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Datasheet for the decision of 21 July 2022

Case Number: T 1516/18 - 3.3.05

Application Number: 12772937.4

Publication Number: 2791071

IPC: C03B37/04, C03C3/087, C03C13/06, C03B5/02

Language of the proceedings: EN

Title of invention:
MELT COMPOSITION FOR THE PRODUCTION OF MAN-MADE VITREOUS FIBRES

Patent Proprietor:
Rockwool International A/S

Opponents:
SAINT-GOBAIN ISOVER
Paroc Group Oy
Knauf Insulation SPRL

Headword:
Melt composition/Rockwool

Relevant legal provisions:
EPC Art. 54, 56, 83
RPBA Art. 12(2), 12(4)
RPBA 2020 Art. 13(2)

Keyword:

Novelty - (yes)
Inventive step - main request (no) - auxiliary request (yes)
Sufficiency of disclosure - (yes)
Late-filed facts - admitted (no)

Decisions cited:

T 0279/12, T 2614/17, T 0210/05, T 1634/13, T 0026/85, T 0666/89, T 0440/04, T 1095/18, T 1311/13, T 2843/19

Catchword:

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Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1516/18 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 21 July 2022

Appellant 1: (Opponent 1)	SAINT-GOBAIN ISOVER 18, avenue d'Alsace 92400 Courbevoie (FR)
Representative:	Saint-Gobain Recherche Département Propriété Industrielle 39 Quai Lucien Lefranc 93300 Aubervilliers (FR)
Appellant 2: (Opponent 2)	Paroc Group Oy Energiakuja 3 00180 Helsinki (FI)
Representative:	Berggren Oy P.O. Box 16 Eteläinen Rautatiekatu 10A 00101 Helsinki (FI)
Appellant 3: (Opponent 3)	Knauf Insulation SPRL Rue de Maastricht, 95 4600 Visé (BE)
Representative:	ARC-IP ARC-IP sprl Rue Emile Francqui 4 1435 Mont-Saint-Guibert (BE)
Respondent: (Patent Proprietor)	Rockwool International A/S Hovedgaden 584 2640 Hedehusene (DK)
Representative:	Gill Jennings & Every LLP The Broadgate Tower 20 Primrose Street London EC2A 2ES (GB)

Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted on 3 May 2018 rejecting the opposition filed against European patent No. 2791071 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman E. Bendl
Members: S. Besselmann
S. Fernández de Córdoba

Summary of Facts and Submissions

I. The appeals in this case, by opponents 1-3 (appellants 1-3), are against the opposition division's decision to reject the oppositions against European patent EP 2 791 071 B1. The patent in suit concerns a melt composition for the production of man-made vitreous fibres.

II. The following documents, cited during the opposition proceedings, are of relevance here:

C1 WO 99/28253 A1

C2 WO 2012/140173 A1 (18 October 2012)

C3 Production Process, Product Properties, and Application of a New Generation Rockwool® Stone Wool Insulation Products, Rockwool International, April 1998
plus further evidence to show C3's publication date

C4 US 7,638,447 B2

C5 WO 96/14454 A2

C7 CA 2 638 653 A1

C9 EP 1 944 272 A1

C12 WO 95/21799 A1

C19 WO 97/30002 A1

III. With their statements of grounds of appeal, the appellants raised objections of lack of novelty and lack of inventive step against the patent as granted. Appellant 3 additionally raised an objection of lack of sufficiency of disclosure and submitted their arguments filed during the opposition proceedings as annexes.

IV. The patent proprietor (respondent) defended the patent as granted (main request) and additionally filed auxiliary requests 1-5 with the reply to the appeals.

V. The patent as granted contains independent claims relating to a melt composition (claim 1), man-made vitreous fibres (claim 3), a method of forming man-made vitreous fibres (claim 8) and a method of forming a melt composition (claim 9), which read as follows:

"*1. A melt composition for the production of man-made vitreous fibres comprising the following oxides, by weight of composition:*

SiO_2	*39-43 weight %*
Al_2O_3	*20-23 weight %*
TiO_2	*up to 1.5 weight %*
Fe_2O_3	*5-9 weight %, preferably 5-8 weight %*
CaO	*8-18 weight %*
MgO	*5-7 weight %*
Na_2O	*up to 10 weight %, preferably 2-7 weight %*
K_2O	*up to 10 weight %, preferably 3-7 weight %*
P_2O_5	*up to 2%*
MnO	*up to 2%*
R_2O	*up to 10 weight %*

wherein the proportion of Fe(2+) is greater than 80% based on total Fe and is preferably at least 90%, more preferably at least 95% and most preferably at least 97% based on total Fe."

"*3. Man-made vitreous fibres having a composition comprising the following oxides, by weight of composition:*

SiO_2	*39-43 weight %*
Al_2O_3	*20-23 weight %*
TiO_2	*up to 1.5 weight %*
Fe_2O_3	*5-9 weight %, preferably 5-8 weight %*

CaO 8-18 weight %
MgO 5-7 weight %
Na_2O up to 10 weight %, preferably 2-7 weight %
K_2O up to 10 weight %, preferably 3-7 weight %
P_2O_5 up to 2%
MnO up to 2%
R_2O up to 10 weight %
wherein the proportion of Fe(2+) based on total Fe is greater than 80%, preferably greater than 90%, more preferably greater than 95%, most preferably greater than 97%."

"*8. A method of forming man-made vitreous fibres comprising fiberising a melt composition according to claim 1 or claim 2 by a spinning cup method to form fibres and collecting the formed fibres.*"

"*9. A method of forming a melt composition as defined in claim 1 or claim 2, comprising heating and melting mineral material in a furnace to produce a mineral melt and, if necessary, adjusting the oxidation state of the melt such that the proportion of Fe(2+) based on total Fe is greater than 80%, preferably greater than 90%, more preferably greater than 95%, most preferably greater than 97%.*"

VI. Independent claims 1 and 3 of auxiliary request 2 differ from those as granted in that the Na_2O and K_2O contents have been more narrowly defined by deleting the broad range, as shown by strikethrough:

Na_2O ~~up to 10 weight %, preferably~~ 2-7 weight %
K_2O ~~up to 10 weight %, preferably~~ 3-7 weight %

Independent claims 8 and 9 were not amended. Dependent claims 2, 4-7 and 10-14 relate to particular

embodiments of the composition, fibres or methods, or a vitreous fibre product. Of these, claim 6 was also amended and reads as follows (amendments indicated):

"6. Man-made vitreous fibres according to any of claims 3 to 5, wherein the ratio of K_2O to Na_2O calculated by weight of oxides is from ~~1:2 to 4:1, preferably from~~ 1:1 to ~~3:1~~1:2."

VII. The appellants did not reply in writing to the respondent's filing of the auxiliary requests.

VIII. The board issued a communication pursuant to Article 15(1) RPBA 2020, informing the parties of its provisional opinion that the second auxiliary request seemed to meet the requirements of the EPC.

IX. Appellant 2 then raised an objection of lack of inventive step against the second auxiliary request in view of C5 in combination with C7.

X. During oral proceedings before the board, the respondent withdrew auxiliary request 1.

The appellants stated their objections against auxiliary request 2, which were the following.
Appellant 1 raised an objection of lack of novelty in view of C1, and an objection of lack of inventive step starting from C5 as the closest prior art.
Appellant 2 maintained their objection of lack of inventive step in view of C5 in combination with C7 as the only objection.
Appellant 3 stated that they maintained the objections they had raised against the main request in the statement of grounds of appeal. These were lack of sufficiency of disclosure, lack of novelty in view of

each of C1-C5 and lack of inventive step starting from C5, further noting that any one of C1-C4 could alternatively be used as the closest prior art. Appellant 3 stated that they would refer to their arguments filed during the opposition proceedings.

XI. The appellants' arguments, where relevant to the present decision, can be summarised as follows.

Regarding the main request

C5 took away the novelty of claim 1 in view of composition "N". If this composition were produced on an industrial scale, a cupola furnace would be used (page 8, lines 10-17), meaning that the iron would be present as Fe(2+). The iron oxide content was 9.8 weight% expressed as Fe_2O_3. This value anticipated the range specified in the claim for several reasons. Composition "N" was to be seen as a target composition to which the tolerances foreseen under the certified EUCEB system had to be applied, so a range of 8.1 to 11.4 weight% was inherently disclosed. The range stipulated in the claim at issue had to be read while applying the rounding convention; it thus encompassed values up to less than 9.5 weight%, overlapping with the inherent disclosure of C5. Furthermore, pursuant to Article 69 EPC, equivalents had to be taken into account, and an Fe_2O_3 content of 9.8 weight% was equivalent to the upper limit of the claimed range.

The general disclosure of C5 was also relevant to novelty because the ranges specified in claim 6 of C5, including the features of claims 2 and 4, overlapped with those specified in the claim at issue.

Alternatively, C5 was also relevant for inventive step. Changing the proportion of Fe(2+) was associated not with lowering the liquidus temperature but with improving the high-temperature properties. A high proportion of Fe(2+) was rendered obvious by the teaching of any one of e.g. C9, C12 and C19.

The remaining alleged difference, namely the iron oxide content, did not yield any technical effect. C5 taught that good fire-resistance properties were provided when using a preferred FeO content of from 5 to 7 weight%, and thus suggested lower iron oxide contents than those in composition "N".

Regarding auxiliary request 2

Sufficiency of disclosure was lacking. The skilled person was unable to obtain the required proportion of Fe(2+) across the whole scope of the claim, in particular where the furnace was not an electrical furnace or a circulating combustion chamber. They would be unable to obtain the proportion of Fe(0) required by claims 2 and 5, in particular when not using a spinning cup method; the conditions required when using a spinning cup method were not disclosed either.

Novelty was lacking in view of each of C1-C5.

C2 was prior art under Article 54(3) EPC. The ranges stipulated in claim 1 lay within those generally disclosed in C2 (table on page 11). C2 also disclosed specific examples (Examples A-C). Even if the MgO and Al_2O_3 contents in these examples were outside the claimed ranges, the entire document had to be taken into consideration. The most preferred range of the MgO content was between 4.5 and 6.5 weight% (page 10, lines

14-20) and was linked to an Al_2O_3 content of less than 23 weight% (page 10, line 23 - page 11, line 2). The skilled person would thus seriously contemplate working within the overlapping area.

The ranges stipulated in claim 1 also lay entirely within those generally disclosed in C1, and overlapped with the preferred ranges disclosed in C1. They did not fulfil the criteria for a selection invention. In accordance with T 26/85 and T 666/89, what had to be determined was whether the skilled person would seriously contemplate working in the overlapping area. This was the case here because there was no teaching dissuading the skilled person from doing so. A range could not be equated with a list, so the criteria concerning selections from lists did not apply.

C3 disclosed the commercial composition "Roxul 1000" (page 5, Figure 3). All the ranges of this composition overlapped with those stipulated in claim 1.

Regarding C4, it was clear from a comparison of the general disclosure of this document (columns 3 and 4; in particular the narrower ranges) with the claim at issue that the skilled person would have contemplated working in the area of overlap.

C5 took away novelty in the same way as indicated in respect of the main request.

Alternatively, inventive step was lacking in view of C5 as the closest prior art. Even if the Na_2O and K_2O contents differed from composition "N", this difference could not be associated with any technical effect. There was no evidence that the claimed Na_2O and K_2O

contents led to a lower liquidus temperature. The associated objective technical problem was merely providing an alternative. Using Na_2O and K_2O contents within the claimed range was within the general disclosure of C5 (paragraph bridging pages 3-4). C5 taught that the melt viscosity could be increased by increasing the amount of alkali metal oxide and thus even gave the skilled person an incentive to increase the alkali metal oxide (paragraph bridging pages 4-5).

Inventive step was also lacking in view of C5 taken in combination with C7. C7 had been discussed in the opposition proceedings.

XII. The respondent's arguments, where relevant to the present decision, can be summarised as follows.

Regarding the main request

Composition N of C5 did not anticipate the claimed composition.

Starting from C5 as the closest prior art, the technical problem was providing a composition having good high-temperature stability and also a low liquidus temperature, making it suitable for a spinning cup process.

C5 was not specifically concerned with a spinning cup process, and the skilled person had no reason to believe that composition "N" of C5 could be suitable for it. The skilled person would not have chosen composition "N" because other compositions (M, O, P, Q) in the table on page 11 had better properties.

C5 taught away from the invention because it described both a higher iron oxide content and a higher magnesium oxide content to provide improved high-temperature stability (page 6, lines 27-31).

Regarding auxiliary request 2

The additional distinguishing feature, namely the ranges of Na_2O and K_2O, helped to decrease the liquidus temperature (paragraph [0052] of the patent). A low liquidus temperature was an inherent property of the claimed composition, as was mentioned throughout the patent.

Starting from composition "N" of C5, the skilled person had no incentive to lower the liquidus temperature or to increase the alkali metal oxide content.

XIII. Appellants 1-3 (opponents 1-3) requested that the decision under appeal be set aside and that the European patent be revoked.

The respondent (patent proprietor) requested that the appeals be dismissed, or alternatively that the patent be maintained as amended on the basis of one of auxiliary requests 2-5 filed with the reply to the appeals.

Reasons for the Decision

Main request

1. Novelty in view of C5

1.1 Novelty was contested in view of composition "N" of C5 as well as the general disclosure of that document.

1.2 However, the subject-matter of claim 1 differs from composition "N" in that the iron oxide content is lower, and in that the proportion of Fe(2+) based on total Fe is greater than 80%.

1.3 As regards the iron oxide content, there is no basis to view composition "N" as a target composition to which the tolerances allowed in conjunction with EUCEB certification had to be applied. There is no mention of EUCEB certification and the applicable tolerances in C5. Nor is there any reason to doubt that the Fe_2O_3 content of composition "N", namely 9.8 weight% expressed as Fe_2O_3 (calculated by appellant 3), can be distinguished from the upper limit of 9 weight% specified in claim 1 at issue; this is not a question of rounding the figure because a value of 9.8 in any case is above values that could be rounded to "9".

1.4 Furthermore, Article 69 EPC does not provide any basis for interpreting the claim such that it encompasses allegedly equivalent iron oxide contents for the purpose of assessing novelty. Appellant 3 considers the prior-art value to be equivalent to the claimed range. Irrespective of there being no evidence for this, equivalents are not taken into consideration when assessing novelty (Case Law of the Boards of Appeal of the EPO, 9th edition, 2019, I.C.4.5). This concerns not only the disclosure of the prior art but also the interpretation of the claim, as is clear from T 279/12 (Reasons 1.3) and T 2614/17 (Reasons 3.3).

1.5 C5 is silent as regards the proportion of Fe(2+). The appellants derive the presence of Fe(2+) from a cupola

furnace being used. However, a cupola furnace is merely one of several alternatives in C5 (page 8, lines 10-12). There is no disclosure of composition "N" being melted using specifically a cupola furnace; in the examples, a crucible furnace is used. There is no evidence that the resulting melt exhibits the required proportion of Fe(2+).

1.6 Considering the general disclosure of C5 (see the paragraph bridging pages 3-4 and the claims), several selections are necessary to arrive at a composition within the scope of claim 1, in particular selecting the contents of SiO_2, TiO_2, CaO and MgO and selecting the cupola furnace, which is associated with yielding Fe(2+).

1.7 It follows from the above that C5 does not directly and unambiguously disclose a melt composition as specified in claim 1.

2. Inventive step

2.1 The aim of the patent in suit is to provide man-made vitreous fibres that are stable to high temperatures, bio-soluble, and can be produced by a spinning cup method (paragraph [0018]).

2.2 C5 relates to the similar general purpose of producing man-made vitreous fibres which are durable in use but which can be shown to be biologically advantageous (page 1, lines 3-5).

Composition "N" of C5 has most features in common with the claimed composition and constitutes the most promising springboard. This composition is consistent

with the general teaching of document C5. It is irrelevant that other compositions exhibit an even higher sintering temperature, biodegradability or weathering resistance and might be even more preferred from the perspective of C5. Composition "N" of C5 constitutes the most suitable starting point for assessing inventive step.

2.3 As indicated, the patent in suit addresses the technical problem of providing high-temperature stability, bio-solubility and suitability for fiberisation using a spinning cup (paragraphs [0018] and [0056]-[0058]). Fiberisation using a spinning cup requires in particular a low liquidus temperature (paragraph [0084]).

2.4 The claimed melt composition is proposed as the solution to this technical problem, having an Fe_2O_3 content of 5-9 weight% and in which the proportion of Fe(2+) is greater than 80% based on total Fe.

2.5 However, the fibres of sample N in C5 are already bio-soluble (table on page 11; tested at pH 4.5, as in the impugned patent; see page 3, lines 24-26 and page 8, lines 26-30 of C5 and paragraph [0096] of the patent in suit). They are stable at high temperatures, as shown by a sintering temperature of > 900°C (C5, table on page 11). The melts in C5 are also taught as being suitable for use in a spinning cup method, with this method being specifically mentioned in C5 (page 8, lines 18-21). Even though this is not the focus of C5 and the examples are carried out using a cascade spinning process (page 10, line 8), the skilled person has no reason to disregard the explicit reference to a spinning cup method in C5.

Furthermore, the examples in the patent in suit itself provide support for the fact that the high proportion of Fe(2+) is not essential for using the spinning cup process. The comparative melt composition, having a low proportion of Fe(2+) of only 21%, could also be spun using a spinning cup.

It is merely taught that the iron oxide content, in conjunction with the MgO content of 5-7 weight%, provides good temperature stability (paragraph [0040]). The effect in comparison with higher iron oxide contents is not specifically addressed, nor is it shown to be linked to the liquidus temperature or suitability for the spinning cup process.

What the examples in the patent in suit demonstrate is that the higher proportion of Fe(2+) leads to an improvement in the high-temperature stability (paragraph [0095]).

2.6 In light of the above, the objective technical problem may be considered that of providing a melt composition having improved high-temperature stability.

2.7 It follows from the above that this technical problem is solved by the claimed melt composition, in which the proportion of Fe(2+) is greater than 80% based on total iron. There is no indication that lowering the iron oxide content would additionally contribute to this effect.

2.8 The skilled person faced with the problem of improving the high-temperature stability would be aware, for instance, of C9, which also relates to making a mineral melt which can then be fiberised to form mineral fibres (pargaraph [0001]). According to C9, cupola furnaces

which have a highly reducing atmosphere have traditionally been used to make mineral melts, and almost all the iron in melts produced by cupola furnaces is in the form of Fe(2+). C9 furthermore states that Fe(2+) is good for the fire-resistance properties of the fibres (paragraph [0059]).

This teaching is not linked to any specific composition of the melt. Its general nature is also clear since similar teaching is present in C19 (page 2, lines 1-8), according to which Fe(2+) has an advantageous effect on the temperature stability of the fibres, and in C12, according to which Fe(2+) enhances the chemical and mechanical properties of the melt (page 5, lines 23-31) and is preferably produced under reducing conditions such as in a cupola furnace (page 8, lines 5-8).

2.9 The teaching of C9 would consequently prompt the skilled person to provide an Fe(2+)-containing melt when carrying out the teaching of C5, in particular as this can be achieved using a cupola furnace and C5 explicitly mentions that kind of furnace (page 8, lines 10-12). The skilled person would thus readily provide a proportion of Fe(2+) within the claimed range.

2.10 This assessment would not change even if it was additionally taken into consideration that a high proportion of Fe(2+) reduced the liquidus temperature, as stated in the patent in suit (paragraph [0044]) though not proven by experimental data. This effect would merely be a bonus effect.

2.11 As indicated, the other distinguishing feature, namely the lower iron oxide content, does not provide any technical effect. The associated partial technical problem is thus providing an alternative.

2.12 The board does not agree that C5 would teach away from lowering the iron oxide content because doing so would impair the temperature stability.

Lower iron oxide contents are consistent with the disclosure of C5 (see the table on page 11 and claim 1). C5 teaches that the amount of iron oxide (expressed as FeO) is most preferably below 8 weight%, often between 5-7 weight% (page 5, lines 32-35). According to C5, "good" fire resistance is provided by a sintering temperature of at least 800°C (page 7, lines 18-21), which is obtained in all the examples even at lower FeO contents (table on page 11). The "improved" fire resistance is even associated with an FeO content of at least 6% (page 6, lines 27-31), which is lower than the iron oxide content of sample N, although higher amounts are preferred.

2.13 The skilled person faced with the problem of providing an alternative would thus readily select a lower iron oxide content within the general disclosure of C5, for instance 8 weight% expressed as FeO (8.8 weight% Fe_2O_3), without the need to exercise inventive skill.

2.14 In summary, the subject-matter of claim 1 lacks an inventive step in view of C5 in combination with C9.

Auxiliary request 2

3. Claims 1 and 3 have been amended by limiting the ranges for Na_2O and K_2O to the respective preferred ranges, which are specified in claim 1 as granted. The basis for dependent claim 6 can be found on page 12, lines 17 to 20; the claim has been limited to ratios which are

compatible with the part of the subject-matter of the independent claim to which it refers back (claim 3). There were no objections under Article 123 EPC or Article 84 EPC.

4. Sufficiency of disclosure

4.1 Appellant 3 was of the opinion that the skilled person would be unable to carry out the invention and in particular would be unable to obtain the required proportion of Fe(2+) or the Fe(0) content stipulated in dependent claims 2 and 5, referring to an Fe(0) content in the melt of less than 900 ppm, measured using a magnetic analyser.

4.2 A successful objection of lack of sufficiency of disclosure presupposes that there are serious doubts, substantiated by verifiable facts (Case Law of the Boards of Appeal of the EPO, 9th edition, 2019, II.C.9).

4.3 The patent in suit describes suitable raw materials (paragraph [0066]) and indicates melting processes (paragraph [0068] and [0076]-[0077]). It is stated that the level of Fe(2+) in the melt is increased by using a submerged arc furnace with graphite electrodes (paragraph [0068]). In an alternative embodiment, a circulating combustion chamber is used (paragraph [0076]). It is taught that when this method is used under correctly controlled conditions in terms of the redox state, the melt generally has the required proportion of Fe(2+) from the outset (paragraph [0078]). The patent in suit also gives the skilled person instructions on how to measure the amounts of Fe(2+), Fe(3+) and Fe(0) (paragraphs [0041], [0045] and

[0046]), i.e. how to verify whether the desired proportion of Fe(2+) is obtained. Furthermore, it teaches that the melt and the fibres show identical ratios of Fe(2+) to total iron (paragraphs [0062], [0064] and [0065]).

4.4 The melting processes in general are known in the art. There is no proof that the skilled person would be unable to carry them out in such a way as to obtain the desired proportion of Fe(2+). In particular, appellant 3 did not attempt to rework the invention.

4.5 Appellant 3's objection concerned in particular cases in which the furnace was neither an electrical furnace nor a circulating combustion chamber. However, the patent in suit teaches that the redox state of the melt may be adjusted by, for instance, subjecting the melt to an electric potential, preferably using graphite electrodes (paragraphs [0080] and [0081]), so it is unnecessary for the melting step to directly result in the required proportion of Fe(2+). This is reflected in method claim 9.

Claims 1 and 3 relate to products (a melt composition; man-made vitreous fibres). It is irrelevant for the sufficiency of disclosure of the claimed products whether they may alternatively be produced by other methods not explicitly mentioned in the impugned patent, as long as at least one way of obtaining the claimed products is provided.

4.6 The patent also teaches that the level of Fe(0) is very low when a submerged arc furnace is used (paragraphs [0070]-[0072]). There is no evidence that this would not be the case, or that the low level of Fe(0)

stipulated in claims 2 and 5 could not be obtained. A measuring method is described in paragraph [0031].

4.7 There is no reason to question the indication in the patent in suit that the redox state in the final fibres is kept as in the melt (paragraphs [0062] and [0064]), so obtaining the high proportion of Fe(2+) and the low level of Fe(0) is not linked to using - or not using - a specific spinning method.

4.8 In conclusion, the objection of insufficiency of disclosure is not convincing.

5. Novelty

5.1 Document C2 (prior art under Article 54(3) EPC)

5.1.1 The general disclosure of C2 (table on page 11) encompasses the ranges stipulated in claim 1 at issue, but the ranges known from C2 are broader. The indicated table in C2 does not disclose any specific value falling within any of the claimed ranges concerning the amounts of at least SiO_2, Al_2O_3, TiO_2, Fe_2O_3, MgO, Na_2O and K_2O. Several selections of narrower sub-ranges would thus be necessary to arrive at a composition within the scope of claim 1 at issue. C2 does not disclose limiting R_2O, i.e. the total amount of Na_2O and K_2O, to 10 weight% or less.

5.1.2 C2 furthermore discloses three specific examples (A-C). However, in all these examples, the Al_2O_3 content is greater than the range stipulated in claim 1 at issue while the MgO content is lower.

5.1.3 The examples do not illustrate the most preferred range of the MgO content, which is more than 4.5 weight% to

less than 6.5 weight%. An MgO content of this level (higher than 3 weight%) is linked to an Al_2O_3 content which is more preferably not higher than 23 weight% (page 10, line 14 - page 11, line 2).

5.1.4 Nevertheless, the teaching regarding the most preferred range of the MgO content merely identifies preferred sub-ranges in the general description of C2, i.e. in the table on page 11, namely a preferred MgO content of 4.5 weight% to less than 6.5 weight% and an Al_2O_3 content of 15-23 weight%. Even on this basis, it is still necessary to select sub-ranges (of at least SiO_2, Al_2O_3, Fe_2O_3, TiO_2, Na_2O and K_2O) to arrive at a composition as per the claim at issue.

5.1.5 This teaching regarding the most preferred ranges of the MgO and Al_2O_3 contents cannot be construed as the specific disclosure of a variant of Examples A-C in which the MgO and Al_2O_3 contents are modified accordingly while the remainder of the composition is maintained exactly as in these examples.

An example constitutes a specific embodiment that cannot be freely combined with other information selected within the description (T 210/05, Reasons 2.3).

5.1.6 Furthermore, even if the teaching regarding the most preferred ranges of the MgO and Al_2O_3 contents (page 10, line 14 - page 11, line 2) were combined with the examples in C2, this would not inevitably result in a composition within the scope of the claim because it is still necessary to also select the Al_2O_3 content. Moreover, the sum of the K_2O and Na_2O contents (R_2O) is greater than required in the claim.

5.1.7 In summary, C2 does not directly and unambiguously disclose a composition within the scope of claim 1.

5.2 C1

5.2.1 The compositions disclosed in C1 overlap with those stipulated in claim 1 at issue. Considering the most relevant disclosure, namely the narrowest ranges of those disclosed in C1 (page 4), the upper limit of the SiO_2 content (43 weight%), the upper limit of the Al_2O_3 content (23 weight%), the lower limit of the TiO_2 content (1 weight%), the lower limit of the Fe_2O_3 content (5 weight% FeO), the lower limit of the CaO content (10 weight%), the lower limit of the MgO content (5 weight%) and the lower limits of the P_2O_5 and MnO contents (1 weight% each) all fall within the claimed ranges, while the other limits of all of these ranges are outside the claimed ranges. To arrive at a composition within the scope of the claim, it is thus necessary to combine upper limits (i.e. the upper parts of the range) of some components with lower limits (i.e. the lower parts of the range) of other components. These kinds of combinations of the end points of separate ranges are generally not considered disclosed (see T 1634/13, Reasons 3.2). It is furthermore necessary to select an Na_2O content of 2-7 weight% and a K_2O content of 3-7 weight%, but the general disclosure in C1 only concerns the sum of the two, with $Na_2O + K_2O$ being at least 1 and not more than 10 weight% in C1. None of the examples provided in C1 falls within the scope of the claim at issue. Examples 5 and 6, which, it was argued, were particularly close to the claimed subject-matter, relate to MgO contents of 8.7 and 8.5 weight% and K_2O contents of 0.9 and 1.6 weight%, respectively – i.e. outside the claimed ranges of 5-7 weight% MgO and 3-7 weight% K_2O.

5.2.2 Appellant 1 argued that the concept developed in T 26/85 and T 666/89 had to be applied, i.e. assessing whether the skilled person would seriously contemplate working in the overlapping area. In appellant 1's opinion, this was to be distinguished from the considerations relevant to selections from lists, with a list of discrete elements in principle being different from a range of values, as is under consideration here.

5.2.3 The board does not agree that the skilled person would seriously contemplate working in the overlapping area. In this case, and as indicated above, it would be necessary to combine parts of several ranges to arrive at subject-matter within the overlapping area. This amounts to making multiple selections. The mere consideration that the ranges of a multiple selection are as such not excluded from the prior art does not establish lack of novelty (T 1095/18, Reasons 1.8). On the contrary, there is no pointer towards the overlapping area. In particular, C1 does not contain any disclosure of making the necessary adjustments to the MgO and K_2O contents in Examples 5 and 6, which, it was argued, were the closest to the claimed subject-matter.

5.2.4 This case is not comparable with T 440/04, which related to the question of whether a disclaimer could be allowed. It was found that disclaiming a specific example was insufficient because the document under consideration in T 440/04 also made available fibres having compositions that were substantially equal or close to the composition of the example.

Furthermore, assessing whether an example makes the region immediately surrounding it available, as was

done in T 440/04, differs from assessing whether that example makes a specific neighbouring embodiment available – or a defined part of the range surrounding it.

5.2.5 In conclusion, C1 does not directly and unambiguously disclose a composition within the scope of claim 1.

5.3 C3

5.3.1 The objection concerns the commercial mineral fibres Roxul 1000 (page 5, Figure 3). Not only are several selections necessary (the MgO content, the TiO_2 content, the CaO content and the Na_2O content) to arrive at a composition within the scope of claim 1, but the range of the K_2O content specified in the claim at issue (3-7 weight%) is greater than what is disclosed in C3 (0-2 weight%).

5.3.2 C3 therefore does not directly and unambiguously disclose a composition within the scope of the claim at issue.

5.4 C4

5.4.1 None of the examples provided in C4 falls within the scope of claim 1. Considering the general disclosure of C4, it is necessary to select specifically the upper end value of the range of the MgO content (5 weight%) in conjunction with the upper part of the Al_2O_3 range (22 weight%; col. 3, lines 14-16) and the lower limit of R_2O (10 weight%; col. 3, line 29). There is no pointer towards this combination.

5.4.2 C4 therefore does not directly and unambiguously disclose a composition within the scope of the claim at issue.

5.5 C5

5.5.1 C5 does not take away novelty for the reasons set out in relation to the main request (see point 1.).

6. Inventive step starting from C5

6.1 Inventive step was assessed starting from composition "N" disclosed in C5, as in the case of the main request (point 2.). The subjective technical problem is as set out in relation to the main request (point 2.3).

6.2 The claimed composition is proposed as the solution to this technical problem, and additionally differs from that known from C5 in that the Na_2O content is 2-7 weight% and the K_2O content is 3-7 weight%, versus an Na_2O content of 0.6 weight% and a K_2O content of 1.4 weight% in composition "N".

6.3 According to the teaching of the patent in suit, the alkali metal oxide helps to decrease the liquidus temperature (paragraph [0052]).

Even though there is no direct experimental evidence demonstrating this effect of alkali metal oxide, comparing the liquidus temperature generally disclosed in the patent in suit (namely less than 1 220°C or even less than 1 150°C; paragraph [0084]) with the liquidus temperature disclosed in C5 (namely 1 200°C to 1 400°C, preferably 1 240°C to 1 340°C; page 7, lines 22-24) supports the conclusion that the impugned patent relates to compositions that have a relatively low liquidus temperature. There is no reason to assume that the melt composition exemplified in the patent would not comply with the patent's general teaching and would not exhibit a liquidus temperature within the desired

range. This also applies to the claimed melt compositions, which constitute a reasonable generalisation of the example. Furthermore, the appellants provided no evidence to the contrary.

In the example, good high-temperature stability was observed (paragraph [0095]).

6.4 It is therefore accepted that the technical problem of providing a balance between good high-temperature stability and low liquidus temperature, making the composition particularly suitable for the spinning cup process, is solved.

6.5 C5 does not provide any specific instructions on how to control the liquidus temperature, and in particular does not teach any benefits related to increasing the alkali metal oxide content. By contrast, low alkali metal oxide contents are preferred according to C5, the combined amount of alkali (Na_2O + K_2O) usually being below 5% and preferably below 3% (page 6, lines 1-3).

C5 merely teaches that increasing the amount of alkali metal oxide - among other possible measures - may increase the melt viscosity if it is too low (paragraph bridging pages 4-5). However, there is no indication that the melt viscosity of composition "N", which is higher than in the case of several other examples, would be considered "low" from the perspective of C5.

6.6 There is thus no convincing argument why the skilled person, starting out from composition "N" of C5 and faced with the technical problem of providing a balance between good high-temperature stability and low liquidus temperature, would be motivated to adjust the alkali metal oxide content to values as specified in

the claim, in conjunction with the other necessary modifications discussed in relation to the main request.

6.7 For these reasons, the subject-matter of claim 1 involves an inventive step.

6.8 The same conclusion applies to claim 3, which relates to the corresponding man-made vitreous fibres having the same composition.

6.9 The same conclusion also applies to method claims 8 and 9, which relate to a method of forming fibres using the melt composition according to claim 1, and to a method of forming the melt composition, respectively.

6.10 The other claims also directly or indirectly refer back to claims 1 or 3.

7. Articles 12(2) and (4) RPBA 2007

7.1 In the statement of grounds of appeal, appellant 3 made a sweeping reference to their submissions during the opposition proceedings (filed as annexes A and B) and additionally stated that any one of C1-C4 could alternatively be regarded as the closest prior art for assessing inventive step (see page 2, first paragraph and page 11, paragraphs II.3 and II.3.1 of the statement of grounds of appeal).

7.2 In its communication pursuant to Article 15(1) RPBA 2020, the board informed the parties of its provisional opinion that this did not constitute a substantiated submission in the current appeal proceedings, and that

C2 was in any case not prior art under Article 54(2) EPC.

A mere reference to a party's earlier submissions without actually dealing with, or entering into a discussion of, the reasons given in the decision under appeal by the opposition division for arriving at its decision is not enough to substantiate a ground of appeal (T 1311/13, Reasons 19).

7.3 During the oral proceedings before the board, appellant 3 stated that they maintained these objections raised in the statement of grounds of appeal with regard to auxiliary request 2. However, they did not provide any argument why the board's provisional opinion had been incorrect but explicitly acknowledged it.

7.4 The board therefore has no reason to deviate from its provisional opinion. The above-mentioned objection (see point 7.1) is therefore not taken into account (Article 12(2) and (4) RPBA 2007 in conjunction with Article 25(2) RPBA 2020).

8. Article 13(2) RPBA 2020

8.1 Appellant 2's objection of lack of inventive step in view of the combination of C5 and C7 was only raised on 17 June 2022 in reply to the board's preliminary opinion, after summons to oral proceedings had been notified.

Thus, the provisions of Article 13(2) RPBA 2020 apply. Pursuant to this article, any amendment to a party's appeal case after notification of a summons to oral

proceedings shall, in principle, not be taken into account unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned.

8.2 The auxiliary requests under consideration were filed on 28 January 2019 with the patent proprietor's reply to the appeals. It would thus have been appropriate to raise any objections against them as a reaction to their being filed, without waiting for the board's preliminary opinion (see T 2843/19, Reasons 3.3).

8.3 Appellant 2 provided no reasons justifying the late filing of this objection, relying for the first time in the appeal proceedings on document C7. It is insufficient that C7 had been cited during opposition proceedings.

8.4 The objection of lack of inventive step in view of the combination of C5 with C7 is thus not taken into account.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent on the basis of claims 1 to 14 of auxiliary request 2 filed with the reply to the appeals and a description to be adapted thereto.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated