

Internal distribution code:

- (A) [-] Publication in OJ
(B) [-] To Chairmen and Members
(C) [-] To Chairmen
(D) [X] No distribution

**Datasheet for the decision
of 5 November 2013**

Case Number: T 1647/09 - 3.3.05

Application Number: 97109096.4

Publication Number: 814064

IPC: C03C3/087, C03C4/02, C03C4/08

Language of the proceedings: EN

Title of invention:
Infrared and ultraviolet radiation absorbing blue glass
composition

Patent Proprietor:
PPG Industries Ohio, Inc.

Opponents:
Pilkington Group Limited
SAINT-GOBAIN GLASS FRANCE

Headword:

Relevant legal provisions:
EPC Art. 54, 56
RPBA Art. 12(4)

Keyword:
Novelty - main request (no)
Inventive step - auxiliary requests 1 to 3 (no) -
reformulation of the problem (yes)

Decisions cited:

T 0730/07, T 0119/82, T 1082/05, T 0181/09

Catchword:



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 1647/09 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 5 November 2013

Appellant: PPG Industries Ohio, Inc.
(Patent Proprietor) 3800 West 143rd Street
Cleveland, OH 44111 (US)

Representative: polypatent BGL
Braunsberger Feld 29
51429 Bergisch Gladbach (DE)

Respondent 1: Pilkington Group Limited
(Opponent 1) Prescott Road
St. Helens
Merseyside WA10 3TT (GB)

Representative: Pettet, Nicholas Edward
Pilkington Group Limited
Intellectual Property
Pilkington European Technical Centre
Hall Lane
Lathom
Ormskirk, Lancashire L40 5UF (GB)

Respondent 2: SAINT-GOBAIN GLASS FRANCE
(Opponent 2) 18, avenue d'Alsace
92400 Courbevoie (FR)

Representative: Muller, René
SAINT-GOBAIN RECHERCHE
39, quai Lucien Lefranc
93303 Aubervilliers (FR)

Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 29 May 2009
revoking European patent No. 814064 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman: G. Raths
Members: A. Haderlein
P. Guntz

Summary of Facts and Submissions

I. The present appeal lies from the decision of the opposition division to revoke European patent EP-B-814 064. The patent in suit concerns a blue colored, infrared and ultraviolet radiation absorbing glass composition.

II. The opposition division found that claim 1 of the main request filed with the reply to the opposition brief complied with Art. 123(2) EPC but its subject-matter lacked novelty in view of document

D2: WO 96/00194.

The subject-matter of claim 1 of the sole auxiliary request filed during oral proceedings before the opposition division was found to be novel over both D2 and

D1: GB-A-2274841

but did not comply with the requirement of inventive step in view of document D2 alone.

III. The appellant's (proprietor of the patent) notice of appeal and its statement of grounds of appeal were received on 07 August 2009 and 7 October 2009, respectively. The appellant requested that the decision under appeal be set aside and requested the maintenance of the patent in amended form based on a main and five auxiliary requests. The main request and auxiliary request 2 corresponded respectively to the main and the auxiliary requests on which the decision of the opposition division was based.

Apart from the above claim requests, the statement of grounds of appeal contained three annexes, referred to as

"exhibits 6, 12, and 13".

IV. The reply of respondent 1 (opponent 1) was received on 24 February 2010. Reference was made *inter alia* to document

D9: EP 598 305 A1

in view of the first auxiliary request. D9 had not been referred to in the first instance proceedings.

V. The reply by respondent 2 (opponent 2) was received on 24 February 2010.

VI. Further submissions by the appellant were received on 15 July 2010. The submissions contained the request not to admit D9 into the proceedings.

VII. The parties were summoned by the board to oral proceedings to be held on 5 November 2013.

VIII. The respondent 1 informed the board in its letter dated 20 August 2013 that it would not be represented at the oral proceedings.

IX. Under cover of its fax received on 3 September 2013, the appellant submitted further

"exhibits A, B, and C"

in order to support its arguments in favour of novelty over D2.

- X. On 19 September 2013 further submissions by respondent 2 were received. They contained
- a graph ("Annexe I")
- summarising the excitation purity data submitted by the appellant.
- XI. In its fax dated 18 October 2013, respondent 2 objected to the admissibility of the auxiliary requests because these were not converging.
- XII. In its submissions dated 22 October 2013, the appellant filed a new auxiliary request 1 corresponding to previous auxiliary request 2, a new auxiliary request 2 corresponding to previous auxiliary request 1 and containing in addition the limitation of auxiliary request 1, and a new auxiliary request 3 corresponding to previously filed auxiliary request 5 and containing the above limitation. The main request of 7 October 2009 was maintained.
- XIII. Oral proceedings were held on 5 November 2013. At the oral proceedings the appellant confirmed that the auxiliary requests of 22 October 2013 replaced all auxiliary requests previously filed.
- XIV. Claim 1 of the main and of auxiliary requests 1 to 3 reads as follows (amendments with respect to the patent as granted being underlined):
- Main request (5 October 2009)
- "1. A blue colored, infrared and ultraviolet radiation absorbing glass composition having a base glass portion comprising:

SiO₂ 66 to 75 percent by weight
Na₂O 10 to 20 percent by weight
CaO 5 to 15 percent by weight
MgO 0 to 5 percent by weight
Al₂O₃ 0 to 5 percent by weight
K₂O 0 to 5 percent by weight

and a solar radiation absorbing and colorant portion comprising:

total iron 0.53 to 1.1 percent by weight
CoO 5 to 40 PPM
Cr₂O₃ 0 to 100 PPM,

the glass having a redox of 0.28 to 0.35, a luminous transmittance of at least 55% and a color characterized by a dominant wavelength in the range of 485 to 491 nanometers and an excitation purity of 3 to 8 percent at a thickness of 2.13 to 3.2 mm (0.084 to 0.126 inches), an excitation purity of 5 to 12 percent at a thickness of 3.2 to 4.8 mm (0.126 to 0.189 inches), and an excitation purity of about 10 to 18 percent at a thickness of 4.8 to 8.0 mm (0.189 to 0.315 inches)."

Auxiliary request 1 (22 October 2013)

"1. A blue colored, infrared and ultraviolet radiation absorbing glass composition having a base glass portion comprising:

SiO₂ 66 to 75 percent by weight
Na₂O 10 to 20 percent by weight
CaO 5 to 15 percent by weight
MgO 0 to 5 percent by weight
Al₂O₃ 0 to 5 percent by weight
K₂O 0 to 5 percent by weight

and a solar radiation absorbing and colorant portion comprising:

total iron 0.53 to 1.1 percent by weight
CoO 5 to 40 PPM
Cr₂O₃ 25 to 100 PPM,

the glass having a redox of 0.28 to 0.35, a luminous transmittance of at least 55%, and a color characterized by a dominant wavelength in the range of 485 to 491 nanometers and an excitation purity of 3 to 8 percent at a thickness of 2.13 to 3.2 mm (0.084 to 0.126 inches), an excitation purity of 5 to 12 percent at a thickness of 3.2 to 4.8 mm (0.126 to 0.189 inches), and an excitation purity of about 10 to 18 percent at a thickness of 4.8 to 8.0 mm (0.189 to 0.315 inches)."

Auxiliary request 2 (22 October 2013)

"1. A blue colored, infrared and ultraviolet radiation absorbing glass composition having a base glass portion comprising:

SiO₂ 72.4 to 74 percent by weight
Na₂O 12.9 to 13.7 percent by weight
CaO 8.2 to 9.1 percent by weight
MgO 3.5 to 3.9 percent by weight
Al₂O₃ 0.14 to 0.2 percent by weight
K₂O 0.042 to 0.056 percent by weight

and a solar radiation absorbing and colorant portion comprising:

total iron 0.53 to 1.1 percent by weight
CoO 5 to 40 PPM
Cr₂O₃ 25 to 100 PPM,

the glass having a redox of 0.28 to 0.35, a luminous transmittance of at least 55%, and a color characterized by a dominant wavelength in the range of 485 to 491 nanometers and an excitation purity of 3 to 8 percent at a thickness of 2.13 to 3.2 mm (0.084 to

0.126 inches), an excitation purity of 5 to 12 percent at a thickness of 3.2 to 4.8 mm (0.126 to 0.189 inches), and an excitation purity of about 10 to 18 percent at a thickness of 4.8 to 8.0 mm (0.189 to 0.315 inches)."

Auxiliary request 3 (22 October 2013)

Claim 1 of auxiliary request 3 differs from claim 1 of auxiliary request 2 in that the following passage was inserted between "Cr₂O₃ 25 to 100 ppm" and "the glass having a redox of 0.28 to 0.35":

"SnO ₂	0 to 2.0 percent by weight
CeO ₂	0 to 1.0 percent by weight
TiO ₂	0 to 0.5 percent by weight
ZnO	0 to 0.5 percent by weight
Nd ₂ O ₃	0 to 0.5 percent by weight
MnO ₂	0 to 0.1 percent by weight
MoO ₃	0 to 100 PPM
V ₂ O ₃	0 to 75 PPM
NiO	0 to 10 PPM
Se	0 to 3 PPM".

XV. The arguments of the appellant are summarised as follows:

- a) According to established case law lower and upper end points of ranges having different preference can be combined. Hence, the lower limit of the redox value (i.e. 0.28) in claim 1 of all the requests finds support in the application as filed (0.25 to 0.35, preferably 0.28 to 0.33), lines 15 to 17 on page 3 corresponding to lines 6 and 7 on page 3 of the patent as granted where it was disclosed together with an upper limit of 0.33,

whereas in the claim it now forms the range 0.28 to 0.35.

- b) The glass composition of claim 1 of the main request was novel over D2 because the examples of D2 did not disclose directly and unambiguously redox values within the claimed range. In particular, it was not clear whether the expression " Fe_2O_3 " in the tables of D2 referred to total iron (including FeO) expressed as Fe_2O_3 or rather to Fe_2O_3 alone, in the latter case the redox value of examples 4 and 18 being outside the claimed range.
- c) Moreover, examples 4 and 18 neither explicitly nor implicitly disclosed all the required excitation purities. In particular, while the excitation purities of example 18 of D2 were in the required first two ranges, the requirement that the excitation purity is about 10 to 18 percent at a thickness of 4.8 to 8.0 mm was not fulfilled.
- d) At the oral proceedings, the appellant also submitted that claim 1 needed to be construed such that all the excitation purity values for all thicknesses within the claimed thickness ranges had to be in the claimed excitation purity ranges. As the excitation purity value of example 18 of D2 at a thickness of 6 mm was outside the claimed range of 10 to 18 percent, the requirement that all the excitation purity values at thicknesses of 4.8 to 8 mm had to be within 10 to 18 percent was not complied with. Moreover, there was no proof that the excitation purity would increase linearly as suggested by the extrapolation provided in the graph submitted by respondent 2.

- e) Apart from the redox value and the excitation purities the appellant did not contest that the remaining features of claim 1 are disclosed in D2.

- f) The subject-matter of claim 1 of auxiliary request 1 involved an inventive step over D2. Small amounts of Cr_2O_3 in the claimed range of 25 to 100 ppm led to an increased UV absorption as evidenced by a comparison of examples 10 and 16 of the patent in suit. D2 taught to use Cr_2O_3 amounts in the order of 500 to 900 ppm in order to obtain a green glass composition. The skilled person would not expect that the presence of 25 to 100 ppm Cr_2O_3 would lead to only a slight shift of the dominant wave length.

- g) While D9 submitted by respondent 1 was not *prima facie* relevant and, therefore, should not be admitted into the proceedings, the subject-matter of claim 1 of auxiliary request 2 involved an inventive step in view of documents D2 and D9. As D2 taught that the MgO content in the base glass composition should be limited to 2% in order to increase the absorption in the infrared, it would teach away from the subject-matter of claim 1 of the first request which requires an MgO content of between 3.5 and 3.9 percent, i.e. leading to a decrease of absorption capacity in the infrared.

- h) The subject-matter of claim 1 of auxiliary request 3 was not further distinguished from example 18 of D2 than the subject-matter of claim 1 of auxiliary request 2, but involved an inventive step for the same reasons as for auxiliary request 2.

XVI. The arguments of the respondents are summarised as follows:

- a) The amendment to a redox of 0.28 to 0.35 added subject-matter as said range was not disclosed as such and the value of 0.28 was only disclosed in combination of an upper limit of 0.33. For the same reasons the auxiliary requests also contained added subject-matter.
- b) The expression " Fe_2O_3 " in the examples of D2 indeed referred to total iron expressed as Fe_2O_3 and, therefore, the redox values of examples 4 and 18 in D2 were within the range required in claim 1 of the main request. Example 18 of D2 also disclosed the required excitation purities as shown by the evidence submitted by the appellant for the ranges 2.13 to 3.2 mm and 3.2 to 4.8 mm. For the range 4.8 to 8.0 mm, an extrapolation based on the data provided by the appellant showed clearly that the excitation purity in the latter range was within the required 10 to 18 percent. Therefore, the subject-matter of claim 1 of the main request lacked novelty.
- c) The amount of Cr_2O_3 of as low as 25 ppm in claim 1 of auxiliary request 1 could even be considered to cover impurities which are commonly encountered in glass compositions such that D2 was also novelty destroying for the subject-matter of claim 1 of auxiliary request 1.
- d) The subject-matter of claim 1 of auxiliary request 1 did not involve an inventive step in view of D2 alone. The difference in UV absorption of examples 10 and 16 was insignificant and,

therefore, an improved UV absorption could not be considered when formulating the objective technical problem. Starting from example 18 of D2 the objective technical problem was to impart a green color component. It was obvious to use amounts of Cr_2O_3 as called for in claim 1 of auxiliary request 1 in view of the penultimate paragraph on page 8 of D2.

- e) The composition of claim 1 of auxiliary requests 2 and 3 did not involve an inventive step in view of a combination of D2 and D9. In particular, D9 taught that the base glass composition used therein was not critical and may consist of any conventional soda-lime-silica flat glass composition. Using the base glass composition called for in claim 1 of auxiliary requests 2 and 3 was particularly obvious in view of the table on page 4, lines 25 to 40 of D9.

XVII. The appellant (patent proprietor) requested that the decision under appeal be set aside and the European patent be maintained in amended form on the basis of the claims of the main request filed with the letter of 5 October 2009, or alternatively, on the basis of the claims of auxiliary requests 1 to 3 of 22 October 2013.

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

Reasons for the Decision

1. The appeal is admissible
2. Amendments - Art. 123(2), (3) EPC

The issue of compliance of the amendments with Article 123(2), (3) EPC does not need to be addressed since the requests fail for other reasons.

3. Main request - novelty

- 3.1 Two features were at issue when dealing with the novelty objection:

- a) the redox value in the context of the total iron content and

- b) the excitation purity.

The remaining features were not a controversial issue.

- 3.2 The first question to be dealt with was whether the redox value of example 18 of document D2 falls within the range of 0.28 to 0.35.

Before considering the redox value, it must be clear what has to be understood by the expression "Fe₂O₃" in the table relating to the examples in D2 and whether this expression is representative for the total iron content.

- 3.2.1 The table relating to the examples in D2 indeed does not explicitly mention that "Fe₂O₃" is representative for the total iron content. But this does not necessarily mean that the values given therein relate to Fe₂O₃ only, i.e. total iron minus FeO.

3.2.2 The expression "Fe₂O₃" in the table relating to the examples must be construed in the light of the overall disclosure of document D2. For instance, claim 1 of D2 requires that the glass composition has a "Fe₂O₃ (fer total)" content of at most 4 percent. If the row titled "Fe₂O₃" in the table of D2 referred to "Fe₂O₃ alone" and not to the "total iron content", then the "total iron content" in example 12 of D2 would amount to 4.28 percent which is outside the range of claim 1 of D2. Example 12 of D2, however, is said to be according to the invention of D2 (see page 8, penultimate paragraph). Further, D2 teaches that the redox values of the glasses according to that invention are below 0.8 (page 8, lines 5, 6) which value is mentioned again in claim 12 where reference is made to the FeO/Fe₂O₃ ratio, i.e. without mentioning that Fe₂O₃ represents the "total iron content". From the above, when reading D2, the skilled person concludes that the Fe₂O₃ content mentioned in the table of D2 refers to the total iron content rather than to the Fe₂O₃ content alone.

It follows from this meaning of the expression "Fe₂O₃" in the table relating to the examples that the redox of example 18 of D2 is 0.298. Said value of 0.298 falls within the boundaries of the redox range (0.28 to 0.35) of claim 1.

3.2.3 In this context the Board observes that the evidence provided by the appellant (exhibits 6, 12, 13, A, B, and C) relating to example 18 of D2 is based on a redox value of 0.298 (see "Model redox" in the upper right quarter of each exhibit), i.e. the redox value one arrives at if one takes the Fe₂O₃ value as total iron. It follows that the calculations provided by the appellant are all based on the assumption that Fe₂O₃ in

the Table on page 13 of D2 is in fact representative for total iron.

3.3 The second question to be dealt with was whether document D2 disclosed an excitation purity falling within the range of "about 10 to 18%" at a thickness of "4.8 to 8.0 mm".

3.3.1 Claim 1 contained three requirements regarding the excitation purity:

- (i) an excitation purity of 3 to 8 percent at a thickness of 2.13 to 3.2 mm
- (ii) an excitation purity of 5 to 12 percent at a thickness of 3.2 to 4.8 mm
- (iii) an excitation purity of about 10 to 18 percent at a thickness of 4.8 to 8.0 mm

The appellant conceded that for example 18 of D2 the first two requirements of the excitation purities (i) and (ii) were fulfilled, but contested that the requirement (iii) of "an excitation purity of about 10 to 18 percent at a thickness of 4.8 to 8.0 mm" was fulfilled.

The appellant was of the opinion that this feature (iii) of claim 1 needs to be construed so as to mean that all excitation purity values corresponding to thicknesses of 4.8 to 8.0 mm need to be within 10 to 18 percent. In other words, the part of the excitation purity versus thickness curve between the thickness values of 4.8 and 8.0 mm needs to be entirely contained within the boundaries of the rectangle (10%/4.8mm; 10%/8.0mm; 18%/8.0mm; 18%/4.8mm) in the excitation purity/thickness graph submitted by respondent 2.

3.3.2 The Board fails to follow the appellant's construction of the feature "an excitation purity of about 10 to 18 percent at a thickness of 4.8 to 8.0 mm". By using the indefinite article for both the excitation purity and the thickness, according to the literal wording of claim 1, this feature is fulfilled if at any thickness any excitation purity of about 10 to 18 percent is observed. In other words, this feature is complied with if the excitation purity versus thickness curve and the above rectangle have at least one point in common.

3.3.3 For the sake of completeness, the board observes that the restrictive interpretation submitted by the appellant is also not in line with the overall disclosure of the patent in suit. In particular, when considering the excitation purity values (P_e) some examples of the patent in suit would not be covered by claim 1 if one were to apply the appellant's interpretation, although these examples are said to be according to the invention (see page 4, lines 4 *et seqq.* of the patent specification).

For instance, in examples 1, 16, and 21 P_e values at 5.5 mm (Tables 4 and 8) are all below 10% and at 4.8 mm would even be lower, i.e. clearly below the required 10%. Also, examples 24 and 25 have P_e values at 5.5 mm (see Table 8) of as high as 14.7 and 15.7% such that the corresponding P_e values at 4.8 mm are clearly above 12%, i.e. outside the required range of 5 to 12%.

3.3.4 Also according to the appellant, it was uncertain whether the excitation purity would increase with the same slope beyond the value of 8.57 percent obtained for a thickness of 6 mm, and therefore it was not established that the excitation purity of example 18 would be within 10 to 18 percent.

This argument must fail as on the one hand there is no evidence that would suggest that the excitation purity does not increase linearly beyond a thickness of 6 mm with the same slope as below 6 mm. On the other hand, the graph submitted by respondent 2 which is based on the data provided by the appellant undoubtedly shows a linear relationship between excitation purity and thickness and there is no reason to believe that this would not be the case at thicknesses beyond 6 mm and up to 8 mm thickness.

The Board thus concludes that the excitation purity of example 18 of D2 at thicknesses between about 7 and 8 mm is within the claimed range of about 10 to 18 percent.

3.4 It follows from the above that the subject-matter of claim 1 of the main request lacks novelty in the sense of Art. 52(1) EPC in combination with Art. 54(1), (2) EPC.

4. Auxiliary request 1 - novelty

4.1 The Board had to deal with the question whether amounts of as low as 25 ppm are to be considered impurities implicitly disclosed in the prior art glass compositions.

In the written proceedings, respondent 1 argued that Cr_2O_3 in an amount of 25 ppm was commonly encountered as impurities in glass compositions.

4.2 According to the patent in suit, paragraph 0025, lines 35-38, 5 to 10 ppm of Cr_2O_3 are considered as impurities. Apart from that passage, no evidence was

referred to by the parties that would support the argument that 25 ppm of Cr₂O₃ was commonly encountered as impurities in glass compositions and, therefore, would be implicitly disclosed in D2.

The board thus concludes that D2 does not disclose Cr₂O₃ in an amount falling within the boundaries of the claimed range of 25 to 100 ppm.

4.3 It follows from the above that the subject-matter of claim 1 of auxiliary request 1 is novel in the sense of Art. 52(1) EPC in combination with Art. 54(1), (2) EPC.

5. Auxiliary request 1 - inventive step

5.1 The invention concerns an infrared and ultraviolet radiation absorbing blue colored soda-lime-silica glass composition suitable for architectural and automotive glazing applications (see paragraph [0001] of the patent in suit).

5.2 Such glass compositions were known from document D2, which the parties took as the starting point for assessing inventive step; in particular example 18 of document D2 represents the closest state of the art to the subject-matter of claim 1 of auxiliary request 1.

5.3 Example 18 of D2 discloses a blue colored (see page 3, line 17-20) glass composition which is infrared and ultraviolet absorbing (see T_{UV} and T_{IR} values on the table on page 13). It comprises a base glass portion comprising (see Table on page 9, column "A"):

SiO ₂	72.60%
Na ₂ O	16.30%
CaO	8.70%

MgO	0.03%
Al ₂ O ₃	0.50%
K ₂ O	0.20%

It also comprises a solar radiation absorbing and colorant portion comprising total iron of 0.56% (expressed as Fe₂O₃, see the table on page 13 of D2, cf. at 3.2.1 *supra*), 15 ppm CoO and having a redox of 0.298 (see at 3.2.1 *supra*), a luminous transmittance (T_{LA}) of 72.9% and a color having a dominant wavelength (λ_D) of 488 nm. The excitation purities of the composition of example 18 of D2 fulfill the requirements of claim 1 of the first auxiliary requests for the reasons set out at 3.3 to 3.3.4 *supra*.

- 5.4 According to the patent in suit (paragraph 0016), the problem to be solved consisted in providing a blue colored, infrared and ultraviolet radiation absorbing glass composition having improved UV absorption and having a green color component.
- 5.5 As a solution to said problem, the patent in suit proposes a glass composition according to claim 1 of auxiliary request 1 characterised by a Cr₂O₃ content of 25 to 100 ppm.
- 5.6 As to the success of the solution, it needs to be determined whether the above problem has been solved over the whole scope claimed. As conceded by the appellant, example 10 (residual levels of Cr₂O₃) and example 16 (50 ppm Cr₂O₃) are the only pair of examples given in the patent in suit that compares UV transmission values for a glass composition having a Cr₂O₃ content in the claimed range and for one having no (significant) Cr₂O₃ content and having the same thickness, the same total iron, the same Fe₂O₃ and the

same FeO. The corresponding UV transmission values (TSUV) are 53.5% for example 10 and 52.7% for example 16 (see Tables 3 and 7 of the patent in suit).

The question whether a reduction in UV transmission of merely 0.8 % was significant or not can remain unanswered as it is not credible that such an effect, if any, actually occurs over the whole scope claimed. In fact, examples 10 and 16 both have the same total iron amount, namely 0.598 and 0.600 wt. %, close to the lower limit of the claimed range of 0.53 to 1.1 percent by weight. According to D2, examples 17 and 14, no effect is observed at a total iron content of 1.51 wt. % even if the Cr₂O₃ amount added is 900 ppm, i.e. ninefold the upper limit of the range claimed in claim 1 of auxiliary request 1. As evidenced by D2 and as submitted by respondent 2 at the oral proceedings, there is a strong influence of the total iron content on UV absorption (see for example a comparison of examples 4 and 6), i.e. at higher total iron contents UV absorption is significantly increased. An increase in UV absorption caused by adding Cr₂O₃ in an amount within the claimed range is, if at all, small at total iron contents of 0.6 %. The Board therefore concludes that it is not credible that an increase is achieved at total iron contents close to or at the upper limit of the claimed range, i.e. 1.1 %.

It is, however, credible that Cr₂O₃ present in an amount of 25 to 100 ppm imparts a green color component. This was not contested by the parties.

5.7 The technical problem needs therefore to be reformulated as the provision of a blue colored, infrared and ultraviolet radiation absorbing glass

composition having a green color component. Indeed, this problem has been solved.

- 5.8 It remains to be decided whether the proposed solution is obvious in view of the cited prior art.

According to the appellant, D2 only taught to use amounts of 500 and 900 ppm Cr_2O_3 in order to obtain a green glass composition, i.e. one in which the dominant wavelength was outside the range claimed in claim 1 of auxiliary request 1. There was no teaching in D2 to use amounts of 25 to 100 ppm in order to arrive at a glass composition the dominant wavelength of which would be shifted significantly from the one of example 18.

The Board cannot accept this restricted interpretation of the teachings of D2. It should be noted that the problem to be solved is not to provide a green glass composition, but rather to provide a blue glass composition having a green color component. Faced with the problem of providing a green color component to the blue glass composition of example 18 of D2, the skilled person would add only small amounts, i.e. amounts in the order of the range claimed, to the glass composition, and thus would arrive at a glass composition having only a slightly increased dominant wave length, i.e. one that would still be within the boundaries of the range of 485 to 491 nm claimed. Hence, the skilled person would be prompted by D2 to arrive at the subject-matter of claim 1 of auxiliary request 1.

- 5.9 It follows from the above that the subject-matter of claim 1 does not fulfill the requirement of inventive step set forth in Art. 56 EPC.

6. Admissibility of D9

6.1 The appellant requested that D9 be not admitted into the proceedings as it was not *prima facie* relevant for the decision to be taken in the present appeal proceedings.

6.2 According to established case law of the Boards of Appeal, filing a new document is considered in due time if the filing was occasioned by a point raised by another party and could not have been filed before under the circumstances of the case (see e.g. T 730/07 of 15 April 2010, reasons 1.1).

6.3 D9 was filed in reaction to the amendments carried out by the appellant in the first auxiliary request filed with the statement of the grounds of appeal (see item 3.1 of the reply to the grounds of appeal by respondent 1). Indeed, the amendments carried out in the auxiliary request filed with the grounds of appeal and now present in claim 1 of auxiliary requests 2 and 3 originate from the description (paragraph 0024 of the patent corresponding to page 9, lines 20 to 29 of the description as originally filed) as submitted by the appellant in its statement of grounds of appeal (see item 3.1 thereof).

6.4 Document D9 was presented by respondent 1 in its reply to the statement of grounds of appeal. This reply was timely filed, i.e. within the time limit set by the Board.

6.5 For the above reasons, the filing of document D9 was admissible even without considering the question of whether document D9 was *prima facie* relevant. The

document is therefore admitted into the proceedings by the Board.

7. Auxiliary request 2 - inventive step

7.1 As to the closest prior art, while in the appellant's view, both example 18 of D2 as well as D9 are eligible as starting points for assessing inventive step, respondent 2 started from D9 and respondent 1 from example 18 of D2.

The Board will assess herein-below inventive step based on example 18 of D2 as closest prior art.

7.2 According to the patent in suit (paragraph 0016), the problem to be solved consisted in providing a blue colored, infrared and ultraviolet radiation absorbing glass composition having improved UV absorption and having a green color component.

7.3 As a solution to said problem, the patent in suit proposes a glass composition according to claim 1 of auxiliary request 2 characterised by a Cr_2O_3 content of 25 to 100 ppm, an N_2O content of 12.9 to 13.7 percent by weight, an MgO content of 3.5 to 3.9 percent by weight, an Al_2O_3 content of 0.14 to 0.2 percent by weight, and a K_2O content of 0.042 to 0.056 percent by weight.

7.4 As to the success of the solution, the appellant has not submitted any particular effect that would be associated with base glass composition of claim 1 of auxiliary request 2. Also from the patent in suit, wherein both the comparative examples and the examples according to the invention have this base glass composition, it appears that no such effect is present.

- 7.5 Accordingly, the problem to be solved remains the same as defined under point 5.7, namely, the provision of a blue colored, infrared and ultraviolet radiation absorbing glass composition having a green color component. Indeed this problem has been plausibly solved.
- 7.6 It now needs to be decided whether the proposed solution was obvious with regard to the cited prior art.
- 7.6.1 As set out at 5.8 *supra*, it was obvious in the light of D2 alone to have a solar radiation absorbing and colorant portion having a Cr₂O₃ content of 25 to 100 ppm.
- 7.6.2 D9 discloses on page 4, lines 25 to 42, a base glass composition having SiO₂, Na₂O, CaO, MgO, Al₂O₃, and K₂O contents falling, apart from the Na₂O content (13.76 compared to maximum of 13.7 percent by weight), within the boundaries of the ranges claimed in claim 1 of auxiliary request 2. D9 also teaches that this base glass composition is not critical (page 4, lines 25 and 26) and that the Na₂O content could range from 10 to 20 percent (see page 4, line 26 in combination with page 2, lines 12 to 21).
- Also, the appellant agreed at the oral proceedings that D9 would teach Na₂O contents of 13.7 percent.
- 7.6.3 The appellant contested that the skilled person would combine the glass composition of example 18 of D2 and the base glass composition of D9 because D2 clearly taught to have the MgO content limited to 2 percent by weight whereas in claim 1 of auxiliary request 2 a minimum of 3.5 percent by weight was required.

- 7.6.4 The Board agrees with the appellant insofar as the authors of D2 indeed claim that they have discovered that at MgO levels at 2 weight percent and below, IR absorption capacity is increased while visible transmission is not impeded (page 5, lines 17 to 23). But the Board disagrees that this would teach the skilled person away from combining documents D2 and D9. In fact, D2 does not teach not to have a MgO content of above 2 weight percent, but rather teaches that if absorption in the IR spectrum was to be increased without affecting transmission in the visible range, the MgO content should not be above 2 weight percent.
- 7.6.5 According to established case law (T 119/82 of 12 December 1983, reasons 16; cited e.g. in T 1082/05 of 26 September 2007, reasons 6.3.3, and in T 181/09 of 24 November 2011, reasons 3.9.1) disadvantageous modifications do not involve an inventive step if the skilled person could clearly predict these disadvantages, if his assessment was correct and if these predictable disadvantages were not compensated by any unexpected technical advantage.
- 7.6.6 In the case at hand, such an unexpected technical advantage has neither been invoked by the appellant nor is there any indication that the glass compositions of claim 1 of auxiliary request 2 would not have a decreased IR absorption due to the higher MgO content. Thus, the skilled person could clearly predict that, when using the Na₂O, MgO, Al₂O₃, and K₂O contents of the alternative base glass composition disclosed in D9, IR absorption would be decreased. Moreover, he was aware of the teaching in D2 (page 5, lines 23 to 27) that when increasing the MgO content, the Na₂O content can be decreased.

7.6.7 For the above reasons it was obvious to arrive at the subject-matter of claim 1 of auxiliary request 2 in view of a combination of D2 and D9. It is thus not necessary to assess inventive step taking D9 as closest prior art.

Hence, the requirement of inventive step set forth in Art. 56 EPC is not complied with.

8. Auxiliary request 3 - inventive step

Compared to claim 1 of auxiliary request 2, claim 1 of auxiliary request 3 now includes a number of ranges of compounds all of which include zero as the lower limit. Neither the glass composition of example 18 of D2 nor the base glass composition of D9 comprise any of these compounds. This was not contested by the appellant. Thus, auxiliary request 3 fails to succeed for the same reasons as auxiliary request 2.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar:

The Chairman:



C. Vodz

G. Rath

Decision electronically authenticated