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**Datasheet for the decision
of 29 April 2026**

Case Number: T 0115/25 - 3.3.05

Application Number: 13709022.1

Publication Number: 2819966

IPC: C03C21/00, C03C23/00

Language of the proceedings: EN

Title of invention:

Ion Exchanged Glasses Via Non-Error Function Compressive
Stress Profiles

Patent Proprietor:

Corning Incorporated

Opponents:

Nippon Electric Glass Co., Ltd.
SCHOTT AG / SCHOTT Technical Glass Solutions GmbH

Headword:

Ion Exchanged Glasses/Corning Inc.

Relevant legal provisions:

EPC Art. 123(2), 83

Keyword:

Amendments - allowable (yes)

Sufficiency of disclosure - (yes)

Decisions cited:

G 0010/91

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 0115/25 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 29 April 2026

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted/electronically
transmitted on 22 November 2024 revoking
European patent No. 2819966 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chair	R. Winkelhofer
Members:	J. Roider
	R. Elsässer

Summary of Facts and Submissions

I. The appeal by the patent proprietor (appellant) lies from the opposition division's decision to revoke European patent EP 2 819 966 B1.

II. Claim 1 of the main request in the appeal proceedings essentially corresponds to claim 1 of the patent as granted, with additional amendments as outlined and emphasis added by the board, and with the basis indicated in square brackets:

"1. An alkali aluminosilicate glass (100) having a surface (110) thickness t , the glass (100) comprising:

*a first region (120) under a compressive stress, the first region extending from the surface (110) to a depth of layer **DOL** in the glass (100), wherein the compressive stress **CS** has a maximum **CS₁** at the surface (110) and varies with distance **d** from the surface (110) according to a function other than a complementary error function; and*

*a second region (130) under a tensile stress **CT**, the second region extending from the depth of layer into the glass.*

wherein the first region (120) comprises:

*a first segment (120a), the first segment (120a) extending from the surface (110) to a first depth **d₁**, wherein the depth **d₁** is less than the depth of layer **DOL**, wherein the compressive stress **CS** in the first segment (120a) varies according to a first complementary error function; and*
*a second segment (120b), the second segment (120b) extending from the first depth **d₁** up to the depth of*

*layer **DOL**, wherein the compressive stress **CS** in the second segment (120b) varies according to a second function, wherein the first function is different than the second function, wherein the second function is a second complementary error function or a diffusion tail,*
*wherein the tensile stress **CT**, expressed in MPa, is greater than or equal to $-36.7\ln(t)$ (MPa) + 48.7 (MPa) wherein **t** is expressed in millimeters [claim 1 as granted]*
*wherein the compressive stress has a local maximum **CS₂** in the second segment (120b) [claim 2 as granted], and wherein the depth of layer **DOL** is at least 100 μm .*
[last sentence of paragraph [0027] of the description as filed]"

Claims 2 and 3 are dependent on claim 1.

- III. The appellant (patent proprietor) argued, in particular, that the main request and the auxiliary requests fulfilled the requirements of Article 123(2) EPC and Article 83 EPC.
- IV. Respondent 1 (opponent 1) and respondent 2 (opponent 2) argued, in particular, that the requirements of Article 123(2) EPC and Article 83 EPC were not met.
- V. Substantive requests:

The appellant (proprietor) requests that the decision under appeal be set aside and amended such that the patent be maintained on the basis of the main request, or, in the alternative, on the basis of "main request A" or one of auxiliary requests 1, "1A", 2 and "2A", all resubmitted with the statement of grounds of appeal.

The respondents 1 and 2 (opponents 1 and 2) request that the appeal be dismissed.

Reasons for the Decision

Main request

1. Amendments, Article 123(2) EPC

Because Article 100(c) EPC was not invoked as a ground of opposition, it was not in dispute that the subject-matter of claims 1 and 2 as granted, taken together, finds its basis in the combination of the original claims (as filed) 1 to 5, 7 and 8 (which together form the basis for claim 1 as granted), and the original claim 6 (which forms the basis for claim 2 as granted).

The basis for the additional feature in claim 1 of the current main request specifying the depth of layer (DOL) is found in the application as (originally) filed, specifically in paragraph [0027], which reads: *"... the depth of layer DOL of each of first and second compressive layers 120, 122 is at least about 50 μm and, in some embodiments, at least about 100 μm ".*

- 1.1 The opposition division found this combination of features unallowable under Article 123(2) EPC. It held that the feature *"DOL is at least 100 μm "* in claim 1 was disclosed in paragraph [0027] of the application as filed only in connection with *"some embodiments"*, and that there was no pointer in the application as filed to combine this specific feature with the particular

combination of features derived from the original claims. Therefore, the amendment resulted from an unallowable multiple selection from two different lists of features: a first "list" comprising the possible combinations of features from the original claims, and a second "list" comprising the possible values for the DOL in paragraph [0027].

1.2 Respondents 1 and 2 endorsed this view in their replies to the appeal. They argued that in the absence of a specific disclosure of this particular combination, the amendment created new subject-matter.

This was all the more true because paragraph [0027] related to any glass that could be chemically strengthened by ion exchange and did not only relate to alkali aluminosilicate glass, the specific glass claimed in claim 1.

Moreover, claim 5 of the patent in suit, requiring a DOL of at least 40 μm , corresponded to claim 10 as filed; however, claim 10 as filed had not been dependent on claim 5 as filed, which required a local maximum CS_2 of the compressive stress, a feature which was now included in claim 1. Therefore, the combination of the local maximum CS_2 of the compressive stress (now in claim 1) with the DOL of at least 40 μm (now in claim 5) was not originally disclosed.

Finally, the presence of a local maximum CS_2 of the stress function was not a requirement in the original application, as is also apparent from Fig. 3, which showed a saddle in curve 310.

Therefore, the skilled person would have to make an additional selection from the curves disclosed in Fig. 3.

1.3 The appellant maintained that the basis for claim 1 of the main request was claims 1 to 5, 7 and 8 in

combination with paragraph [0027] of the description as filed.

On the grounds of it being late-filed, they objected to the respondents' argument concerning the alleged unallowable combination of claims 1 and 5 of the patent in suit.

- 1.4 The respondents' position is indeed not persuasive.
- 1.4.1 The amendment made to claim 1 of the main request is, in fact, not the result of multiple selections from independent lists of options.
- 1.4.2 The combination of features drawn from claims 1 to 5, 7 and 8 as filed defines a specific, coherent embodiment of the invention. This combination describes an alkali aluminosilicate glass having a specific stress profile: a first region under compressive stress comprising two distinct segments (120a, 120b), where the second segment (120b) exhibits a local maximum CS_2 .

In a manner consistent with Fig. 3, this set of features forms a single, disclosed technical concept. Contrary to the respondents' view, both curves 310 and 320 in Fig. 3 show a local maximum. This is also explicitly described in paragraph [0028] of the application as filed.

Contrary to the respondents' view, in this context, there is no harm in Fig. 3 being schematic only.

The combination of claims 1 to 5, 7 and 8 as filed serve as the main basis for the amendment.

- 1.4.3 The parameter "*depth of layer DOL*" is not an optional feature selected from a separate list, but an inherent and necessary characteristic of the claimed glass.

Claim 1 of the patent explicitly defined the glass as comprising *"a first region (120) ... extending from the surface (110) to a depth of layer DOL in the glass (100)"*.

Furthermore, claim 5 of the patent (claim 10 of the patent application) already specified a particular value for this parameter, claiming a glass in which the *"depth of layer DOL is at least about 40 μm "*.

Since Article 100(c) EPC was not invoked as a ground of opposition, the combination of claims 1, 2 and 5 of the patent was not disputed in the written proceedings. Only in the oral proceedings before the board did respondent 1 challenge the validity of this combination, for the first time.

As this objection relates to a combination of the claims as granted, it amounts to raising a new ground of opposition under Article 100(c) EPC. This can only be permitted with the consent of the appellant as the patent proprietor, but they objected to that line of argument as being too late.

In line with G 10/91, headnote 3., this attack thus cannot be considered.

- 1.4.4 The amendment in the main request therefore does not add a new feature, but rather restricts the lower limit of an already present range for the DOL. The application as filed discloses some ranges, differing only in their lower limits: at least 40 μm (the original claim 10), at least 50 μm and at least 100 μm (both in paragraph [0027] of the description as filed).
- 1.4.5 Paragraph [0027] discloses a list of nested ranges for the same feature. The wording *"in some embodiments"* prior to the broadest range *"at least 100 μm "* does not

change this fact. It does not add more information than the obvious: a range of the DOL of at least 50 μm covers more embodiments than a range of at least 100 μm .

It does not imply that it is unknown whether a range for the DOL of at least 100 μm also applied to alkali aluminosilicate glass.

- 1.1 The present situation is therefore not one of a selection from two independent lists of features. Instead, it concerns the selection of a single value ("*at least 100 μm* ") from some disclosed alternative values for a single parameter ("*DOL*"), which is then applied to a single, specifically disclosed embodiment. Such an amendment, which further limits the claimed subject-matter by specifying a value for an existing parameter taken from the description, is generally allowable and does not give rise to an objection under Article 123(2) EPC (see Case Law of the Boards of Appeal, 11th edition 2025, II.E.1.6.1 c)).
- 1.5 For these reasons, claim 1 of the main request meets the requirements of Article 123(2) EPC. There is therefore no need to discuss whether the objection against the combination of claims 1 and 5 should be considered under Article 13(2) RPBA.
2. Sufficiency of disclosure, Article 83 EPC

Respondents 1 and 2 raised several objections which can be summarised as follows:

(i) The term "diffusion tail" in claim 1 was not a well-established term in the art, and the patent failed to provide an enabling disclosure of how to produce a glass article exhibiting such a feature. In particular, there was no example showing a "diffusion tail".

(ii) The patent lacked any working examples of a glass having a depth of layer of at least 100 μm ("DOL \geq 100 μm "), and therefore did not enable the skilled person to achieve the claimed subject-matter. The example was not representative of the broad claim, particularly concerning the glass composition.

(iii) The claim lacked an upper limit for the central tension (CT), thereby encompassing embodiments of frangible glass, for which the patent did not provide any teaching of how to make it in a useful, non-frangible manner.

(iv) The examples provided in the patent were based on "artificially combined" data from different types of samples and thus did not represent real, workable examples.

1.2 These objections are unconvincing, for the following reasons.

1.2.1 "Diffusion tail"

This objection relates primarily to clarity under Article 84 EPC. The term "diffusion tail" was found in claim 1 as granted. As the amendments made to the main request do not affect this feature, it cannot be brought into question under Article 84 EPC.

As regards Article 83 EPC, the disclosure is sufficient for carrying out the claimed subject-matter. The patent describes a multi-step process for producing the claimed glass, which includes a first ion-exchange step followed by a heat treatment step for stress relaxation and diffusion of ions further into the glass. A skilled person readily understands that this heat treatment step is precisely what creates the "diffusion tail". Adjusting the parameters of the heat treatment (e.g., temperature and duration) to achieve a desired profile

shape is a matter of routine optimisation, not an undue burden.

The example of the patent in suit is representative of the claimed subject-matter, and no evidence to the contrary has been provided by the respondents. The allegation that the processing parameters for different alkali aluminosilicate glasses cannot be established without undue burden is not backed by experimental evidence.

1.2.2 DOL \geq 100 μm

The fact that the patent does not contain a specific example of a glass with a DOL of 100 μm or more does not render the disclosure insufficient in itself. A disclosure is sufficient if it provides the skilled person with the necessary information to achieve the claimed subject-matter across its scope.

The patent in suit provides exactly this information. In particular, a comparison of the examples underlying Fig. 7 and 8 provides clear teaching. The process for the glass in Fig. 8, which achieved a DOL of about 90 μm (patent in suit, paragraph [0047]), differs from the processes for the glasses in Fig. 7 (DOL \approx 59-64 μm ; patent in suit, paragraphs [0042], [0044] and [0045]) primarily on account of a longer duration and higher temperature in the first ion-exchange step (16 hours at 450°C in paragraph [0047] vs. 8 hours at 410°C in paragraph [0042]). This provides a direct and unambiguous pointer to the skilled person: to achieve a deeper DOL, the parameters of the first ion-exchange step should be increased. Moving from a disclosed 90 μm to the claimed lower limit of 100 μm is a small, straightforward extrapolation that the skilled person

can achieve without inventive skill or undue experimentation.

No evidence was provided that this is not possible. It is also not persuasive that the results obtained from the example cannot be applied by analogy to substantially all of the claimed alkali aluminosilicate glasses.

In the absence of any evidence to the contrary, it is mere speculation to assume that variation in temperature and duration, i.e. fundamental process parameters governing diffusion, would not make it possible to achieve a higher penetration depth over substantially the entire claimed range.

1.2.3 Upper limit for CT

The claim does not contain the functional feature that the glass must be "non-frangible". Therefore, the question of whether some of these glasses might be frangible, as raised by the respondents, is irrelevant to the question of sufficiency of the claimed subject-matter.

1.2.4 "Artificially combined" data

Finally, the respondents' argument that the patent was not enabling merely because the examples used data from both glass rods (for the depth profile) and flat glass samples (for the surface stress) is not convincing either.

The mere fact that the measurements were taken on glass samples having different geometries does not justify the conclusion that the patent in suit is insufficiently disclosed, nor has it been demonstrated

that the combination of measurement results obtained from samples of differing geometries would lead to such a finding.

For an objection of insufficient disclosure, the burden of proof generally lies with the opponent, which must establish that a skilled person reading the patent, using common general knowledge, would be unable to carry out the invention.

The respondents did not provide any such evidence.

3. With the requirements of Article 83 EPC and Article 123(2) EPC thus being fulfilled, the impugned decision cannot stand. The case is to be remitted to the opposition division to assess the requirements of patentability, as set out by the oppositions.

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 for further prosecution.

The Registrar:

The Chair:



C. Vodz

R. Winkelhofer

Decision electronically authenticated