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Datasheet for the decision of 8 December 2016

Case Number: T 0378/12 - 3.4.03

Application Number: 07864969.6

Publication Number: 2102908

IPC: H01L25/075

Language of the proceedings: EN

Title of invention:
LIGHTING DEVICE AND LIGHTING METHOD

Applicant:
Cree, Inc.

Headword:

Relevant legal provisions:
EPC Art. 52(1)
EPC 1973 Art. 54, 56
EPC 1973 R. 71(2)
RPBA Art. 15

Keyword:
Novelty - selection invention (yes)
Inventive step - (no)
Evidence - sufficient probative value (no)

Decisions cited:
T 0164/83, T 0198/84, T 0279/89, T 1233/05, T 0230/07, T 1130/09

Catchword:

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Case Number: T 0378/12 - 3.4.03

D E C I S I O N
of Technical Board of Appeal 3.4.03
of 8 December 2016

Appellant: (Applicant)	Cree, Inc. 4600 Silicon Drive Durham, NC 27703 (US)
Representative:	Dummett Copp LLP 25 The Square Martlesham Heath Ipswich IP5 3SL (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 28 September 2011 refusing European patent application No. 07864969.6 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	G. Eliasson
Members:	S. Ward
	C. Heath

Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division refusing European patent application No. 07 864 969 on the grounds that the claimed subject-matter did not meet the requirements of Article 123(2) EPC, was not clear within the meaning of Article 84 EPC, was not new within the meaning of Article 54(1) and (2) EPC, and did not involve an inventive step within the meaning of Article 56 EPC.

II. The appellant requested in writing that the decision under appeal be set aside and that a patent be granted on the basis of claims 1-12 submitted with the letter of 8 November 2016.

In the same letter it was stated that the appellant would not be represented at the scheduled oral proceedings. Oral proceedings before the Board were therefore held in the absence of the appellant.

III. The following document is referred to in this decision:

D1: EP 1 160 883 A2

The Board has also taken into account the following documents submitted by the appellant:

Negley I: A first declaration made by Gerald H Negley dated 23 December 2011 and filed with the statement of grounds of appeal

Negley II: A second declaration made by Gerald H Negley dated 4 November 2016 and filed with the letter of 8 November 2016

Appendix A: US Department of Energy (DOE) Test Report 07-31

Appendix B: US Department of Energy (DOE) Test Report 07-47

Appendix C: US Department of Energy (DOE) Summary of Results ("Round 3 of Product Testing")

Appendix D: US Department of Energy (DOE) Summary of Results ("Round 4 of Product Testing").

Gerald H Negley is mentioned in the present application as one of the inventors.

IV. Claim 1 of the main request reads as follows:

"A lighting device comprising:
a first group of solid state light emitters, the first group of solid state light emitters comprising at least a first solid state light emitter;
at least a first luminescent material; and
a second group of solid state light emitters, the second group of solid state light emitters comprising at least one solid state light emitter,
wherein:
each of said first group of solid state light emitters, if illuminated, would emit light having a peak wavelength in the range of from 430nm to 480nm,
said first luminescent material, if excited, would emit light having a dominant wavelength in the range of from about 555nm to about 585nm,
each of said second group of solid state light emitters, if illuminated, would emit light having a dominant wavelength in the range of from 600nm to 630nm,

when the first group of solid state light emitters is illuminated and at least the first luminescent material is excited, a mixture of light exiting the lighting device that was emitted by the first group of solid state light emitters and light exiting the lighting device that was emitted by at least the first luminescent material would, in an absence of any additional light, produce a sub-mixture of light having x, y color coordinates which define a point that is within an area on a 1931 CIE Chromaticity Diagram enclosed by first, second, third, fourth and fifth line segments, the first line segment connecting a first point to a second point, the second line segment connecting the second point to a third point, the third line segment connecting the third point to a fourth point, the fourth line segment connecting the fourth point to a fifth point, and the fifth line segment connecting the fifth point to the first point, the first point having x, y coordinates of 0.32, 0.40, the second point having x, y coordinates of 0.36, 0.48, the third point having x, y coordinates of 0.43, 0.45, the fourth point having x, y coordinates of 0.42, 0.42, and the fifth point having x, y coordinates of 0.36, 0.38, and

when the first group of solid state light emitters is illuminated, and the second group of solid state light emitters is illuminated, and at least the first luminescent material is excited, a mixture of light exiting the lighting device that was emitted by the first group of solid state light emitters, light exiting the lighting device that was emitted by the second group of solid state light emitters and light exiting the lighting device that was emitted by at least the first luminescent material would, in an absence of any additional light, produce a mixture of light having x, y coordinates on a 1931 CIE

Chromaticity Diagram which define a point that is within ten MacAdam ellipses of at least one point on the blackbody locus on a 1931 CIE Chromaticity Diagram."

V. The findings of the Examining Division, insofar as they are relevant to the present decision, may be summarised as follows:

Document Dl disclosed an LED lamp including at least a blue LED having a peak emission wavelength in the range 450-470 nm, a red LED having a peak emission wavelength in the range 610-630 nm and a YAG:Ce phosphor converting part of the blue light into yellow-green light having a peak emission wavelength in the range 520-560 nm.

D1 also taught that the light emitted by the combination of the blue LED and the phosphor defined an area 45 in the Chromaticity Diagram of Fig. 7. Even if area 43 was preferred, the whole area 45 formed part of the invention of D1.

The area claimed in the present application formed a part of the area 45 of D1 and it had to be decided whether the claimed area was disclosed in D1. According to GL C-IV 9.8 (ii), for the claimed area to be new, in addition to criteria (a) and (b) that were fulfilled, the criterion (c) should be fulfilled, i.e. the selected range should not be an arbitrary specimen of the prior art but another invention (e.g. purposive selection, new technical teaching).

In the present case the application did not show any effect resulting from that selection. The application only mentioned a surprisingly high CRI and high

efficacy but without any comparison with prior art devices. Furthermore it was to be noted that D1 specifically taught that the devices disclosed therein show high efficacy and high CRI, and recited a CRI Ra of at least 80 and an efficacy of 30 lm/W or more, which values were equal to or higher than those given in the application. Hence there was clearly no technical effect on file associated with the selection of the range of the sub-mixture of the application, and said range was not new over the range of D1.

With respect to the mixture of light emitted by the first and second groups of solid state light emitters and the first luminescent material, D1 taught that by varying the peak intensity of the red LED, a white light such as tropical daylight, neutral white, warm white or incandescent lamp white light can be obtained.

VI. The appellant's arguments may be summarised as follows:

Document Dl disclosed in Figure 1 a lamp 100 which included a blue LED chip 11, a red LED chip 12 and phosphor 13, the phosphor 13 being photoexcited by the emission of the blue LED chip 11 to exhibit a luminescence. In paragraph [0026] document Dl disclosed an embodiment where the peak wavelengths produced may lie between 450 and 470nm (blue LED), between 610 and 630nm (red LED) and between 520 and 560nm (phosphor).

Document Dl also disclosed that by adjusting the luminous intensity ratio of the blue and red LED chips, the light produced can have its correlated color temperature changed.

In Fig. 7 the range 41 represented the chromaticity of the emission produced by the blue LED chip 11 and the

curve 42 represented the chromaticity of the luminescence produced by the yellow (YAG) phosphor 13; the combination of the blue LED chip 11 and the yellow phosphor 13 theoretically realized any chromaticity within the range 45. However, Dl disclosed that this combination preferably had a chromaticity falling within the range 43, which was located over a blackbody (Planckian) radiation locus 30.

According to the presently claimed subject-matter, a mixture of light that was emitted by the first group of light emitters and light that was emitted by at least the first luminescent material would, in an absence of any additional light, produce a sub-mixture of light that was non-white and that had x, y color coordinates within an area on the 1931 CIE Chromaticity Diagram that was neither disclosed nor suggested in D1.

By providing a device that emitted such a sub-mixture in addition to a second group of light emitters, it was possible to obtain surprisingly high CRI Ra while also obtaining surprisingly high efficacy.

D1 did not contain any suggestion that any benefit would be obtained by providing a lighting device in which a sub-mixture of emitted light has x, y color coordinates within the recited area on the 1931 CIE Chromaticity Diagram, nor did it contain any suggestion that such a lighting device would achieve such a combination of excellent color rendering and energy efficiency.

The Examining Division argued that the selected range was an arbitrary specimen of the prior art which did not show any effect resulting from that selection. However, the declaration by Gerald Negley (Negley I)

showed the substantial effects that resulted from the selections made in accordance with the present inventive subject matter. The efficacy obtained by a lighting device as described in the present specification was compared with the efficacy obtained by a variety of prior art devices. The wall plug efficiency (which factors all losses) of the lighting device as described in the present specification was found to be about or higher than 60 lumens per watt, a value which is much higher than the "30 lm/W" mentioned by the Examining Division.

Appendices A and B reported tests conducted on the embodiment described from page 35, line 1 to page 38, line 16 of the present specification (and depicted in Figs. 4-8). Appendix A reported that the devices achieved wall plug efficiency values of 59.9 lumens per watt, 60.1 lumens per watt and 62.4 lumens per watt, and Appendix B reported that the device achieved wall plug efficiency values of 61.3 lumens per watt and 62.4 lumens per watt.

Appendix C tabulated the results from the tests reported in Appendices A and B and the results provided by conventional devices. As shown in Table 1 (page 5), the devices according to the present inventive subject matter achieved wall plug efficiency values which were sharply higher than those achieved by other devices. The sharp difference between the wall plug efficiency values achieved by the devices according to the present inventive subject matter and other devices was also reflected in the plot shown in Figure 3 on page 10, where the point at the far right corresponded to the devices according to the present inventive subject matter.

Appendix D included a plot (Figure 2 on page 10) and a Table (Table 7 on page 17) which reflected the sharp distinction between the wall plug efficiency values obtained by the devices according to the present inventive subject matter compared to those of conventional devices.

This clearly demonstrated the substantial effects that resulted from the selections made in accordance with the present inventive subject matter, and the superior properties obtained by the present inventive subject-matter relative to the broad disclosure in document Dl.

Accordingly, the claimed subject-matter was novel over D1 having regard to the principles set forth in GL C-IV 9.8(ii).

The claims also defined inventive subject matter as a result of the the technical effects of the difference of this subject-matter over the prior art, as demonstrated by the evidence submitted and discussed above.

Moreover, Negley II clarified that Appendix C tabulated wall plug efficiencies as determined by the tests reported in Appendices A and B, together with the wall plug efficiencies (also determined by the US DOE) of solid state lighting (SSL) devices that the US DOE determined to be the other most energy-efficient SSL devices available as of 2007, and incorporating the most energy-efficient components available as of 2007.

The devices of the invention operated within the two-dimensional region defined in claim 1, whereas the other SSL devices did not operate in that defined

region, and this contributed to the sharp difference between the achieved wall plug efficiency values.

There were no significant differences in the efficiencies of the components between the devices according to the present inventive subject matter and the conventional devices.

Accordingly, Negley II established that there is a link between the defined region and higher wall plug efficiency.

The passage bridging pages 15 and 16 (indicating that it would be possible to put the inventive subject matter into practice and achieve a luminous efficacy of as low as 25 lumens per Watt) was included to provide support for claiming a variety of ranges for wall plug efficiency. The high wall plug efficiencies achieved with the present inventive subject matter (59.9, 60.1, 62.4, 61.3 and 62.4 lumens per Watt) were all within the range of "at least 25 lumens per Watt". There was no evidence in the record that a device constructed as recited in claim 1 would have a wall plug efficiency of as low as 25 lumens per Watt.

VII. With the summons to oral proceedings, the Board sent the appellant a communication under Article 15(1) RPBA setting out its provisional opinions. The Board expressed the view that the objections raised by the Examining Division under Article 123(2) EPC appeared to have been overcome by amendment, but that the claims did not appear to be concise (Article 84 EPC 1973). Furthermore, the Board expressed the view that the subject-matter of claim 1 could be considered novel, but questioned whether it involved an inventive step,

and indicated that this matter would be discussed at oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

2. As announced in advance, the duly summoned appellant did not attend the oral proceedings. According to Rule 71(2) EPC 1973, the proceedings may nevertheless continue without a duly summoned party, that party then being treated as relying only on its written case. As the present case was ready for decision at the conclusion of the oral proceedings (Article 15(5) and (6) RPBA), the voluntary absence of a party was not a reason for delaying the decision (Article 15(3) RPBA).

3. *Article 123(2) EPC and Article 84 EPC 1973*

The objections raised by the Examining Division in relation to the requirements of Article 123(2) EPC have been overcome by amendment, and the Board sees no reason to raise other objections of inadmissible extension of subject-matter. The objections raised both in the contested decision and in the Board's communication under Article 15(1) RPBA have also been overcome by amendment.

4. *Novelty*

4.1 According to claim 1, the first and second groups of solid state light emitters may each comprise just a single first and second light emitter, respectively,

and the appellant has not disputed that document D1 discloses a lighting device comprising a first (blue) and a second (red) solid state light emitter, and a first luminescent material, each having peak light emission wavelengths falling within the claimed ranges (see e.g. document D1, claims 1 and 3).

The remainder of the claim consists of two features defining the locus of emitted light combinations in the 1931 CIE Chromaticity Diagram.

4.2 The second of these features essentially defines that a mixture of light exiting the lighting device emitted by the combination of the first and second groups of solid state light emitters and the first luminescent material would, in an absence of any additional light, produce light corresponding to a point having x, y coordinates within ten MacAdam ellipses of at least one point on the blackbody locus on a 1931 CIE Chromaticity Diagram.

4.3 In Fig. 7 of document D1, line 30 represents the blackbody locus, and line 33 represents the locus of the possible range of chromaticities of the LED lamp, which "can be substantially matched with the blackbody radiation locus 30" (paragraph [0056], [0057]).

Even if no quantitative measure of the deviation between the two loci is disclosed, at least at, and in the neighbourhood of, the point where these two lines cross, the two loci will be within ten MacAdam ellipses of each other. This was pointed out by the Board in the communication under Article 15(1) RPBA and has not been contested by the appellant. This feature is therefore considered to be disclosed in document D1.

4.4 The remaining feature is essentially that a mixture of light exiting the lighting device emitted by the first group of solid state light emitters and the first luminescent material would, in an absence of any additional light, produce a sub-mixture of light having x, y colour coordinates corresponding to a point on a 1931 CIE Chromaticity Diagram lying within an area defined as being enclosed by the straight lines joining the points (0.32, 0.40); (0.36, 0.48); (0.43, 0.45); (0.42, 0.42) and (0.36, 0.38).

4.5 According to document D1 (paragraph [0055] and Fig. 7), the "combination of the blue LED chip 11 and yellow (YAG) phosphor 13 theoretically realizes any chromaticity within the range 45...", the preferred range being the range 43. By mapping the above points onto the CIE Chromaticity Diagram, it is apparent that the area defined by claim 1 of the present application falls entirely within the general area 45 disclosed in document D1 (but ldoes not overlap the preferred area 43). The claimed region of chromaticity is therefore a two-dimensional sub-range lying entirely within a disclosed two-dimensional range.

4.6 The same conclusion was reached in the contested decision, and in order to determine whether the claimed sub-range was disclosed in document D1, the Examining Division applied the three criteria, (a)-(c), set out in C-IV, 9.8(ii) of the April 2010 Edition of the Guidelines for Examination (corresponding to G-VI, 8(ii) of the November 2016 Edition).

Criteria (a) and (b) require that the selected sub-range is narrow compared to the known range, and is sufficiently far removed from any specific examples disclosed in the prior art and from the end-points (or

in the present two dimensional case, boundary lines) of the known range. The Examining Division decided that these criteria were fulfilled, and the Board sees no reason to question this finding.

However, the claimed sub-range was found not to meet the criterion (c), that "the selected range is not an arbitrary specimen of the prior art, i.e. not a mere embodiment of the prior art but another invention (purposive selection, new technical teaching)". As a result, the Examining Division decided that the claimed sub-range was disclosed in document D1, and hence that the subject-matter of claim 1 was "not new in the sense of Article 54(1) and (2) EPC."

4.7 The principles set out in the section of the Guidelines cited by the Examining Division were developed in particular in T 198/84 (see e.g. Headnote) and summarised in T 279/89 (Reasons, point 4.1) and elsewhere.

4.8 In several more recent decisions, however, the boards have taken the view that criterion (c) (purposive selection) is relevant for the question of inventive step rather than novelty (cf. Case Law of the Boards of Appeal, 8th edition 2016, I.C.6.3.1, final three paragraphs). For example, in the Headnote of T 230/07 the position was set out as follows:

"Novelty and inventive step are two distinct requirements for the patentability of an invention and therefore different criteria should apply for their assessment. So, when assessing novelty of an invention, the presence or absence of a technical effect within a sub-range of numerical values is not to be taken into account in the assessment of novelty.

"For establishing novelty of a sub-range of numerical values from a broader range, the selected sub-range should be narrow and sufficiently far removed from the known broader range illustrated by means of examples. A sub-range is not rendered novel by virtue of a newly discovered effect occurring within it."

Similar views are expressed in, for example, T 1130/09 (Reasons, point 3.2, fourth paragraph) and T 1233/05 (Reasons, point 4.4).

4.9 The present Board is also of the view that purposive selection is relevant for assessing inventive step but not novelty. Consequently, since the claimed sub-range meets the criteria (a) and (b), the Board judges that the subject-matter of claim 1 is new within the meaning of Article 52(1) EPC and Article 54 EPC 1973.

5. *Inventive step*

5.1 In the light of the above, claim 1 differs from the closest prior art (document D1) in the feature mentioned under point 4.4, above.

Several performance advantages of lighting devices of the present invention are mentioned in the application. The Color Rendering Index (referred to as "CRI" in the application, as "Ra" in document D1, and as "CRI Ra" in the present claims) may, for example, be "at least 80" (claim 9 as originally filed; present claim 6). However, the devices of document D1 achieve comparable, or even greater, Ra values (Figs. 11A - 13C), and so it cannot be seen that this parameter could be the basis for a persuasive case that the claimed subject-matter is inventive.

5.2 In the application (e.g. page 7, fourth full paragraph), the invention is also presented as solving the problem of providing a high luminous efficacy (or wall-plug efficiency), and this aspect is stressed in the appellant's submissions.

5.3 However, the application provides no evidence of a technical character (e.g. the results of tests performed on embodiments of the invention) which would justify this assertion, or which would establish that the lighting devices of the present invention are superior in this respect to the devices of document D1, in which the luminous efficacy is "about 30 to 50 lm/W" (paragraph [0129]).

5.4 The only numerical values cited in the application for the achievable luminous efficacy occur in claim 10 as originally filed ("at least 25 lumens per watt") and in the following statement:

"In some embodiments according to the present invention, the lighting device has an efficacy of at least 25 lumens per watt, in some cases at least 50 lumens per watt, in some cases at least 60 lumens per watt, in some cases at least 70 lumens per watt, and in some cases at least 80 lumens per watt" (passage bridging pages 15 and 16).

The appellant has accepted that this very general passage "was included to provide support for claiming a variety of ranges for wall plug efficiency" (letter of 8 November 2016), and hence it does not represent technical evidence of actual measured wall plug efficiencies.

There is one embodiment described in detail in the application (page 35, line 1 to page 38, line 16 and Figs. 4-8), which will be referred to as the "representative embodiment" (following the terminology used under paragraph 6 of both Negley I and Negley II). However, no value for the luminous efficacy or wall-plug efficiency is given.

5.5 The appellant has attempted to supply the missing technical evidence by submitting the two declarations by Gerald H Negley (Negley I and Negley II), and the four appendices (A-D).

It should be noted that in the present decision the documents corresponding to the designations "Appendix A", "Appendix B", "Appendix C" and "Appendix D" are as set out above under point III of the Facts and Submissions, above, and that this is consistent with the nomenclature of Negley II. It would appear, however, that the documents referred to as "Appendix A" and "Appendix B" in Negley I are in fact the documents referred to as "Appendix C" and "Appendix D" in Negley II and in the present decision.

5.6 There are also serious substantive inconsistencies between Negley I and the statement of grounds of appeal (both filed on the same day) and between Negley I and Negley II.

In paragraph 7 of Negley I it is stated that the device of the representative embodiment, mentioned above under point 5.4, "has achieved wall plug efficiency ... of 135 lumens per watt". By contrast, "Appendix A ... tabulates wall plug efficiencies of conventional devices", including lighting devices that are "similar to lighting device according to the present inventive

subject matter". The column "Efficacy (lm/W)" in Table 1 on page 5 shows that the wall plug efficiency values "for conventional devices are sharply lower than the wall plug efficiency (135 lm/W) achieved" by the representative embodiment of the present application (Negley I, paragraph 8). A similar conclusion is drawn from Appendix B (Negley I, paragraph 9).

Thus, according to Negley I, the lighting device of the described representative embodiment of the invention has a wall plug efficiency of 135 lumens per watt, and the documents referred to in Negley I as Appendix A and Appendix B (the only appendices mentioned in Negley I) describe devices which do not correspond to the present invention (although they may be "similar"), and which have much lower wall plug efficiencies.

5.7 The statement of grounds, however, asserts that four appendices (A-D) are mentioned in Negley I (which is not the case), that appendices A and B correspond to tests of the representative embodiment, that appendices C and D compare test results of the representative embodiment with those of conventional devices, and that the devices according to the present invention achieve wall plug efficiencies of about "60 lumens per watt". There is no mention of the device according to the invention achieving a wall plug efficiency of 135 lumens per watt.

5.8 The explanations of the appendices given in Negley II and in the letter of 8 November 2016 essentially correspond to that given in the statement of grounds. There is no mention in this letter of any error in Negley I; it is merely said that Negley II "clarifies" certain points and "provides further evidence" of technical effects demonstrating inventive step.

5.9 When additional evidence is provided - whether as declarations, comparative tests or in any other form - it is the responsibility of the submitting party to ensure that it is unambiguously clear to the Board which facts the party believes are demonstrated by the evidence.

In the present case the two declarations by Negley contradict each other firstly regarding the wall plug efficiency of the representative embodiment of the invention, and secondly in relation to the nature of the devices which were subjected to the tests reported in the appendices. These glaring contradictions are neither explained nor even acknowledged in the appellant's submissions.

For this reason alone, the Board cannot regard the appellant's submissions as providing a coherent body of evidence supporting inventive step.

5.10 Furthermore, even if Negley I is considered erroneous, and Negley II is regarded as corresponding to the appellant's actual case, the Board does not consider that the evidence presented therein is sufficient to establish that the claimed subject-matter is inventive.

Appendix A (DOE Test Report 07-31) and Appendix B (DOE Test Report 07-47) describe tests performed on downlight retrofit lamps with LEDs manufactured "in accordance with US 7 213 940 (see page 2), which is the US patent family member of the present application. Claim 1 of US 7 213 940 is substantially the same as claim 1 of the present application. It is therefore plausible that the tests were performed on devices falling within the ambit of present claim 1.

In Table 1 on page 5 of Appendix C, test results of reports 07-31 and 07-47 are summarised and compared with the corresponding test results for other commercially available solid state lighting devices. The products tested in reports 07-31 and 07-47 are listed as having the highest luminous efficacy (61 lm/W).

The most that could be considered to be established by this evidence, and by the other sections of the appendices discussed in Negley II, is that at least some of the embodiments of the presently claimed device have a higher luminous efficacy than the other commercially available products tested. No conclusions can be drawn as to why this should be, or whether it has anything to do with the feature distinguishing the claimed subject-matter from the closest prior art (document D1).

5.11 According to established jurisprudence, if comparative tests are chosen to demonstrate an inventive step on the basis of an improved effect, the nature of the comparison with the closest state of the art must be such that the alleged advantage or effect is convincingly shown to have its origin in the distinguishing feature of the invention compared with the closest state of the art (cf. Case Law of the Boards of Appeal, 8th edition 2016, I.D.10.9).

Headnote I of T 164/83 is also relevant in this regard:

"Technical progress shown in comparison with marketed products as an alleged support for inventive step cannot be a substitute for the demonstration of

inventive step with regard to the relevant closest state of the art."

5.12 In the present case there is no indication in Appendix C that any of the other devices listed in Table 1 correspond to the claimed subject-matter minus the distinguishing feature, or that providing a sub-mixture of light in a sub-range as defined in claim 1 is the reason for the higher efficacy of the products tested in reports 07-31 and 07-47.

5.13 In paragraph 10 of Negley II it is stated that such a link exists, and that the other tested products fail to achieve the luminous efficacy of those of reports 07-31 and 07-47 because none of them operate within the claimed sub-range. There is, however, nothing in the appendices to confirm this claim, and the author does not give any indication of the source of this information. Consequently, the statements made in this paragraph are seen as essentially unsubstantiated assertions which do not provide evidence of an inventive step.

5.14 In the absence of any clear evidence of an advantageous effect arising from working in the claimed sub-range as opposed to elsewhere in the range 45 disclosed in document D1, the Board can only regard this sub-range as an essentially arbitrary specimen of the larger range. Even if a skilled person might be more inclined to work within the preferred sub-range 43 of document D1, no inventive step would be involved in choosing to work in a sub-range within the non-preferred region unless there exists persuasive technical evidence that doing so would result in an advantageous technical effect. For the reasons given above, the Board does not

believe that such evidence is to be found either in the application or in the appellant's submissions.

5.15 While a choice to work in the claimed sub-range would have the effect of shifting, to some extent, the line 33 (document D1, Fig. 7) representing the locus of the possible range of chromaticities of the LED lamp, the skilled person would ensure that the overall chromaticity remained as close as possible to the blackbody radiation locus 30 as explicitly taught in paragraphs [0056] and [0057] of document D1. The claimed "within ten MacAdam ellipses" would represent an obvious and undemanding target which the skilled person would readily achieve.

5.16 The Board therefore concludes that the subject-matter of claim 1 does not involve an inventive step within the meaning of Article 52(1) EPC and Article 56 EPC 1973.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

S. Sánchez Chiquero G. Eliasson

Decision electronically authenticated