication, it was further pointed out that it did not seem to be argued by the respondent that the amendment made in claim 1 of auxiliary request 2 to further define the component containing silica or silicate (feature F7) was suitable "to distinguish the subject-matter being claimed from the organic montmorillonite (OMMT)

according to D7 (as put forward by the appellant in section 7 of the statement of grounds of appeal)". Although the respondent filed two written submissions in reaction to the Board's communication, no arguments directed to this issue were advanced.

4.5.2 In addition, it is established case law that the criteria set out in Articles 12(4) to 12(6) RPBA are also applicable when a Board exercises its discretion to decide on the admittance of an amendment to a party's case pursuant to Article 13(2) RPBA (Case Law, *supra*, V.A.4.5.1.a, last paragraph).

The Board took into consideration that the admission into the proceedings of the respondent's new line of defence would have changed the framework of the assessment of inventive step in view of D7 as the closest prior art and would have increased the complexity of the case. In particular, it would have been necessary to assess for the first time during the oral proceedings before the Board how the term "consists of silica and/or silicate" was to be interpreted in the context of claim 1 of auxiliary request 2 and whether this term was suitable to distinguish the subject-matter claimed from an expandable polymeric material comprising an organically modified montmorillonite according to the disclosure of D7. In these circumstances, admitting the new line of defence of the respondent would have been detrimental to procedural economy.

4.5.3 In view of the above, the Board decided not to admit into the proceedings the new line of defence in respect of claim 1 of auxiliary request 2 that was put forward by the respondent for the first time during the oral

proceedings (Article 13(2) RPBA).

5. Inventive step

Considering that the respondent's new line of defence regarding claim 1 of auxiliary request 2 was not admitted and in the absence of any other arguments from the respondent that the amendment made distinguished the subject-matter being claimed from the disclosure of D7, the analysis of inventive step outlined above in respect of auxiliary request 1 remains valid for auxiliary request 2. In these circumstances, the subject-matter of claim 1 of auxiliary request 2 can only share the same fate as that of claim 1 of auxiliary request 1, i.e. it does not involve an inventive step when the relevant example of D7 is taken as the closest prior art.

Auxiliary requests 3 and 4

6. Inventive step

6.1 During the oral proceedings before the Board, the respondent acknowledged that the Board's conclusion on (lack of) inventive step reached for the higher-ranked requests would be equally valid for claim 1 of each of auxiliary requests 3 and 4 (minutes: page 4, end of second paragraph).

6.2 The Board has no reason to be of a different opinion, in particular because, as indicated in point 14 of the Board's communication,

- The amendment made in claim 1 of auxiliary request 3 to further define the component containing silica or silicate (feature F7) was

neither shown, nor argued, to be suitable to distinguish the subject-matter being claimed from an organic montmorillonite according to D7. Therefore, the amendment made does not constitute any additional or different distinguishing feature.

- The amendment made in claim 1 of auxiliary request 4 to further define the alkaline earth metal component (features F5/F6) was neither shown, nor argued, to be suitable to distinguish the subject-matter being claimed from a mixture of huntite and hydromagnesite according to D12. Therefore, the reasoning on obviousness of the solution remains valid.

6.3 In view of the above, the subject-matter of claim 1 of each of auxiliary requests 3 and 4 does not involve an inventive step when the relevant example of D7 is taken as the closest prior art.

Auxiliary request 5

7. Inventive step

7.1 The subject-matter of claim 1 of auxiliary request 5 differs from that of claim 1 of auxiliary request 1 in that the at least one alkaline earth metal component is limited to mixtures of huntite and hydromagnesite (features F5/F6).

7.2 This amendment effectively limits the subject-matter of claim 1 of auxiliary request 5 to embodiments already analysed for the main request and auxiliary request 1 (see in particular point 2.2.1 above). Therefore, claim 1 of auxiliary request 5 can only share the same

fate regarding inventive step when assessed against the relevant example of D7 as claim 1 of auxiliary request 1, i.e. its subject-matter does not involve an inventive step.

Auxiliary requests 6 to 9

8. Inventive step

During the oral proceedings before the Board, the respondent agreed that claim 1 of each of auxiliary requests 6 to 9 merely combined amendments made in higher-ranked requests and that these requests were therefore bound to share the same fate regarding inventive step (minutes: middle of page 4). In these circumstances, the subject-matter of claim 1 of each of auxiliary requests 6 to 9 does not involve an inventive step when the relevant example of D7 is taken as the closest prior art.

9. Considering that none of the requests defended by the respondent is allowable, the patent is to be revoked.

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:

D. Hampe D. Semino

Decision electronically authenticated