BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS	BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE	CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Datasheet for the decision
of 20 January 2009

Case Number: T 0354/04 - 3.3.05

Application Number: 97107511.4

Publication Number: 0792845

IPC: C03C 13/00

Language of the proceedings: EN

Title of invention:
Man-made vitreous fibres

Patentee:
Rockwool International A/S

Opponents:
Knauf Insulation GmbH
Paroc Oy Ab
SAINT-GOBAIN ISOVER

Headword:
Mineral fibres III/ROCKWOOL

Relevant legal provisions:
EPC Art. 100(b)

Keyword:
"Sufficiency of disclosure (no):
- determination of a calculated parameter value delimiting the claimed subject-matter not possible throughout the whole ambit of the claim
- incomplete teaching of the reference document for the calculation
- completing the teaching of the reference document requires an undue amount of experimentation"

Decisions cited:
T 0435/91, T 0409/91

Catchword:
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Case Number: T 0354/04 **-** 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 20 January 2009

Appellant: (Patent Proprietor)	Rockwool International A/S Hovedgaden 501 DK-2640 Hedehusene (DK)
Representative:	Samuels, Lucy Alice Gill Jennings & Every LLP Broadgate House 7 Eldon Street London EC2M 7LH (GB)
Appellant 1: (Opponent 1)	Knauf Insulation GmbH Industriestrasse 18 AT-9586 Fürnitz (AT)
Representative:	Becker, Thomas Patentanwälte Becker & Müller Turnstrasse 22 D-40878 Ratingen (DE)
Appellant 2: (Opponent 2)	Paroc Oy Ab Neilikkatie 17 FI-01300 Vantaa (FI)
Representative:	Rauh, Peter Vossius & Partner Postfach 86 07 67 D-81634 München (DE)
Appellant 3: (Opponent 3)	SAINT-GOBAIN ISOVER 18, avenue d'Alsace F-92400 Courbevoie (FR)
Representative:	Muller, René SAINT-GOBAIN RECHERCHE 39, quai Lucien Lefranc F-93303 Aubervilliers (FR)

C2152.D

Decision under appeal: Interlocutory decision of the Opposition Division of the European Patent Office posted 27 February 2004 concerning maintenance of European patent No. 0792845 in amended form.

Composition of the Board:

Chairman: G. Raths
Members: B. Czech
              C. Vallet

Summary of Facts and Submissions

I.   The appeals lie from the interlocutory decision of the
      opposition division concerning the maintenance of the
      European patent No. 0 792 845 in amended form.

II.   Claim 1 according to the main request decided upon by
      the opposition division reads as follows:

      *"1. Use of a melt composition to make man-made vitreous
      fibres which are shown to be biodegradable in the lung
      wherein the composition has an analysis, measured as
      weight of oxides, which includes*

SiO_2	*32 to below 45%*
Al_2O_3	*above 16 up to 26%*
CaO	*10 to 30%*
MgO	*2 to 20%*
FeO	*2 to 15%*
$Na_2O + K_2O$	*0 to 12%*
TiO_2	*0 to 4%*
Other Elements	*0 to 8%*

      *and the composition has a melt viscosity at 1400°C of
      10 to 70 poise, and in which the fibres have a
      dissolution rate as defined herein at pH 4.5 of at
      least 20nm per day."*

III. In the contested decision the opposition division inter
      alia found that the patent was not objectionable for
      insufficiency of disclosure. More particularly, it
      accepted that the "analysis of the fibres ... had a
      composition as indicated in the claim" and that "the
      viscosity criteria stated in the claim refer to the
      melt, but a melt having a composition equivalent to the
      fibres" (point 4.1, second paragraph of the reasons).

The opposition division considered (see reasons, point 4.2.1 "Viscosity") that the viscosity values in the claims were values calculated according to the approach published by Bottinga and Weill ("BW" hereinafter) in document C28. Concerning the calculation of the melt viscosity values according to the BW model, the opposition division, taking into account inter alia A14, came to the following conclusions (see point 4): "It can be accepted that BW does not allow calculating all viscosities within the claimed range. However, it was not disputed that certain, if not most compositions can be treated in the proposed way, with plausible results. By extrapolation of the missing D-values from neighbouring values, more compositions can be calculated. Still existing gaps can then be filled, if necessary, by experimental viscosity determination, using standard methods and equipment. The results so obtained can be calibrated against the calculated values in such a way that a consistent set of data is obtained. Although this could sometimes involve considerable experimental effort, compared with the suggested calculation according to BW, it does not imply that the patent could not be worked. Viscosity measurements are routine in the art of mineral fibre manufacture. There is thus no undue experimental burden, as in T 32/85."

IV.   The documents considered in the opposition procedure include the following:

A14:   Glafo Report 008629 - Fibre P

C24a: Glafo Report 018693-2;

C25:   DE 28 56 206 C2;

C28:   Y. Bottinga and D. Weill, "The viscosity of
       magmatic silicate liquids: A model for
       calculation"; American Journal of Science,
       Vo.272, May 1972, p.438 to 475;

C34:   EP 0 459 897 A1;

A43:   Summary of the patent proprietor's arguments
       concerning the issue of sufficiency of
       disclosure;

A44:   Correspondence Ms Guldberg / Prof. Dingwell dated
       2 October and 30 October 2001, respectively.

A46:   Letter and "Stellungnahme" of Professor Conradt

V.   In their respective statements of grounds of appeal,
       all three appealing opponents, i.e. appellant 1
       (Knauf Insulation GmbH), appellant 2 (Paroc Oy AB) and
       appellant 3 (Saint-Gobain Isover) objected to the
       claims that had been considered patentable by the
       opposition division, inter alia on the ground of
       insufficiency of disclosure. In particular, appellant 1
       raised objections under Article 100(b) EPC inter alia
       having regard to the term "*composition*" and to the
       viscosity criterion comprised in claim 1. In this
       connection, it discussed the contents of C28 and
       addressed the difficulties involved in measuring the
       melt viscosities of compositions as defined in claim 1,
       by referring also to document

       A57:   An experimental report of Prof. Suvorov of 2003.

VI.   With its statement of grounds of appeal dated 5 July
        2004, the appellant and patent proprietor Rockwool
        International A/S (referred to as "appellant Rockwool"
        hereinafter) filed five sets of amended claims as main
        and first to fifth auxiliary requests. It approved the
        findings of the opposition division concerning
        sufficiency of disclosure without going into details.
        It also filed a writ ("A39A") and further references
        essentially relating to novelty and inventive step
        issues.

VII.   In its reply dated 10 January 2005, appellant 1 inter
        alia submitted further arguments concerning its
        objection under Article 100(b) EPC, pointing out inter
        alia the lack of information in C28 concerning some
        "*other elements*" which according to claim 1 may be
        present in amounts of up to 8% in the melt composition.

VIII.   With its letter of 17 January 2005, appellant Rockwool
        filed a further set of claims as sixth auxiliary
        request, and a copy of a writ filed in a closely
        related case (T 440/04) wherein with respect to the
        issue of insufficiency of disclosure reference was made
        (see points 25 and 26) to documents A43, C24a and

        C48c: Table with viscosity calculations "according to
               the Bottinga-Weill model".

IX.   In its letter dated 24 January 2005 in reply to
        appellant Rockwool's statement of grounds of appeal,
        appellant 2 maintained its earlier objections and
        raised objections under Article 100(c) EPC against some
        of the pending auxiliary requests of appellant Rockwool.

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X.   In its further written submissions dated 27 January
        2006, 7 April 2006 and 18 August 2006 appellant 1
        further developed its argumentation concerning
        insufficiency of disclosure having regard inter alia to
        the features "*composition*" and "*viscosity*", by
        referring inter alia to the following further documents,
        and expressly making the contents of A83 (an opinion of
        Prof. Jestädt) part of its argumentation:

        A80.1: ARP Report A007/4133/06;
        A80.2: Report LAB 849/06 Prof. Meisel - Leoben;

        A82.1: Report of Prof. Mengel; and
        A82.2: Report Dr Kirschner - Leoben.

XI.   The parties were summoned to oral proceedings.

XII.   In its submission of 24 September 2008, appellant 1
        cited further documents. In this letter and a further
        letter of 10 December 2008, it provided further
        detailed arguments inter alia concerning the
        "*composition*" feature and the issue of the calculated
        viscosity.

XIII.   In two written submissions of 14 October 2008 and
        18 December 2008, appellant 3 formulated objections
        under Articles 100(c) and 100(a) EPC having regard to
        appellant Rockwool's pending requests.

XIV.   In a letter dated 15 December 2008, appellant 2
        objected to the requests of appellant Rockwool, by
        raising objections under Articles 100(a)(b)(c),
        Article 84 and Rule 80 EPC. Concerning the issue of

viscosity, appellant 2 referred to the previous
submissions of appellant 1.

XV.   On 19 December 2009, the board dispatched a
        communication in preparation of the oral proceedings in
        which it inter alia addressed the issue of sufficiency
        of disclosure. It inter alia indicated its provisional
        opinion concerning the meaning of the term
        "*composition*" (point 6.1) and addressed the question of
        "*whether the disclosure of the patent in suit is
        sufficiently clear and complete to enable the skilled
        person to actually determine - without undue burden -
        correct and significant values of the desired
        properties such as the viscosity ... for a given fibre
        having a composition falling within the ranges
        specified in the claims*" (point 6.3). Concerning C28,
        the board also pointed out "*that the "D"-values to be
        used for the calculations are not available for a large
        part of the compositions falling within the ranges of
        the present claims*" (point 6.4). The board also noted
        (points 6.7 and 6.8) that appellant Rockwool had
        already been able to analyse and discuss the content of
        several documents (including A80.1/A80.2 and
        A82.1/A82.2) filed by appellant 1 despite their late
        filing in the appeal proceedings.

XVI.   Later on 19 December 2009, the board received a fax
        from the appellant Rockwool wherein fifteen auxiliary
        requests were made. Some of the requests were not
        completely drafted, but merely presented in the form of
        statements concerning intended combinations to be made
        amongst some of the fully formulated requests.

The appellant Rockwool inter alia also addressed the issue of insufficiency of disclosure by referring to the further documents

A87: M. Korsgaard et al., "Derivation of the temperature dependent constants for $KAlO_2$ and $NaAlO_2$ in a viscosity predictive model for high aluminosilicate melts"; Glass. Sci. Technol. 76 (2003) No.6, p. 270-275; and

A90: Submissions made by Paroc Group Oy AB in a different case and comprising viscosity calculations (sheet 3 of 3) according to the Bottinga and Weill model.

XVII. Finally, on 14 January 2009, appellant Rockwool filed fifteen sets of claims, namely a new main request and first to seventh and ninth to fifteenth auxiliary requests, respectively. The requests consisted of clean-typed versions of the requests previously on file, but with some additional amendments. The previous eighth auxiliary request was expressly withdrawn. Claim 1 according to the said second auxiliary request reads as follows (amendments to claim 1 according to the main request previously on file **highlighted** by the board):

"*1. Use of a melt composition to make man-made vitreous fibres which are shown to be biodegradable in the lung wherein the composition has an analysis, measured as weight of oxides, which includes*
SiO_2 32 to below 45%
Al_2O_3 above 16 up to 26%
CaO   10 to 30%

MgO   *2 to 20%*

FeO   *2 to 15%*

$Na_2O + K_2O$ *0 to **below 3%***

TiO_2   *0 to 4%*

*Other Elements 0 to 8%, and **wherein B_2O_3 is absent**
and the composition has a melt viscosity at 1400°C of
10 to 70 poise, **calculated according to Bottinga and
Weill, American Journal of Science volume 272, May
1972, page 455-475** and in which the fibres have a
dissolution rate as defined herein at pH 4.5 of at
least 20nm per day."*

With the same submission, appellant Rockwool also filed
copies of letters dated 23 July 2008, 11 November 2008
and 15 June 2004, respectively, which letters had been
filed in the appeal proceedings concerning the parent
case (T 337/04). The first two of the said letters were
attached because they contained appellant Rockwool's
comments on sufficiency of disclosure, including
comments on documents A80.1/A80.2 and A82.1/A82.2; see
points 7.22 to 7.26 of the copy of the letter dated
23 July 2008 and points 2.2.3 and 2.2.5 of the copy of
the second letter dated 11 November 2008.

XVIII. During the oral proceedings on 20 January 2009 the
appellant Rockwool withdrew its previous main and first
auxiliary requests, the request filed as "second
auxiliary request" on 14 January 2009 becoming its new
main request, and confirmed that there was no eighth
auxiliary request.

The exchange of arguments during the oral proceedings
was essentially focussed on the admissibility of
appellant Rockwool's requests filed on 14 January 2009

and on the issue of sufficiency of disclosure, more particularly having regard to the calculation of melt viscosities according to the BW method described in C28.

At the end of the oral proceedings, the board announced its decision.

XIX.   The arguments of the parties, as far as they are relevant for the present decision, can be summarised as follows:

The appellants 1 to 3 requested that all or at least some of the appellant's requests of 14 January 2009 should not be admitted in view of their very late filing. Such a large number of requests which did not converge in terms of the numerous amendments made, and which raised new issues shortly before the oral proceedings, was not admissible pursuant to Article 13 of the RPBA.

In connection with its objections concerning sufficiency of disclosure, appellant 1 argued that although the expression "*a melt composition*" as used in the preamble of claim 1 was clear, it was questionable whether, considering the contents of the description of the patent in suit, "*the composition*" defined in claim 1 by virtue of its chemical composition ("*analysis*") and viscosity was the composition of the melt from which the fibres were made or the composition of the raw material mix used when preparing the melt. Depending on the particular components and processing conditions, it was possible that the composition of the melt differed from the one of the raw material mix and

that the composition of the melt changed to some extent
before it was actually formed into fibres (documents
A80.1/A80.2).

Concerning the calculated viscosity feature, appellants
1 to 3 did not contest that calculations were possible
for some compositions, but it was argued that they were
not possible for compositions comprising components
and/or amounts of components with respect to which C28
did not contain any or at least not enough information
on how to consider them in the calculation. More
particularly, C28 did not contain any information
whatsoever concerning melts comprising ZrO_2 and no
information concerning melts comprising P_2O_5 in amounts
of up to 8 weight percent. Substantial numbers of such
compositions were, however, encompassed by the
definition in claim 1. Those two oxides had already
been used previously as components in mineral fibre
compositions. Apatite was a natural occurring rock
containing high amounts of phosphorus, and slags were
also mentioned in the description as possible raw
materials. The composition as defined in claim 1 also
encompassed compositions having viscosities falling
outside the claimed range. Therefore, in the absence of
any indication in C28 concerning inter alia the D_i
values to be applied for ZrO_2 or P_2O_5 at higher
concentrations, or concerning their estimation by
approximation or extrapolation, the skilled person
could not calculate the viscosity of such compositions
using the model described in C28. Adding higher amounts
of phosphorus to silicon was not the same approach as
the one referred to in the priority application and was
something else than adding very small amounts of
phosphorus to silicon. Consequently, the skilled person
could not, based on the patent in suit and common

general knowledge, reproduce the claimed invention.
Moreover, the skilled person could not be expected to
find the proper values by an undue experimental burden.
In particular, appellant 1 pointed out that the mineral
melts under consideration were not Newtonian liquids
(C57). High temperature melt viscosity measurements
were difficult and not a usual routine for the skilled
person (documents A82.1/A82.2) and would lead to
different results depending on the measuring method and
depending on whether they were measured or calculated.
The patent did not contain any information on how the
viscosities could be measured and how a measured
viscosity could be translated into a calculated one.

Appellant Rockwool argued that the requests filed on
14 January 2009 were only slightly amended compared to
the ones filed on 19 December 2008. A large number of
requests was necessary in view of the different
objections and the volume of the arguments raised. The
number of changes was small and the analysis of the
changes was not particularly complex. The recent
amendments were made to overcome objections that
emerged more clearly during the oral proceedings
concerning the parent appeal case T 337/04.

According to appellant Rockwool, the composition of the
fibres and of the melt from which the fibres were
formed were the same and had the analysis recited in
the claims. A calculated melt viscosity could also be
attributed to a fibre composition. Hence there was no
lack of clarity or insufficiency of disclosure in this
respect, even when the melt composition changed over
time.

Appellant Rockwool argued that C28 was the
authoritative reference concerning predictive melt
viscosity calculations for geologists in the last two
decades. Manufacturers making mineral fibres had relied
for years on the BW model for calculating, rather than
measuring viscosities of melts from natural stones. As
to the melt compositions recited in claim 1, the
indication "*up to 8%*" was intended to deal with the
fact that a complex composition comprising five
essential oxides and being based on naturally occurring
rocks as raw materials would inevitably include ten or
more other elements. However, each of these other
elements would only be present in a small proportion of
at most 1%. Elements present in such small amounts
(small molar fraction) would however only provide a
very small, negligible influence on the viscosity
calculated according to C28. Moreover, C28 gave
sufficient guidance on how to deal with several of the
other elements for which there were no specific D_i
values and none of which would in practice be present
in amounts of more than 5% (i.e. as major component) in
the blend of oxides containing only up to 8% of other
elements, such as zinc and barium. In particular, small
amounts of phosphorus were to be added to silicon, but
this was also applicable to higher amounts of
phosphorus. Appellant Rockwool stressed that the patent
was directed to the person skilled in the art, i.e. a
person actually manufacturing fibres from natural
stone, trying to make a commercial product therefrom.
He would not think about some theoretical synthetic
mixture of several different components. At the oral
proceedings, appellant Rockwool however accepted that
according to claim 1 P_2O_5 may be present in an amount of
up to 8% by weight. According to BW, even such amounts

were to be added to silicon for calculation purposes.
Although the compositions recited in the claim covered
compositions with viscosities falling outside of the
claimed range, these latter compositions were excluded
by the wording of the claim. Prompted to consider the
content of priority application GB 9500667.2 (page 10),
appellant Rockwool pointed out that the calculation
approach according to the priority document would only
give a slightly different value. Moreover, the patent
in suit did not contain this information. In the
meantime, the opponents also used BW for their
viscosity calculations on phosphorus containing
compositions. For instance from A90 it was apparent
that appellant 2 used the BW model for viscosity
calculations. There was no proof that the inclusion of
phosphorous in concentrations of up to 8% would affect
the boundaries of the claim so that the skilled person
could not decide whether he was inside or outside of
the claim. Adding P to Si was the appropriate approach
and if this was done, the viscosity could be
calculated. There was no subsequent art saying that
this approach was wrong or difficult. The content of
the said priority document was no prior art and hence
not relevant. The work reported in A87 was only a
master student's project and was thus not beyond the
experimentation that ought to be expected of a person
skilled in the art. The authors of C28 explained that
there were some gaps and that they invited people to go
and fill them, giving some guidance on what needs to be
done. At the oral proceedings, appellant Rockwool
stated that according to Professor Dingwell, it would
take his group only a few weeks to test the guidance
given by BW on phosphorus. This could not be considered

as an undue experimentation. Hence the disclosure was sufficient.

XX.   The appellant Rockwool (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained on the basis of the main request labelled second auxiliary request, alternatively, on the basis of one of the auxiliary requests labelled third to seventh or ninth to fifteenth request, all requests filed on 14 January 2009.

        Appellants I, II and III (opponents 01, 02 and 03) requested that the decision under appeal be set aside and that the patent be revoked.

Reasons for the Decision

Late filed evidence (A80.1/A80.2 and A82.1/A82.2)

1.   As noted in the board's communication in preparation of the oral proceedings (point 6.7), the appellant Rockwool had the opportunity to comment and did comment in detail on the relevance of inter alia documents A80.1/A80.2 and A82.1. and A82.2 which were cited by appellant 1 at a relatively late stage of the appeal proceedings; see the contents of the two letters dated 23 July 2008 and 11 November 2008 referred to under point XVII hereinabove. The board also considered that more than two years elapsed between the filing of said evidence and the date of the oral proceedings, that said evidence was filed by appellant 1 to further corroborate some of its earlier statements, and that

said evidence is of prima facie relevance (see points
6.1.1 and 11.4.1 below).

The board exercising its discretionary power under
Article 114(2) EPC thus decided to consider the said
documents despite their late filing.

Main request - Admissibility

2.   Claim 1 of the present main request filed on 14 January
        2009 (labelled "second auxiliary request (December
        2008)") differs from claim 1 according to the main
        request filed with the statement of grounds of appeal
        of appellant Rockwool dated 5 July 2004 in that:
        - it is specified that the melt viscosity value is
        calculated according to the Bottinga and Weill ("BW"
        hereinafter) publication C28,
        - the upper limit of the weight-% range for $Na_2O + K_2O$
        has been reduced from 12% to 3%, and
        - the presence of B_2O_3 is excluded.
        Furthermore, the present main request differs from the
        main request filed with the statement of grounds of
        appeal in that four dependent claims, corresponding to
        dependent claims 8, 12, 16 and 18 of the patent as
        granted were deleted.

2.1   Concerning the reference to C28, the board notes that
        in the contested decision, the opposition division held
        that the viscosity values given in the claims were
        implicitly values calculated according to C28 (see
        Reasons, point 4.2.1, first paragraph), although the
        method used for determining the viscosity was not
        indicated in the claims. In the appeal proceedings
        T 337/04 concerning the parent patent (and involving

all the parties to the present proceedings), the issue
of insufficiency of disclosure having regard to the
viscosity feature was discussed at the oral proceedings
on 2 and 3 December 2008, during which patent
proprietor (Rockwool International) filed amended
claims comprising a reference to the method of Bottinga
and Weill (C28). Since the claims of the present patent
as granted are also silent about the method used for
determining the melt viscosity, and since appellant
Rockwool previously argued that calculated viscosity
values, and not measured values, were appropriate (see
e.g. A43, point 34; letter dated 24 December 2004,
points 23 and 25), the board considers that the
amendment consisting in the introduction of a reference
to C28 into claim 1 was a foreseeable possible reaction
of appellant Rockwool in the present proceedings.

2.2   The issue of the applicability of the BW method to
compositions comprising high amounts of $Na_2O + K_2O$
and/or "*other components*" was already previously
addressed in the present case in the decision under
appeal and in the submissions of appellant 1 (see e.g.
its statement of grounds of appeal, point E.2 and its
letter dated 10 January 2005, point III). Moreover, the
applicability of the BW method to melt compositions
comprising high amounts of alkali oxides and/or boron
oxide was extensively discussed during the oral
proceedings in the appeal case (T 337/04) concerning
the parent patent, at the end of which the patent
proprietor's appeal was dismissed. Therefore, the board
also considers the lowering of the upper limit for the
amount of $Na_2O + K_2O$ and the exclusion of B_2O_3 as
foreseeable possible reactions of appellant Rockwool.

Said amendments can thus not have taken the other parties by surprise.

2.3   The amendments addressed under points 1.2 and 1.3 hereinabove were already proposed in appellant Rockwool's second auxiliary request filed on 19 December 2008, i.e. soon after the oral proceedings in the parent case (T 337/04) and one month before the oral proceedings in the present case.

2.4   Concerning the amendments consisting in the deletion of the four dependent claims, the board accepts that they are occasioned by grounds of opposition in accordance with Rule 80 EPC. More particularly, deleted claims 12 and 16 (numbering of the granted claims) had already been objected to under Article 100(c) EPC in the notice of opposition of opponent I dated 6 April 2001 (see "Anlage BMO", page 5, top paragraph). The features of deleted claim 8 (numbering of the granted claim) relating to the sintering temperature (deleted granted claim 8) were objected to under Article 100(b) EPC throughout the proceedings. Finally, the appellants 1 to 3 have not denied that the features of deleted claim 19 (numbering of the granted claim) had been objected to under Article 100(b) EPC in related proceedings, as it was pointed out by appellant Rockwool.

2.5   Considering all the above circumstances, the board does not consider the amendments in the claims according to the present main request to be too complex or to be filed so late that they could not be dealt with by the other parties without the adjournment of the oral proceedings.

The board exercising its discretionary power under
Article 13 RPBA thus decided to admit the said main
request despite its late filing.

Main request - Amendments

3.   Although the specific method for calculating the melt
        viscosity values as now referred to in claim 1 is
        expressly mentioned in both the application as filed
        and the parent application as filed (see WO 96/ 14274;
        page 12, lines 25 to 28), the board has doubts as to
        whether the use of a melt composition specifically
        combining all the amended features of present claim 1
        (restricted compositional ranges, properties) is
        actually directly and unambiguously disclosed therein.

3.1   However, the board does not consider it necessary to
        discuss the allowability of the various amendments
        involved under Articles 76(1) and 123(2) EPC, since the
        patent as amended suffers in any case from an
        insufficiency of disclosure having regard to the
        feature relating to the calculated melt viscosity (see
        points 4 to 15 below).

Main request - Insufficiency of disclosure

4.   Insufficiency of disclosure, inter alia with respect to
        the viscosity feature, was one of the main issues in
        the present case. According to established
        jurisprudence of the boards of appeal, the requirement
        of sufficiency of disclosure is only met provided the
        invention as defined in the independent claim can be
        performed by the person skilled in the art within the
        whole area claimed without the burden of an undue

amount of experimentation, taking into consideration
common general knowledge and the whole information
content of the patent in suit (see decisions T 435/91,
OJ 1995, 188, point 2.2.1, third paragraph, of the
reasons, and T 409/91, OJ 1994, 653, point 2, first
paragraph, penultimate sentence).

5.   The invention as claimed is the use of a melt for
        making man-made vitreous fibres of a specified
        solubility which are shown to be biodegradable in the
        lung, wherein said melt must have both
        i) a specific composition defined by quantitative
        ranges for its components, and
        ii) a viscosity at 1400°C in the range of 10 to 70
        poise, the viscosity value being <u>calculated</u> according
        to C28.

        In order for the requirement of sufficiency of
        disclosure to be fulfilled in the present case, the
        skilled person must thus inter alia be able to
        calculate according to the BW model as set out in C28
        the viscosity values of compositions having analyses
        throughout the ranges indicated in claim 1 so that he
        is able to identify and use those compositions having a
        viscosity value falling within the viscosity range
        indicated in claim 1 and to discard those which don't.
        As will appear from the following, appellant Rockwool's
        position that the invention is sufficiently disclosed
        cannot be accepted, since the skilled person cannot
        simply rely on what is disclosed in C28 to calculate
        viscosities across the whole area defined by the
        compositional ranges indicated in claim 1, and is thus
        not in a position to carry out the claimed invention
        over the whole ambit of claim 1.

6.   The ambit of claim 1

6.1   Meaning of "*melt composition*" and "*composition*"

6.1.1   The board acknowledges that in the description of the
        patent in suit (see e.g. sections [0002], [0044], [0045]
        and [0058]) the term "*composition*" is sometimes also
        used in connection with the composition of the mineral
        raw material mix to be melted in the course of the
        fibre fabrication. Depending on the process conditions
        and the nature of the raw materials, the composition of
        the melt may differ from the composition of the raw
        material mix and may change during the melting due to
        volatilisation, reduction and/or oven lining
        dissolution phenomena (see e.g. A80.1/A80.2). This was
        not disputed, see e.g. A43, points 67 and 69; points
        7.22 and 7.23 of the letter dated 23 July 2008 attached
        to appellant Rockwool's written submission of
        14 January 2009.

6.1.2   However, despite the somewhat misleading references to
        the composition of the raw material mix in the
        description, it is clearly apparent from the patent as
        a whole including the description that the aim is to
        identify compositions for providing fibres having
        controlled properties (inter alia a certain minimum
        dissolution rate in a specified environment), which
        properties depend on the composition of the fibres
        formed. Therefore, the board accepts the view of
        appellant Rockwool, that the skilled person would
        understand that "*the composition*" referred to in
        claim 1 by virtue of its chemical composition
        ("*analysis*") and viscosity is identical with the
        composition designated in claim 1 as "*a **melt***

composition" (emphasis added by the board), i.e. the composition from which fibres having said chemical composition are actually spun, and that this composition need not be identical with the (possibly somewhat different) compositions of the raw material mix or of the melt at some intermediate processing stage.

6.2   Compositions embraced by the compositional ranges

6.2.1   The compositions as defined in claim 1 may in terms of their "*analysis*" not only comprise the oxides specifically recited, but they may also comprise one or more "*other elements*" in significant amounts (calculated as oxides) of up "*to 8%*" by weight in total.

6.2.2   Claim 1 is, however, silent about the nature of these other elements. Only the description of the patent in suit (section [0033]) contains a <u>non-exhaustive</u> list of "*other elements*" that "*can be present in the composition in any amount that does not detract from the desired properties and which does not exceed 8%*": P_2O_5, B_2O_3, BaO, ZrO_2, MnO, ZnO and V_2O_5 are specifically mentioned as examples of such "*other elements*". With regard to the amounts of these "*other elements*", it is indicated in the description only (section [0035]), that "***each** of the other elements is **normally** present in an amount of not more than 2%, except that P_2O_5 and/or B_2O_3 may be present in larger amounts*" (emphasis added by the board). Moreover, it is expressly mentioned (section [0034]) that "*often B_2O_3 is absent*" and that "*preferably, there is 1 **to 8%** ... P_2O_5 and 0 to 5% B_2O_3*". In section [0044] it is stated that the composition to

be melted is **"*typically*"** formed by blending naturally occurring rock and sand materials and waste materials.

6.2.3 Moreover, claim 1 contains no qualitative indications concerning the nature
i) of the raw materials from which the fibres are manufactured or
ii) of the so-called "*other elements*" and the only quantitative limitation with respect to the latter is that their total amount may be up to 8 % by weight. Therefore, for the board, claim 1 is <u>not</u> limited to the use of compositions made from some specific raw materials, such as the naturally occurring rocks and/or the specific waste materials mentioned in the description (section [0044]). So, the compositions that may potentially be used according to present claim 1 are defined rather broadly and may even comprise oxide components not expressly mentioned as examples in section [0033] of the patent in suit.

6.2.4 It remained undisputed that mineral fibres comprising relatively high amounts of ZrO_2 or P_2O_5 were not unknown in the field of mineral fibres before the priority dates invoked by the patent in suit. This is illustrated e.g. by C25 (a patent publication of Rockwool International A/S of 1988), where mention is made (see page 1, lines 39 to 52) of mineral fibres comprising ZrO_2 in amounts of up to 10 % by weight, and by C34 (published 1991) disclosing mineral fibres comprising up to 10 % by weight P_2O_5 (see abstract or claim 1).

6.2.5 From the above, the board concludes that present claim 1 embraces the use of all those compositions

which comprise one or more oxide forming elements not specifically mentioned in the claim or in the description in amounts of up to 8% by weight in total provided these compositions meet - inter alia - the recited viscosity requirement. In particular, the set of compositions having an "*analysis*" as recited in claim 1 embraces compositions comprising up to 8% by weight of one "*other*" element, e.g. of P_2O_5 (as conceded by appellant Rockwool at the oral proceedings), or of one of the other elements mentioned in the description, e.g. ZrO_2.

6.3   Calculated viscosity range as a further limitation

As acknowledged by the appellant Rockwool, the compositional ranges recited in claim 1 embrace compositions with viscosities falling outside of the claimed range (see e.g. the two examples mentioned in point 2.2.9 of the letter dated 11 November 2008 referred to under point XVII above). Claim 1 is, however, restricted to the use of those melt compositions which not only have an "*analysis*" falling within the recited compositional ranges, but which additionally meet the requirement of a melt viscosity value falling within the recited numerical range, the value to be considered being the viscosity value calculated according to the BW model described in C28.

7.   The Bottinga and Weill model as described in C28

7.1   C28 describes a model for calculating, instead of measuring, the viscosities of multi-component silicate liquids (i.e. melts) based on their composition according to the formula

$$\ln \eta = \sum_i X_i D_i \qquad (1),$$

wherein η is the viscosity, X_i is the mole fraction of the i-th component, D_i is a constant associated with component i over a restricted range (in terms of mole percent SiO_2) of composition, and each temperature has a particular set of D_i constants. The D_i constants tabulated in C28 (Table 3 on pages 452 to 456) were determined by mathematical methods based on measured viscosity data (2440 data points) extracted from a preferred set of published references that were available to the authors (C28: page 441, Table 1).

7.2   C28 is primarily concerned with a model for predicting, by means of calculations, the viscosities of naturally occurring magmatic liquids, and the application of the model to geologic problems involving viscosity (see e.g. the title; the abstract; page 460, second paragraph, first and last sentence; page 471, "Concluding remarks", first sentence). Applications in the field of mineral fibre manufacturing are not addressed. The authors of C28 specifically mention (in the paragraph bridging pages 442 and 443) that having regard to the evaluation of the reliability of the method more measured data would be "very desirable" for the components K_2O, Fe_2O_3, TiO_2, FeO and MnO, i.e. even for some of the components explicitly recited in present claim 1.

7.3   The authors of C28 indicate (see page 451, "Viscosity calculations") that in some cases a direct viscosity calculation is not possible for lack of input data in Table 3, which "makes it necessary to estimate Di values for certain components". Since the "paper is concerned primarily with geological applications", the authors have "chosen several compositions

representative of the magmatic range in order to discuss the calculations and necessary approximations". The authors of C28 recommend that "for all major components", i.e. components present in amounts of > 5 mole %, "only the D_i values actually listed in table 3 be used" and they consider that viscosity calculations will only be possible as far as the D_i values are available for the temperature ranges concerned, although the linear temperature dependence may be extrapolated to some extent (see page 457, second paragraph).

7.4   More particularly, having regard to some specific cases where the necessary D_i values are missing for the relevant SiO_2 mole fraction range in Table 3, the authors of C28 give some specific guidance on how to carry out the calculations based on certain estimations or approximations (see the section "Viscosity calculations" extending over pages 451 and 457 to 460). Some express guidance is given (see page 451, last paragraph, page 458, first paragraph, to page 459, first paragraph) on how to deal with certain components of the representative magmatic compositions, i.e. with "small amounts" of phosphorous, with potassium in the form of $KAlO_2$, with "minor amounts" (< 5 mole%) of TiO_2 or of sodium oxide in the form of $NaAlO_2$ in the composition range $0.35 < X_{SiO2} < 0.45$ (page 458, last paragraph), and with "minor" MO components (i.e. bivalent metal oxides).

7.5   According to C28 (page 457, first paragraph), a "small amount of phosphorous usually present in magmas is added to silicon (compare calculations in table 4)". From the said Table 4, which lists the compositions of

several representative magma types, it can be gathered
that the amounts considered as "small" are in the range
of 0.5 to 0.53 % by weight.

7.6   However, in developing and testing their model, the
        authors of C28 have not considered compositions
        comprising significant amounts of some of the other
        oxides specifically mentioned in the patent in suit as
        possible "*other elements*" in the patent in suit
        (section [0033]). For instance, ZnO, B_2O_3 and ZrO_2 are
        not mentioned in C28 at all, and V_2O_5 is only mentioned
        in connection with measurements which were disregarded
        as source of input data by the authors (see C28:
        page 441, last full sentence; Tables 1, 4 and 6).

7.7   The board notes that it has not been disputed by the
        respondents that the viscosities of **certain** SiO_2 based
        melt compositions to be used in mineral fibre
        production can actually be calculated using the BW
        model described in C28, instead of being measured. The
        board accepts that each oxide of an "*other element*"
        which is present only in a minor amount of up to about
        1% (corresponding to a mole fraction of 0.01) may - at
        least when considered individually - only have an
        insignificant impact on the viscosity as determined
        according to formula (1) because the corresponding term
        D_iX_i may be very small and may thus contribute very
        little to the sum of these terms and hence to the
        calculated viscosity.

7.8   However, in the present case, the question that must be
        answered in the first place is not whether a calculated
        viscosity value falls within or without the numerical
        range in the claim but whether the person skilled in

the art, considering the contents of the patent in suit
and of C28, as well as common general knowledge on the
filing date of the patent in suit, was actually in a
position to calculate the viscosities of melt
compositions having analyses throughout the ranges
indicated in claim 1. As already set out under point
6.2.5 hereinabove, the compositional ranges in claim 1
include, inter alia, compositions comprising relatively
high amounts of ZrO_2 or P_2O_5. Only when the skilled
person is in a position to actually calculate the
viscosity value for these compositions he will be able
to check thereafter whether this calculated value falls
within or without a given range.

8.   The limitations in the teaching of document C28

C28 describes a model for predicting instead of
measuring the viscosities of multi-component silicate
melts. At first glance C28, which is praised as the
authoritative reference in viscosity calculations,
appears to describe a simple calculation of the
viscosity of multi-component melts requiring not much
more than filling in available data in the formula (1).
When trying to apply the calculation model of C28 to
the compositions embraced by the compositional ranges
in claim 1, the skilled person is however confronted
with difficulties due to a lack of data and to gaps in
the information provided in C28. The teaching in C28 is
incomplete insofar as the BW model as set out therein
is not fully applicable to all the compositions as
defined in present claim 1.

8.1   Teaching in C28 is incomplete insofar as certain
        D_i values are missing

        The straightforward viscosity calculation according to
        formula (1) of C28 requires that for each component of
        the melt composition present in a significant amount,
        the corresponding D_i value must be known. As far as ZrO_2
        and P_2O_5 are concerned, C28 does not report any of the
        D_i values needed for the calculation. The
        straightforward viscosity calculation according to
        formula (1) of C28 is thus not possible for the
        compositions comprising up to 8 weight % ZrO_2 or P_2O_5.

8.2   Teaching in C28 is incomplete insofar as certain
        necessary estimations are not indicated

8.2.1   As mentioned under point 7.3 above, the authors of C28
        indicate that in some cases, estimated or approximated
        D_i values of certain components may be used in the
        calculation when the required D_i values are not
        tabulated.

8.2.2   However, C28 contains no guidance whatsoever (see
        sections "Chemical dependence of viscosity – General",
        pages 443 to 444, and section "Viscosity calculations",
        pages 451 and 457 to 460) having regard to
        approximations or estimations that could be applied in
        the case where a composition contains ZrO_2 in more than
        just a negligible amount, let alone in a higher amount
        of up to 8% by weight.

8.2.3   Having regard to phosphorus, C28 does not comprise any
        express information on how to deal with amounts

substantially higher than the "small amounts" of at most 0.53 % by weight reported in Table 4.

8.3 Having regard to compositions comprising ZrO_2 or P_2O_5 in amounts of up to 8 % by weight, C28 thus not only lacks the required D_i values but also any indications concerning the specific approximations to be applied. The board thus concludes that the skilled person was not in a position to calculate or estimate in a reliable way a viscosity value "*according to Bottinga and Weill, American Journal of Science Volume 272, May 1972, page 455 - 475*" as required by claim 1 for at least those compositions falling within the compositional ranges of claim 1 which comprise high amounts of up to 8 % by weight ZrO_2 or P_2O_5.

9. Incomplete teaching in C28 calls estimations to be made by the skilled person into question

9.1 According to the appellant Rockwool, C28 teaches to make best efforts to approximate or estimate or derive averages when a particular value is missing (see e.g. A43, point 36). By doing so, the skilled person would be able to calculate the melt viscosities of the compositions throughout the whole area claimed. These considerations are, however, not convincing for the board since reliable estimations cannot be made for all the compositions falling within the compositional ranges in claim 1 for the following reasons.

9.2 The authors of C28 indeed state that in some cases "lack of sufficient input data makes it necessary to estimate D_i values for certain components" (page 451, section "Viscosity calculations", second sentence).

Notwithstanding the fact that some guidance is given in
C28 on how to estimate or approximate the required
values in the case of some typical magmatic
compositions reported in Table 4 of C28, no guidance is
given in C28 on how to estimate, approximate or derive
appropriate D_i values for ZrO_2 and P_2O_5 when present in
high amounts of up to 8 % by weight (see points 8.2.2
and 8.2.3 hereinabove).

9.3   Instead, it must be noted that the authors of C28
        emphasise (see the first sentence on page 446) that "a
        satisfactory quantitative model of viscosity-
        composition variation must be more discriminating than
        the usual "network former" and "network modifier"
        categories". However, C28 does not contain theoretical
        considerations which could be considered as a basis for
        enabling the skilled person to make appropriate,
        scientifically sound estimations of the D_i values for
        ZrO_2 and for P_2O_5 in amounts of up to 8 % by weight.

9.3.1   In particular, nothing can be derived from C28
        concerning the interaction of ZrO_2 with a silicate
        network in a multi-component melt and appellant
        Rockwool did not present arguments in this respect.

        The board notes that the patent in suit also does not
        comprise any information or guidance in this respect.

9.3.2   As far as phosphorus is concerned, the specific reasons
        that actually lead the authors of C28 to recommend
        adding "small amounts" of phosphorus to silicon are not
        indicated either. Hence, no information can be gathered
        from C28 concerning an appropriate way for
        approximating or estimating the D_i value for P_2O_5

present in the composition in amounts of up to 8 % by
weight, i.e. in amounts that may be several times
higher than the "small amounts" reported in Table 4 of
C28. Therefore, the board does not accept that C28
suggests this approach and - in the absence of
corroborating evidence to this effect - that the
skilled person would necessarily envisage using this
approach even in the case of compositions comprising
P_2O_5 in relatively high amounts of up to 8 % by weight.
For the skilled person, using this approach would
merely be one conceivable possibility amongst others,
and its validity would need to be tested and possibly
confirmed by experimental investigations (in this
respect see point 11 below).

This view is corroborated by the fact that in one of
the applications from which the patent in suit claims
priority (GB 9500667.2, page 10, lines 18 to 22), i.e.
at a time before the filing date of the patent in suit,
Rockwool considered that a different approximation for
taking P_2O_5 into consideration in the calculation was
appropriate, namely to "equalise 1 mole % P_2O_5 with
2 mole % Si + 1 mole % Ca" and undertook laboratory
tests which "proved that this approximation is valid
within actual chemical ranges".

The board notes that in the patent in suit (sections
[0025] and [0034] of the description) it is merely
stated that P_2O_5 may be added to "*maintain*" or "*adjust*"
the "*melt properties*", which include in particular the
viscosity and the liquidus temperature (see section
[0003]). According to section [0025] a decreased amount
of SiO_2 (tending to lower the viscosity) is to be
compensated by the addition of P_2O_5. Although the

skilled person could arguably derive therefrom that an addition of P_2O_5 tends to raise the viscosity, the board considers that the information contained in the quoted passages is not specific enough to constitute a guidance for estimating the appropriate D_i value to be used when calculating the viscosity of compositions containing P_2O_5 in relatively high amounts of up to 8 % by weight according to formula (1) given in C28.

9.4   Since the authors of C28 recommend that for components present in relatively high amounts (particularly for components present in amounts beyond the somewhat arbitrary limit of > 5 mole %) only the D_i values listed in table 3 are to be used, the board takes the view that the skilled person would consider that for compositions of compositions containing ZrO_2 or P_2O_5 in relatively high amounts of up to 8 % by weight, an estimation of the corresponding D_i value would not be appropriate, let alone without experimental confirmation.

9.5   No evidence was brought to the board showing that a specific approach for estimating the respective D_i values for the ZrO_2 or P_2O_5 components present in relatively high amounts of up to 8 weight % in compositions as referred to in present claim 1 belonged to common general knowledge at the filing date of the patent in suit.

More particularly, neither documents C24a, C48c and A90 referred to by appellant Rockwool in connection with the issue viscosity calculation, nor any of the other documents relied upon by appellant Rockwool in the present appeal proceedings, provide any additional

information in this respect. C24a and A90 are silent
about the presence of phosphorus or zirconium. Document
C48C reports results of "viscosity calculations
according to the Bottinga-Weill model", but P_2O_5 is
expressly referred to as being "outside model".

10.   Incomplete teaching in C28 does not permit the
        extension of the applicability of the BW model

10.1   Having regard to conceivable ways of estimating or
        approximating D_i values that might potentially be used
        by the skilled person in the calculation of viscosities
        along the lines indicated in C28, it is expedient to
        also consider document A14, a report issued by the
        renowned Glafo Research Institute. The contents of A14
        confirm that the skilled person would not necessarily
        consider extending the applicability of the BW model
        beyond what is explicitly taught by C28.

10.1.1 From A14 it can be gathered that the experts of Glafo
        consider the text of C28 to be not "fully conclusive"
        and that there can be "difficulties with these
        calculations" (C14, page 1, sentence underneath the
        table of values). Referring to the specific composition
        which is identical to the composition "P" of the patent
        in suit, the Glafo experts conclude that the model of
        BW is "not suitable to calculate melt viscosities at
        1400°C" of certain compositions (see page 2,
        penultimate paragraph; page 3, first sentence)
        containing a component (10.1 mole % $NaAlO_2$) for which
        the required D_i value and a specific estimation
        methodology are missing in C28 (see entire page 2). The
        Glafo experts apparently did not consider it to be
        appropriate to estimate a D_i value. They calculated a

viscosity value based on choosing 0 as the value for the missing D_i factors (bottom of page 2).

10.1.2 Although the composition specifically dealt with in A14 does not comprise phosphorus or zirconium, A14 corroborates the finding of the board that in the absence of useful indications in C28, the skilled person was not in a position to make a reliable estimation of the appropriate D_i values for ZrO_2 and P_2O_5 present in high amounts of up to 8% by weight and, therefore, to calculate the viscosity of such compositions "according to" C28. In this connection the board notes that document C24a concerns a different composition (9.0 mol % $NaAlO_2$ but in a different X_{SiO2} range) of which Glafo was able to calculate the viscosity according to C28 based on available D_i values and an indications concerning the approximation of the D_i value to be used for $KAlO_2$ (see entire document).

10.1.3 The appellant Rockwool considered that the approach as adopted by the Glafo experts was not appropriate (see A43, points 35 to 40) since no effort was made to estimate or derive a suitable average value. In its view, the information contained in C28 and the patent in suit permitted an estimation of a D_i value for $NaAlO_2$ in the X_{SiO2} range form 0.35 to 0.45, which was more appropriate than choosing the value 0 and led to a lower error in the calculation. This view of appellant Rockwool is confirmed by Professor Dingwell and Professor Conradt, but only as far as the amount of $NaAlO_2$ comprised in a composition with an X_{SiO2} in the 0.35 to 0.45 range is relatively close to the 5 mole % (i.e. the value distinguishing minor from major components according to C28); see A44; third paragraph

of Ms Guldberg's letter; second, third and fifth
paragraph of Professor Dingwell's reply and A47; page 2
of the "Stellungnahme". The opinions of these two
experts are thus not in contradiction with the
conclusions of the Glafo experts in A14, which relate
to a different composition (10.1 mole % $NaAlO_2$, i.e. as
major component) for which C28 contains less of the
data needed for calculating the viscosity.

10.2   The skilled person taking into account common general
knowledge could not derive from C28 and the patent in
suit the estimations or approximations to be applied in
the case of compositions comprising ZrO_2 or P_2O_5 in
amounts of up to 8 % by weight. To fill these gaps in
C28, the skilled person could only speculate about
appropriate estimations based on considerations not
addressed in C28, and the viscosity calculated would
thus depend on speculative D_i values. In other words,
depending on the specific underlying assumptions
adopted by the skilled person, the estimations would
not in any case give the same result.

Under these circumstances, for the board, the skilled
person would have to grope in the dark because he is
not in a position to calculate the viscosity of these
compositions as required by claim 1, i.e. based on the
information comprised in C28, the patent and common
general knowledge alone.

11.   Incomplete teaching in C28 calls for undue amount of
experimentation

11.1   According to the appellant Rockwool, C28 also invites
the skilled person to fill the gaps in the available

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data by means of additional measurements. Such
measurements, as far as they were necessary at all, e.g.
to test some adopted approximations, would not go
beyond what ought to be expected from the skilled
person. The board also does not agree with this
argument for the following reasons.

11.2   The authors of C28 indeed suggest that their model can
        be improved and/or completed by gathering data from
        further viscosity measurements (see e.g. the sentence
        bridging pages 442 and 443, the first full sentence on
        page 458). Whilst their work was focussed on magmatic
        liquids and geologic applications and therefore did not
        consider compositions containing high amounts of
        certain components, they expressly left it "to others
        to **develop** additional applications and also to **test
        further its validity** as additional data are gathered"
        (see page 471, "Concluding remarks") (emphasis added by
        the board).

11.3   In order to be able to calculate viscosity values
        according to the model of C28 for the compositions
        referred to under point 6.2.5, the skilled person would
        thus first have to investigate experimentally the
        quantitative impact of specific components such as ZrO_2
        and P_2O_5 on the viscosity of multi-component silicate
        melts in the SiO_2 mole fraction range(s) concerned. The
        investigations necessary for obtaining the correct D_i
        values or for checking the validity of an approximation
        not disclosed in C28 involve high temperature melt
        viscosity measurements, the evaluation of the data and
        cross-checking how they fit with the BW model.

11.4   The necessary viscosity measurements and the subsequent
        evaluative work cannot, however, be considered as a
        matter of mere experimental routine. As will appear
        from the following, the obtainable results will depend
        to some extent on choices to be made when carrying out
        the measurements and when evaluating their significance.
        Different choices will inevitably lead to different
        results.

11.4.1 As noted in C28 (and confirmed in point 34 of A43),
        accurate high-temperature viscosity measurements on
        multi-component silicate melts are difficult to perform
        and imply various considerations concerning inter alia
        the appropriate experimental setup, method and
        parameters. The difficulties to be expected by the
        person skilled in the art of high temperature viscosity
        measurements when trying to measure viscosities of
        composition as defined in claim 1 are also illustrated
        by documents A82.1/A82.2 (see in particular point 3 of
        A82.2).

11.4.2 Difficulties having a potential impact on the results
        of the measurements, such as bubble formation,
        volatilisation of components and contamination of
        sample by the crucible proper control of the
        compositions are also extensively addressed in C28
        itself, e.g. at page 440, third paragraph; page 441;
        page 442, first paragraph; page 461, second paragraph;
        page 465; page 466, first paragraph.

11.4.3 In this connection it is worth noting that Bottinga and
        Weill excluded several scientific publications of
        viscosity measurements, i.e. measurements carried out
        by persons skilled in the art of viscosity measurements,

as data sources due to their contradiction with other measurements or because of insufficient evidence for the control of composition, and in particular measurements relating to the system $SiO_2-Al_2O_3-CaO$ with additions of inter alia **P_2O_5** (see C28, page 441). The skilled person reading C28 would thus expect these measurements to be particularly critical.

11.5   Moreover in C28 it is assumed that the melts behave as Newtonian fluids under the conditions considered in the document (page 439, second paragraph). As can be gathered from the results presented in A57, this is not necessarily the case in compositions as defined in claim 1. Moreover, a measured viscosity value for a given melt may deviate substantially from the viscosity calculated according to C28 for the same melt (see e.g. Table 5 of C28, calculated versus measured viscosity values at low X_{SiO2} values).

11.6   Neither the patent in suit nor C28 contain more specific instructions on how viscosity measurements and evaluations required for determining the results to be used in the BW model for P_2O_5 or ZrO_2 in compositions as defined in claim 1 could be carried out. Moreover, a calibration of the measured data against C28 or patent data is not possible since these two documents do not contain examples of compositions comprising ZrO_2 or P_2O_5 in amounts of up to 8 % by weight. The skilled person is thus forced to develop its own research program. For the board, there are however limitations to what can be expected from the skilled person.

11.7   As indicated in C28, with the newly gathered experimental data the skilled person will have to

verify the validity of the calculation model, and of
any approach based on approximations (see point 9.3.2
hereinabove). Using the words of the authors of C28,
this work can be considered as the development of an
additional application.

11.8   From the above, the board thus concludes that the
        experimental and evaluative work required from the
        skilled person represents an undue amount of
        experimentation in the sense of decision T 435/91 (loc.
        cit.) The skilled person would actually be forced to
        generate all necessary data in order to be in a
        position to calculate the viscosities of melt
        compositions having analyses throughout the full ranges
        indicated in claim 1. This undue amount of
        experimentation requires more than routine means and
        manipulations and requires more than merely common
        general knowledge. The skilled person cannot be
        expected to embark on the scientific research programme
        required for testing the validity of given
        approximations and/or for finding the correct D_i values
        for the calculation of the parameter value which is
        needed for identifying those amongst the compositions
        falling within the compositional ranges of claim 1
        which are actually the ones to be used according to the
        invention. Or, in other words, it is not up to the
        skilled person to overcome the limitations of the
        patent in suit and fill gaps left by the patentee in
        the information.

11.9   However, even if the skilled person would decide to
        carry out such experimental work, he would not be in a
        position to know with certainty whether Bottinga and
        Weill and/or the scientific community would also

qualify the results obtained as the "right" ones to be used in calculating the melt viscosity "*according to Bottinga and Weill, American Journal of Science volume 272, May 1972, page 455-475*". So, the skilled person would be left in doubt whether or not he can rely on his results. Hence, the viscosity definition as chosen by the patentee does not allow the skilled person to decide in a reliable manner and for a substantial set of compositions embraced by the compositional ranges of claim 1, whether or not he is working the claimed invention.

The consequences that variations in the quality of the data or of the approximations underlying the BW model as described in C28 can have are illustrated by the post-published document A87. Whereas the D_i value for $NaAlO_2$ at 1400°C to be used in the X_{SiO2} range of from 0.35 to 0.45 is 9.15 according to the "neighbouring table approach" described in C28, it was determined to be much lower, namely 4.50, based on the experimental work done according to A87 (see Table 5).

11.10   At the oral proceedings, appellant Rockwool did not rely on any further documents cited in the course of the present opposition and appeal proceedings in connection with the specific issue addressed hereinabove. The board is also not aware of a cited document comprising additional information in this respect and which would lead to different conclusions.

12.   Summarising, on the filing date of the patent in suit the skilled person was not in a position to calculate, at least not without the burden of an undue amount of experimentation, the melt viscosity value "*according to*

Bottinga and Weill, American Journal of Science volume 272, May 1972, page 455-475" as required by present claim 1 for a substantial number of melt compositions falling within the compositional ranges recited in the claim. Consequently, the skilled person would not be able to identify in a reliable way throughout the whole ambit of the claim those melt compositions which meet both the compositional requirements and the viscosity requirement and may thus be used according to claim 1.

13.   The board thus concludes that the patent does not disclose the invention as claimed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC).

14.   Consequently, the appellant's main request cannot be allowed.

Auxiliary requests

15.   The respective claims 1 of the remaining twelve auxiliary requests of appellant Rockwool (labelled "third" to "seventh" and "ninth" to "fifteenth auxiliary request", respectively) also refer to the use of a melt composition having a chemical composition defined by ranges for the relative amounts of the various components and a viscosity calculated according to C28 within a certain range.

15.1   Like claim 1 of the main request, the respective amended claims 1 according to all these auxiliary requests refer to compositions having *"an analysis, measured as weight of oxides, which includes ... Other elements 0 **to 8%**, and wherein B_2O_3 is absent"* and *"a*

*melt viscosity at 1400°C ... **calculated according to Bottinga and Weill, American Journal of Science volume 272, May 1972, page 455-475**" in the given range of either "10 to 70 poise" or "12 to 70 poise"* (emphasis added by the board).

15.2   The further amendments consist in the narrowing of some of the compositional ranges of the melt composition, the exclusion of B_2O_3 as a component, an additional reference to the dissolution rate in connection with the showing of biodegradability, the narrowing of the viscosity range, the inclusion of a reference to end-products which may contain said fibres and/or the inclusion of a reference to end uses of bonded products made from said fibres. The restricted compositional ranges are such that they still include compositions with viscosities falling outside the respective numerical ranges (see point 6.3 above).

16.   The appellant did not argue that these further amendments were intended to overcome the objections under Article 100(b) EPC insofar as the latter concern the calculation of viscosities according to C28 for compositions comprising up to 8% other elements, and they are prima facie not suitable for that purpose.

        Under these circumstances, questions raised by the other parties concerning the admissibility of each of these requests need not be addressed since these requests must in any case fail for the same reasons as the main request as will appear from the following.

17.   For carrying out the invention as defined the respective claims 1 of each of these requests the

skilled person must inter alia be in a position to calculate, according to the method described in C28, the viscosity of melts having compositions throughout the ranges indicated in the respective claims 1, i.e. inter alia compositions comprising "*other elements*" in amounts of up "*to 8%*". Consequently, the considerations under points 4 to 14 hereinabove apply mutatis mutandis to each of the present auxiliary requests.

The present auxiliary requests are thus likewise objectionable under Article 100(b) EPC (insufficient disclosure).

18.   Consequently, none of the present auxiliary requests is allowable.

Order

For these reasons it is decided that:

The decision under appeal is set aside.

The European patent is revoked.

The Registrar   The Chairman

C. Vodz   G. Raths

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