Internal distribution code:

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

Datasheet for the decision of 14 January 2022

Case Number: T 2595/17 - 3.3.03

Application Number: 10773622.5

Publication Number: 2499176

IPC: C08F10/02, C10M101/02, H01B3/44, C08F110/02, C08F210/16, C08F10/00

Language of the proceedings: EN

Title of invention:
Power cable comprising a polymer composition comprising a polyolefin produced in a high pressure process

Patent Proprietor:
Borealis AG

Opponent:
The Dow Chemical Company

Relevant legal provisions:
EPC Art. 54, 56, 100(b)
RPBA Art. 12(4)

Keyword:
Novelty - main request and auxiliary requests I-III (no)
Late-filed evidence - admitted (no)
Grounds for opposition - insufficiency of disclosure (no)
Inventive step - auxiliary request IV (yes)

Decisions cited:
G 0001/92, T 0952/92

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

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

Case Number: T 2595/17 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 14 January 2022

Appellant 1: (Patent Proprietor)	Borealis AG Trabrennstrasse 6-8 1020 Vienna (AT)
Representative:	Dehns St. Bride's House 10 Salisbury Square London EC4Y 8JD (GB)
Appellant 2: (Opponent)	The Dow Chemical Company 2030 Dow Center Midland, MI 48674 (US)
Representative:	Boult Wade Tennant LLP Salisbury Square House 8 Salisbury Square London EC4Y 8AP (GB)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 21 September 2017 concerning maintenance of the European Patent No. 2499176 in amended form.**

Composition of the Board:

Chairman	F. Rousseau
Members:	O. Dury
	R. Cramer

Summary of Facts and Submissions

I. The appeals by the patent proprietor and the opponent lie from the interlocutory decision of the opposition division posted on 21 September 2017 concerning maintenance of European Patent No. 2 499 176 in amended form according to the claims of auxiliary request III filed with letter of 23 May 2016 and an adapted description.

II. In the decision under appeal the following documents were *inter alia* cited:

D1: Global High Voltage Solutions, Dow Wire & Cable, Published August 2008, The Dow Chemical Company
D2: Declaration, T.J. Person, dated 6 October 2015
D2a-D2e: Invoices and certificate of analyses related to material HFDB-4201 SC
D5: JP H06-251624 A
D5a: English translation of D5
D6: W0 98/14537
D7: L.R. Rudnick and R.L. Shubkin, Synthetic Lubricants And High-Performance Functional Fluids, Revised And Expanded, CRC Press, 1999, pages 376-377
D16: EP 1 695 996 A1

III. The decision under appeal was based on a main request filed with letter of 23 May 2016, auxiliary request I filed with letter of 4 May 2017 and on auxiliary requests II and III both filed with letter of 23 May 2016.

Claim 1 of the main request read as follows:

"1. A power cable comprising a conductor surrounded by one or more layers, wherein at least one of said layer(s) comprises a polymer composition having an electric conductivity of 0.50 x 10^{-15} S/m or less, when measured according to DC conductivity method using a tape sample consisting of the polymer composition as described under "Determination Methods", the polymer composition comprising a polyolefin which is obtainable by a high pressure polymerisation process comprising the steps of:

(a) compressing one or more monomer(s) under pressure in a compressor, wherein a compressor lubricant is used for lubrication,

(b) polymerising a monomer optionally together with one or more comonomer(s) in a polymerisation zone,

(c) separating the obtained polyolefin from the unreacted products and recovering the separated polyolefin in a recovery zone,

wherein in step (a) the compressor lubricant comprises a mineral oil."

Claim 1 of auxiliary request I differed from claim 1 of the main request in the following amendments (additions in **bold**):

"A **direct current (DC)** power cable comprising a conductor surrounded by one or more layers, wherein ..."

Claim 1 of auxiliary request II differed from claim 1 of auxiliary request I in the following amendments (additions in **bold**, deletions in ~~strikethrough~~):

"... the polymer composition comprising a polyolefin,

wherein the polyolefin is a low density polyethylene (LDPE) selected from a LDPE homopolymer or LDPE copolymer of ethylene with one or more comonomer(s), which LDPE homopolymer or LDPE copolymer of ethylene may optionally be unsaturated; and

wherein said polyolefin ~~which~~ is obtainable by a high pressure polymerisation process comprising the steps of: ..."

Claim 1 of auxiliary request III differed from claim 1 of the main request in the following amendments (additions in **bold**, deletions in ~~strikethrough~~):

"A **direct current (DC)** power cable comprising a conductor surrounded by one or more layers, wherein ..."

"... the polymer composition comprising a polyolefin,

wherein the polyolefin is a low density polyethylene (LDPE) copolymer of ethylene with one or more comonomer(s), which LDPE copolymer of ethylene may optionally be unsaturated; and

wherein said polyolefin ~~which~~ is obtainable by a high pressure polymerisation process comprising the steps of: ..."

The remaining claims of auxiliary request III were

directed to:

- Further embodiments of the power cable according to claim 1 (dependent claims 2-5);

- A process for producing a power cable according to claims 1 to 5 (claim 6);

- The use of polymer compositions according to claim 1 or embodiments thereof for producing at least one layer of a DC power cable (claims 7-11).

IV. The decision of the opposition division, as far as relevant to the present decision, can be summarised as follows:

- The subject-matter of claim 1 of each of the main request and auxiliary requests I-II was not novel over the power cable depicted on page 15 of D1, which comprises a conductor surrounded by a layer of commercial product HFDB-4201 SC. In that respect, D2a-D2e showed that HFDB-4201 SC was a homopolymer as defined in claim 1 of these requests. The amendments made in claim 1 of auxiliary request I merely defined that the cable being claimed should be suitable for use with a DC field. In the absence of any evidence that the power cable depicted on page 15 of D1 was not suitable for such a use, auxiliary request I was not novel over D1 for the same reasons as outlined above for the main request. Also, the amendment made in claim 1 of auxiliary request II did not distinguish the subject-matter being claimed any further from the disclosure of D1;

- In view of the patent proprietor's statement that it was the use of the mineral oil compressor lubricant that was responsible for the low electrical conductivity specified in claim 1 and in the absence of any substantiated reasons why the skilled person following the disclosure of the patent in suit would not be able to prepare a cable as claimed, the subject-matter of claim 1 of auxiliary request III met the requirements of sufficiency of disclosure;

- Regarding inventive step of said auxiliary request III, either D1 or D5a constituted suitable closest prior art documents. In that respect, an inventive step was acknowledged considering that it was at least not obvious to replace the homopolymer according to D1 or D5a by a copolymer, which was needed in order to arrive at the subject-matter of operative claim 1.

In view of the above, the patent amended on the basis of said auxiliary request III met the requirements of the EPC.

V. Both the patent proprietor (appellant 1) and the opponent (appellant 2) lodged an appeal against the above decision.

VI. In its statement of grounds of appeal appellant 1 requested that the decision of the opposition division be set aside and the patent be maintained in amended form on the basis of the claims of any of the main request or auxiliary requests I to IV filed therewith.

Claim 1 of the main request and of auxiliary requests I and III corresponded to claim 1 of the main request,

auxiliary request I and II, respectively, dealt with in the decision under appeal.

VII. In its statement of grounds of appeal appellant 2 requested that the decision of the opposition division be set aside and the patent be revoked. Also, the following document was filed:

D20: Experimental report, T.J. Person, dated 22 January 2018

VIII. With its reply to the statement of grounds of appeal of appellant 2 dated 18 June 2018, appellant 1 additionally requested that the patent be maintained in amended form according to any of auxiliary requests II or IV to XI filed therewith, whereby said auxiliary request II replaced auxiliary request II filed with the statement of grounds of appeal and the operative auxiliary requests were to be treated in the sequence from I to XI.

Claim 1 of auxiliary request II differed from claim 1 of the main request in the following amendments (additions in **bold**, deletions in ~~strikethrough~~):

"... the polymer composition comprising a polyolefin,

wherein the polyolefin is a low density polyethylene (LDPE) selected from a LDPE homopolymer or LDPE copolymer of ethylene with one or more comonomer(s), which LDPE homopolymer or LDPE copolymer of ethylene may optionally be unsaturated; and

wherein said polyolefin ~~which~~ is obtainable by a high pressure polymerisation process comprising the steps of: ..."

Auxiliary request IV corresponded to auxiliary request III dealt with in the decision under appeal.

Auxiliary requests V to XI are not relevant to the present decision.

Also, the following document was filed:

D21: Extruded Cables for High-Voltage Direct-Current Transmission, Advances in Research and Development, G. Mazzanti and M. Marzinotto, Wiley, 2013, page 42

It was further requested that D20 be not admitted into the proceedings.

IX. With its reply to the statement of grounds of appeal of appellant 1 dated 15 June 2018, appellant 2 requested that auxiliary requests II and III be not admitted into the proceedings. Also, the following documents were *inter alia* filed:

D2f: Certificate of Analysis, Material HFDB-4201 SC, dated 11 June 2007
D2h: Product specification for HFDB-4201 SC, specified material code 00130444, effective date: 23 January 2009

X. The parties were summoned to oral proceedings and a communication was issued by the Board on 8 June 2020 in which concerns in relation to the requests or arguments of the parties were identified. In particular, regarding novelty over D1 and in view of the argument of appellant 1 that no one reading D1 would be aware that a mineral oil was used and that there was no

evidence that anyone in possession of the D1 grade could even determine that a mineral oil was used, the question was posed if the alleged public prior use relating to commercial product HFDB-4201 SC resulted in its composition to be state of the art, in particular taking into account the findings of opinion G 1/92, OJ EPO 1993, 277 (section 6.3.3 of the communication).

XI. Oral proceedings were held on 14 January 2022 in the form of a videoconference. During these oral proceedings, appellant 1 requested that D20 be not admitted into the proceedings. Also, appellant 2 did not object any more to the admittance of D21 into the proceedings and only pursued its objections of lack of inventive step starting from either D1 or D5 as the closest prior art document.

XII. Appellant 1's submissions, in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

Main request - Novelty over D1

(a) Regarding novelty over D1, it was argued in writing that the discrepancies among the resin's properties shown in the documents relied upon by appellant 2 were such that it was not possible to conclude that the electrical conductivity of resin HFDB-4201 according to D1 was effectively in the range defined in operative claim 1. However, that argument was not pursued any longer at the oral proceedings before the Board.

The objection raised in writing that no one reading D1 would be aware that a mineral oil was used and that there was no evidence that anyone in

possession of the D1 grade could even determine that a mineral oil was used was also not pursued at the oral proceedings before the Board. To the contrary, it was then admitted that analysis of the composition was not a problem.

The issue of the reproducibility of resin HFDB-4201 SC according to D1 was questioned in writing and at the beginning of the oral proceedings before the Board, whereby it was further argued with reference to opinion G 1/92 that in the present case the chemical composition of that product had not been made available to the public. However, in view of paragraph 48 of the patent in suit, that objection was not pursued any longer at the oral proceedings.

Auxiliary requests I to III - Novelty over D1

(b) It was argued in writing that it was neither indicated in D1, nor derivable therefrom, that the cable depicted on page 15 was a DC ("direct current") cable. Therefore, the amendment "direct current" made in claim 1 of auxiliary request I effectively distinguished the subject-matter thereof from the power cable disclosed on page 15 of D1. However, it was acknowledged at the oral proceedings before the Board that said amendment did not provide a distinguishing feature over D1.

(c) At the oral proceedings before the Board, it was acknowledged that if the main request and auxiliary request I were not novel over D1, the same would be valid for auxiliary requests II and III. The arguments submitted in writing in support of novelty of auxiliary requests II and III were not

pursued any longer.

Document D20 - Admittance

(d) D20 was an experimental report which was filed in support of a new objection of lack of sufficiency of disclosure raised for the first time in appeal. There was no reason why said objection and/or that document could not have been filed already during the opposition proceedings. For that reason, D20 should be not admitted into the proceedings.

Auxiliary request IV - Sufficiency of disclosure

(e) The patent in suit contained sufficient information how to carry out the invention. In particular, the validity of the examples of the patent in suit was not disputed. In addition, appellant 2's objections regarding lack of sufficiency of disclosure were merely directed to the broadness of the claims, which was at most an issue of inventive step. For these reasons, appellant 2's objections regarding lack of sufficiency of disclosure should be rejected.

Auxiliary request IV -Inventive step

(f) The argument put forward in writing that D1 was not a suitable closest prior art was not pursued any longer at the oral proceedings before the Board. Rather, it was then acknowledged that either D1 or D5 constituted suitable closest prior art documents, whereby the power cables according to page 15 of D1 and the one prepared in the experimental part of D5 were particularly relevant.

The subject-matter of operative claim 1 differed from each of these closest prior art disclosures at least in that the polyolefin defined therein was a polyethylene copolymer and not a polyethylene homopolymer.

The technical problem solved over D1 and/or D5 was to provide an advantageous power cable for DC applications.

Neither D1 nor D5 disclosed HDPE copolymers and could lead to the subject-matter being claimed in an obvious manner. The combination of D1 or D5 with D16, D6 or D7, which was relied upon by appellant 2, was based on hindsight, which was not allowable.

For these reasons, the subject-matter of auxiliary request IV was not obvious starting from either D1 or D5 as closest prior art and an inventive step should be acknowledged.

XIII. Appellant 2's submissions, in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

Main request - Novelty over D1

(a) The subject-matter of claim 1 of the main request was anticipated by the power cable depicted on page 15 of D1, comprising an insulation layer made of product HFDB-4201 SC. The evidence provided by appellant 2 showed that said composition satisfied the requirements in terms of electric conductivity defined in operative claim 1, whereby the discrepancies in properties relied upon by

appellant 1 were due to inevitable fluctuations between batches.

In appellant 2's view, should a sample of resin HFDB-4201 SC be available, it could be analysed and reproduced without any difficulty in so far as the features of claim 1 were concerned. Should the Board arrive at the conclusion that the criteria for the reproducibility of the composition of product HFDB-4201 SC within the meaning of G 1/92 went further than reproducing the features defined in operative claim 1, a referral to the Enlarged Board of Appeal would be necessary in view of the diverging case law in that regard, reference being made to T 952/92 (OJ EPO 1995, 755).

Auxiliary requests I to III - Novelty over D1

(b) The cable depicted in D1 was suitable for DC applications. Therefore, the amendment "direct current" did not distinguish the subject-matter of claim 1 of auxiliary request I from the power cable disclosed in D1. Consequently, auxiliary request I was not novel for the same reasons as outlined for claim 1 of the main request.

(c) The subject-matter of claim 1 of auxiliary requests II and III was not novel over D1 for the same reasons as claim 1 of the main request and auxiliary request I, respectively.

Document D20 - Admittance

(d) D20 was an experimental report which was filed in appeal in relation to an objection of lack of sufficiency of disclosure which was already raised

during the opposition proceedings. It was further filed in reaction to the opposition division's argument that the opponent's objection lacked substantiation. It was further filed in reaction to a statement made for the first time by the patent proprietor during the oral proceedings in front of the opposition division that merely using a mineral oil as the compressor lubricant provided the claimed electrical conductivity. For these reasons, D20 should be admitted into the proceedings.

Auxiliary request IV - Sufficiency of disclosure

(e) Considering the broadness of the operative claims and the few examples contained in the patent in suit, the teaching of the patent in suit was insufficient to show that the invention being claimed could be carried out over the whole breadth of the claims. In particular, the use of a mineral oil compressor lubricant did not mandatorily give the required conductivity. Therefore, the requirements of sufficiency of disclosure were not met.

Auxiliary request IV - Inventive step

(f) Either D1 or D5 constituted suitable closest prior art documents, whereby the power cables according to page 15 of D1 and the one prepared in the experimental part of D5 were particularly relevant.

The subject-matter of operative claim 1 differed from each these closest prior art disclosures at least in that the polyolefin defined therein was a polyethylene copolymer and not a polyethylene homopolymer.

The technical problem solved over D1 and/or D5 was merely to provide an alternative power cable suitable for use as DC cable.

It was obvious to solve that problem in view of the teaching of D5 alone, which was not limited to LDPE homopolymers, or of the combination of either D1 or D5 with D16, D6 or D7.

For these reasons, the subject-matter of operative claim 1 was not inventive.

XIV. Appellant 1 requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of the claims of the main request or of auxiliary request I, filed with its statement of grounds of appeal, of auxiliary request II filed with its letter of 18 June 2018, of auxiliary request III filed with its statement of grounds of appeal, or of any of auxiliary requests IV to XI filed with its letter of 18 June 2018, auxiliary request IV corresponding to the claims allowed by the opposition division.

Appellant 2 requested that the decision under appeal be set aside and that the patent be revoked.

Reasons for the Decision

Main request

1. Novelty over D1

1.1 The picture at the bottom of page 15 of D1 shows a power cable comprising a conductor surrounded by several layers, in particular a layer described to be an insulation layer made e.g. of product HFDB-4201 SC, which is according to page 11 of D1 a crosslinked polyethylene composition specially well suited for high voltage applications.

1.2 In the decision under appeal (sections 12.3 and 12.4 of the reasons), novelty over said power cable according to D1 was denied "*in view of the Proprietor's assertion that the use of a mineral oil compressor lubricant gives the required conductivity*" and of the information provided in D1, D2 and D2a-D2e, which showed that "*the HFDB-4201 SC commercial product disclosed in D1 as an insulating layer of a power cable and provided to customers*" before the effective date of the patent in suit was "*consistently prepared (...) by a process in which a polyolefin undergoes high pressure polymerisation using a mineral oil as a compressor lubricant*".

1.3 In that respect, the availability of commercial product HFDB-4201 SC before the priority date of the patent in suit was not contested during the appeal proceedings and the Board has no reason to deviate from that view.

1.4 According to appellant 2, product HFDB-4201 SC referred to a crosslinkable composition comprising a low-density

polyethylene homopolymer produced in a high pressure polymerisation process as base resin, a specific peroxide, white mineral oil in an amount of 0-0.08 wt% and antioxidants of an unknown nature (appellant 2's letter of 15 June 2018: page 11, last full paragraph, with reference to D2, D2b, D2e, D2f and D2h; page 12, first paragraph).

1.5 In the Board's communication (section 6.2), considering that the polymer composition according to operative claim 1 is defined as a product-by-process ("wherein the polyolefin is obtainable by a high pressure process comprising (a) ..., (b) ..., (c) ..., wherein in step (a) the compressor lubricant comprises a mineral oil"), the question was raised, in view of apparently contradictory statements made by the parties and/or present in some prior art documents, if the mineral oil specified in operative claim 1 effectively characterised the subject-matter being claimed.

In that respect, both parties put forward that in practice it could not be avoided that some lubricant inevitably leaks into the process stream and ends up in the polymer composition being prepared (appellant 1: in section 25 of its letter of 16 November 2021, it was stated that "no leak" was a theoretical situation, which was confirmed by the statement at the oral proceedings before the Board that some lubricant in practice always leaked into the polymer composition; appellant 2: see statement of grounds of appeal: middle of the third paragraph on page 7 in relation to the process used for preparing the low density polyethylene homopolymer contained in HFDB-4201 SC and penultimate paragraph on page 8; letter of 15 June 2018: last full paragraph, fifth line from the bottom). This view is further confirmed by D7, which is a textbook on

lubricants, whereby the passages relied upon are especially directed to compressor lubricants in high pressure process for making polyolefins, i.e. it precisely deals with a process specified in operative claim 1.

1.6 In view of the above and evidence D2, it is concluded that the low density polyethylene homopolymer contained in product HFDB-4201 SC is prepared using a mineral oil compressor lubricant and that traces of mineral oil are present both in the low density polyethylene homopolymer and product HFDB-4201 SC whose prior use is invoked.

1.7 The conclusion of the opposition division that in view of the patent proprietor's statement the electrical conductivity of the polymer composition HFDB-4201 SC was bound to be achieved since said product was prepared using a mineral oil compressor lubricant was not contested by appellant 1 in appeal.

In addition, the preliminary opinion of the Board that it appeared to be derivable from all the evidence on file that the electrical conductivity of resin HFDB-4201 SC was in the range defined in operative claim 1 and did not change over time, and that the discrepancies among some of the resin’s properties indicated by appellant 1 appeared to be due to inevitable fluctuations between batches, was also not contested any further by appellant 1, in particular at the oral proceedings before the Board. Under such circumstances, there is no reason for the Board to deviate from that preliminary view.

In view of the above, the feature defining that the polymer composition should have an electrical

conductivity of 0.50 x 10^{-15} S/m or less cannot constitute a feature distinguishing the subject-matter of operative claim 1 from the power cable depicted at the bottom of page 15 of D1.

1.8 In view of appellant 1's argument (sections 32-34 of its letter of 18 June 2018) that no one reading D1 would be aware that a mineral oil was used for producing the low density polyethylene homopolymer and that there was no evidence that anyone in possession of product HFDB-4201 SC could even determine that a mineral oil was used, the question was raised by the Board in its communication if the composition of a sample of HFDB-4201 SC could be held to belong to the state of the art in the light of opinion G 1/92 (headnote and reasons 1.4). According to opinion G 1/92 the chemical composition of a product is state of the art when the product as such is available to the public and can be analysed and reproduced by the skilled person, irrespective of whether or not particular reasons can be identified for analysing the composition, i.e. a necessary condition for the chemical composition of a product to belong to the state of the art is that it may be reproduced without undue burden by the skilled person.

However, appellant 1 did not contest any longer at the oral proceedings before the Board that, should a sample of HFDB-4201 SC have been available before the priority date of the patent in suit (which remained undisputed), said sample could be analysed by usual techniques, whereby the presence of a mineral oil could be determined without any difficulty. Therefore, the fact that product HFDB-4201 SC can be analysed without any difficulties, whereby the presence of a mineral oil would be detected and would obviously be present for

the skilled person as the result of its use as compressor lubricant in a high pressure polymerisation process (see section 1.5 and 1.6 above), is in the present case not contested. In addition, it was also acknowledged by appellant 1 during the oral proceedings before the Board that, in view of the statement of paragraph 48 of the patent in suit ("The high pressure (HP) polymerisation and the adjustment of process conditions for further tailoring the other properties of the polyolefin depending on the desired end application are well known and described in the literature, and can readily be used by a skilled person.") and taking into account the above conclusion regarding the analysability of product HFDB-4201 SC, the skilled person would have no difficulty to reproduce said product and not only to the level of what is being claimed. Under these circumstances, the existence of a lack of uniformity of the case law following the publication of opinion G 1/92 invoked by appellant 2 is not decisive for the outcome of the present case, since taking a strict standard for the reproducibility of HFDB-4201 SC or less demanding standards as set out in decision T 952/92 leads to the same conclusion, namely that product HFDB-4201 SC can not only be analysed, but also reproduced.

Under these circumstances, there is no reason to consider that the composition of product HFDB-4201 SC does not form part of the prior art pursuant to Article 54(2) EPC in view of the criteria set out in opinion G 1/92.

1.9 In view of the above, the power cable depicted at the bottom of page 15 of D1 fulfills all the requirements set out in claim 1 of the main request. The subject-matter of claim 1 of the main request therefore lacks

novelty (Article 54(2) EPC) and, for that reason, the main request is not allowable.

Auxiliary requests I to III - Novelty over D1

2. Auxiliary request I

2.1 Auxiliary request I corresponds to the main request in which the subject-matter of claim 1 was limited to direct current (DC) power cables.

2.2 However, no evidence was provided by appellant 1 to refute appellant 2's argument (see letter of 11 April 2019: page 6, sixth paragraph) and/or the opposition division's finding (decision under appeal: section 15.2 of the reasons) that there was no key structural difference between AC and DC cables. In particular, no such evidence was submitted in reaction to the Board's communication in which said issue was identified (section 9.1). To the contrary, questioned by the Board at the oral proceedings, appellant 1 even stated that one could not look at AC and DC cables and tell any difference. At the oral proceedings before the Board, it was further clarified with appellant 1 that apart from the difference regarding the nature of the insulation layer, no other structural or compositional difference between an AC or DC cable was derivable from the disclosure of D21. Considering that it was concluded above that the layer of low electrical conductivity defined in claim 1 of the main request was anticipated by the insulating layer obtained with product HFDB-4201 SC according to D1, D21 was not shown to support appellant 1's argument that the amendment "direct current (DC)" made in claim 1 of auxiliary request I constitutes any additional distinguishing feature over the disclosure of the power cable at the

bottom of page 15 of D1.

2.3 In view of the above, the denomination "DC cable" is seen as a mere indication of an intended use, which does not introduce any functional or structural feature as compared to claim 1 of the main request. Therefore, auxiliary request I can only share the same fate as the main request and is not novel over D1 (Article 54(2) EPC).

3. Auxiliary requests II and III

3.1 Claim 1 of auxiliary requests II and III correspond to claim 1 of the main request and of auxiliary request I, respectively, whereby the polyolefin is defined in more detail, whereby said polyolefin may be a LDPE homopolymer.

3.2 As acknowledged by appellant 1 at the oral proceedings before the Board, considering that according to D2, the polyolefin contained in product HFDB-4201 SC of the insulation layer of the power cable depicted at the bottom of page 15 of D1 is a LDPE homopolymer (D2: page 1, sixth and seventh paragraphs: see information related to base resin DXM 446), claim 1 of auxiliary requests II and III is not novel for the same reasons as outlined above for claim 1 of the main request and auxiliary request I, respectively.

3.3 In view of the above, there is no need to address the issue of the admittance of auxiliary requests II and III, which was contested by appellant 2.

Auxiliary request IV

4. Admittance of D20

4.1 D20 is an experimental report on conductivity tests of various polymers and was filed in support of appellant 2's arguments regarding the objections of lack of sufficiency of disclosure (see e.g. page 3, fifth paragraph of the statement of grounds of appeal), which did not convince the opposition division. D20 was held to show that the low conductivity defined in operative claim 1 was not necessarily obtained when the compressor lubricant comprised a mineral oil for a specific kind of copolymers also defined in said claim 1, namely copolymers which contained a large amount of polar comonomers. Although primarily filed in respect of sufficiency of disclosure, D20 was further used in support of an objection of lack of inventive step (claimed effect not achieved on the whole scope of the claims: see page 9, fourth paragraph of the statement of grounds of appeal).

4.2 Appellant 2 argued that D20 was filed in reaction to the opposition division's decision (statement of grounds of appeal: page 4, second full paragraph).

4.2.1 However, an objection of lack of sufficiency of disclosure based on the fact that a composition according to operative claim 1 and having a low electrical conductivity as defined therein could not be prepared using some polyolefins taught in the patent in suit, in particular unsaturated LDPE copolymers comprising a large amount of polar comonomers, was not submitted during the opposition proceedings.

4.2.2 In its letter of 10 August 2020 (page 2, second paragraph) and at the oral proceedings before the Board, appellant 2 argued that it did already put forward such an objection during the opposition proceedings, whereby reference was made to its letter of 4 May 2017 (page 3, third paragraph). However, even if that submission were to be read as put forward by appellant 2 as being related to an objection that the invention was not disclosed so that it could be carried out on the whole breadth of the claims (appellant 2's letter of 10 August 2020: middle of page 2, where reference is made to the question of working "throughout the scope of the claims"), no reference was made therein to any difficulty of carrying out the invention when using polar comonomers according to the objection presented in the statement of grounds of appeal. Therefore, that argument is rejected.

4.2.3 In addition, it is noted that in the opposition division's preliminary opinion, which was communicated to the parties well in advance of the oral proceedings (26 October 2016 vs. 7 July 2017) it was already indicated that the opponent's objections of lack of sufficiency of disclosure were not backed up by any evidence (section 6.2.3). Therefore, appellant 2 not only could have filed D20 (and the objection based thereon) already during the opposition stage but he would even have had good reasons to do so.The same is valid regarding the use of D20 in support of an objection of lack of inventive step. If appellant 2 contemplated arguing that an alleged effect was not present on the whole scope of the claims, any evidence in that respect should have been filed as soon as possible, i.e. already at the opposition stage.

4.2.4 In that regard, it is further noted that since copolymers were explicitly disclosed in claim 3 as granted, there is no reason why appellant 2's objections based on D20, which are directed to an alleged lack of sufficiency of disclosure or lack of inventive step for a certain kind of copolymers, could not have been made earlier, in particular during the opposition proceedings.

4.2.5 Under these circumstances, the argument that D20 was filed to answer a point raised by the opposition division is not persuasive.

4.3 Appellant 2 further argued that D20 was filed in reaction to an argument put forward by appellant 1 for the first time at the oral proceedings before the opposition division (appellant 2's letter of 11 April 2019: page 3, first full paragraph), that the low conductivity specified in claim 1 of auxiliary request IV was directly linked to the use of a mineral oil as compressor lubricant (see minute of the oral proceedings before the opposition division: section 2.1).

However, this statement merely confirmed the teaching of the patent in suit according to which a mineral oil compressor lubricant would be highly advantageous to keep a low DC electrical conductivity (paragraph 19, to be read in the light of paragraphs 4 to 9). It does however not mean that this is the sole factor on which the DC conductivity depends. Such a statement was not made by the patent proprietor. In addition, considering that the use of a mineral oil as compressor lubricant was a technical feature of claim 1 as granted and was therefore at stake from the beginning of the opposition proceedings, the Board considers that, should the

opponent have had any concerns that the electrical conductivity specified in operative claim 1 could not be achieved for certain copolymers defined in that claim, evidence in support of that objection should have been filed already during the opposition proceedings.

4.4 In view of the above, the statement made by the patent proprietor during the oral proceedings which was relied upon by appellant 2 cannot justify the filing of D20 for the first time together with appellant 2's statement of grounds of appeal.

4.5 For these reasons, the filing of D20 cannot be held to be justified by an unexpected development of the case at the oral proceedings before the opposition division but rather constitutes the basis for a new line of argumentation, which is raised by appellant 2 for the first time in appeal. Under these circumstances, the Board finds it appropriate to make use of its power to hold D20 inadmissible pursuant to Article 12(4) RPBA 2007 (see Article 25(2) RPBA 2020).

5. Sufficiency of disclosure

5.1 Appellant 2 submitted that claims 1 and 7 of auxiliary request IV lacked sufficiency of disclosure.

5.2 In order to meet the requirements of sufficiency of disclosure, an invention has to be disclosed in a manner sufficiently clear and complete for it to be carried out by the skilled person, without undue burden, on the basis of the information provided in the patent specification, if needed in combination with the skilled person's common general knowledge. Having regard to the objection of appellant 2, the question

therefore arises whether it was shown that the skilled person is not in the position to prepare a DC power cable as defined in claim 1 or to use a polymer composition according to claim 7 of auxiliary request IV.

5.3 Appellant 2 disagrees with the findings of the opposition division that, in the absence of any substantiated reasons why the skilled person following the disclosure of the patent in suit would be unable to provide the claimed subject-matter and in view of the patent proprietor's statement that the use of a mineral oil compressor lubricant gave a polymer composition having the required conductivity, the requirements of sufficiency of disclosure were met (reasons of the decision: sections 20.1 and 11.3).

5.4 Appellant 2 argued in essence that the use of a mineral oil compressor lubricant did not mandatorily give the required conductivity, contrary to the conclusions of the opposition division (appellant 2’s statement of grounds of appeal: bottom of page 2).

5.4.1 However, according to EPO case law, an objection of insufficient disclosure presupposes that there are serious doubts, substantiated by verifiable facts, and the burden of proof is primarily on the opponent, here appellant 2 (Case Law of the Boards of Appeal of the EPO, 9th edition, 2019, II.C.9).

5.4.2 Considering that appellant 2’s objection that the electrical conductivity specified in granted claim 1 may not be achieved when various additives are present (appellant 2’s statement of grounds of appeal: page 3, first paragraph) is not based on any evidence, it provides no cause for the Board to overturn the

opposition division’s conclusion in respect of sufficiency of disclosure (sections 20 and 11.3 of the reasons of the decision under appeal). As noted by appellant 1, the composition of operative claim 1 is openly defined through the use of the word "comprising" but nevertheless comprises a limitation for the electrical conductivity. Therefore, the Board agrees with appellant 1 that said claim 1 should not be construed as covering embodiments which are manifestly incompatible with the provision of a composition having low conductivity (rejoinder: section 11).

5.4.3 The same is valid regarding the objection that the patent in suit contains too few examples illustrating the subject-matter being claimed (appellant 2’s statement of grounds of appeal: page 3, second paragraph).

5.4.4 Considering that D20 is not admitted into the proceedings (see sections 4 above), there is no need for the Board to address appellant 2’s objections relying thereon.

5.4.5 In view of the above, appellant 2's arguments provide no reason for the Board to overturn the opposition division’s decision regarding sufficiency of disclosure.

6. Inventive step

6.1 Closest prior art

6.1.1 Considering that the objection of lack of inventive step starting from D16 as the closest prior art was not pursued by appellant 2 during the oral proceedings before the Board (see section XI above), the sole

objections of lack of inventive step that need to be addressed in the present decision are the ones starting from either D1 or D5 as the closest prior art document.

6.1.2 Considering that both parties and the opposition division read the content of D5, which is in Japanese, on the basis of its English translation D5a, the passages of D5 indicated in the following refer to the corresponding passages of D5a.

6.1.3 According to the decision under appeal (section 21.3), either D1 or D5 constituted suitable closest prior art documents. That view was adhered to by appellant 2 (statement of grounds of appeal: page 4, penultimate full paragraph). Although appellant 1 first considered in writing that only D5 - but not D1 - was a suitable closest prior art (statement of grounds of appeal: sections 32-34 and 36), that view was not pursued any longer at the oral proceedings before the Board, whereby both documents were held to constitute suitable starting points for the assessment of inventive step.

6.1.4 According to EPO case law, the closest prior art for assessing inventive step is a prior art disclosing subject matter conceived for the same purpose or aiming at the same objective as the claimed invention and having the most relevant technical features in common, i.e. requiring the minimum of structural modifications (Case Law, *supra*, I.D.3.1).

a) In that respect, it is agreed that D5 is a suitable closest prior art document, since it aims at the same objectives as the patent in suit, namely to provide power cables with good electrical properties, i.e. good insulating properties (patent in suit: paragraphs 4 to 6, 10 to 13, 16, 19, 79-80; D5: paragraphs 3 and 5 to

7).

b) D1 is concerned with high voltage wire and cable products (page 2, first paragraph) comprising high performance insulating materials (top of page 11; page 12, paragraph in the left hand side column; paragraph on page 13; power cable on page 15). In particular, it was shown in section 1 above that the insulation layer HFDB-4201 SC of the power cable depicted at the bottom of page 15 had a low electrical conductivity as defined in operative claim 1 (which cable was shown to anticipate claim 1 of the main request). Under these circumstances, it cannot be concluded that D1 is a prior art disclosure which is irrelevant to the claimed subject-matter in the sense that it does not mention a problem that is at least related to the ones derivable from the patent specification. In particular, the Board is satisfied that D1 represents a promising starting point for the skilled person aiming at solving the technical problems set out in the patent specification

c) Under these circumstances, there is no reason for the Board to deviate from the parties' view that both D1 and D5 constitute suitable closest prior art documents.

6.1.5 In particular, the power cable depicted on page 15 of D1 and the power cable prepared in paragraphs 16 and 17 of D5 constitute promising starting points for the assessment of inventive step.

6.2 Distinguishing feature(s)

It was undisputed that

- the polymer composition HFDB-4201 SC used for obtaining the insulating layer of the power cable depicted on page 15 of D1 comprised a LDPE homopolymer as base polymer (as outlined in section 1 above in respect of novelty of the main request); and

- the insulating composition of the power cable disclosed in the experimental part of D5 (paragraph 17) uses as a base polymer a polyethylene produced via a high-pressure method involving compressing ethylene gas, i.e. the base polymer is made up of ethylene as the sole monomer.

Therefore, the subject-matter of operative claim 1 at least differs from the above indicated power cables according to D1 and D5 in that the polyolefin defined therein is a LDPE copolymer, whereas the ones according to the above indicated disclosures of D1 and D5 is a LDPE homopolymer.

6.3 Problem effectively solved over the closest prior art

The appellants disagreed how the technical problem solved over D1 and/or D5 should be formulated. Whereas appellant 1 considered that the problem successfully solved over the closest prior art was the provision of an advantageous power cable for DC applications, appellant 2 formulated the problem solved as the mere provision of further power cables suitable for use as DC cables. However, considering that the Board concluded that an inventive step is present independently of the formulation of that problem (see section 6.4 below), it is sufficient in the present case to address the less ambitious problem formulated

by appellant 2.

6.4 Obviousness

6.4.1 Considering that neither D1 nor D5 explicitly disclose the use of LDPE copolymers for preparing a layer as defined in operative claim 1, the question remains to be answered if the skilled person, desiring to solve the above problem, would find it obvious to modify the disclosures of the closest prior art in such a way so as to arrive at the claimed subject matter, i.e. whether the replacement of the LDPE homopolymer disclosed in D1 or D5 by a LDPE copolymer would be obvious. In that respect, the opposition division already held that such a modification was not obvious (reasons of the decision under appeal: page 12, second and third paragraphs).

6.4.2 Regarding D1, it was not shown that that document contains any disclosure that would have motivated the skilled person to use a LDPE copolymer instead of the LDPE homopolymer comprised in product HFDB-4201 SC of the insulating layer of the power cable depicted on page 15 thereof.

6.4.3 Regarding D5, appellant 2 put forward that although D5 did not explicitly disclose the use of LDPE copolymers for preparing the insulating layer taught therein, it did not exclude the use of such copolymers (statement of grounds of appeal: page 9, second paragraph and page 12, second paragraph; the argument was further pursued at the oral proceedings before the Board). Therefore, its teaching encompassed LDPE copolymers and it would be obvious to replace the LDPE homopolymer used in the experimental part by a LDPE copolymer, so appellant 2.

However, information regarding the nature of the polymers to be used for the insulating layer taught in D5 may be found in claim 1, in paragraph 7 and in the experimental part (paragraphs 10, 16 and 17) of D5. In that regard, claim 1 and paragraph 7 of D5 are directed to an insulating composition using polyethylene as a base polymer, wherein the polyethylene is produced via a high-pressure method involving compressing ethylene gas, i.e. the base polymer is made up of ethylene as the sole monomer. Also in the experimental part of D5 (paragraph 17), the insulating composition is prepared using ethylene as single monomer. Considering that nowhere in D5 reference is made to an insulating layer prepared using a polyethylene copolymer, appellant 2's view that the teaching of D5 encompassed insulating layers prepared using such a copolymer is not shared by the Board. Under these circumstances, using a LDPE copolymer to prepare the insulating layer according to D5 as contemplated by appellant 2 can only be based on hindsight, which is not allowable.

6.4.4 Appellant 2's objection of lack of inventive step was further based on the combination of either D1 or D5 with D16.

a) In that respect, D16 is directed to crosslinkable polymer compositions comprising an unsaturated polyolefin, a scorch retarder and a crosslinking agent and to the use thereof for making a layer of a power cable (claims 1 and 21-24), wherein the voltage applied can be alternating (AC), direct (DC) or transient (impulse) (see paragraph 50 of D10). The polyolefin is preferably a copolymer of ethylene or polypropylene (paragraphs 21-23) and is preferably prepared by a high pressure polymerisation process (paragraph 27). The

composition may be used as semiconductive or insulating layer (paragraph 58). Specific polyolefin compositions comprising a LDPE homopolymer or a LDPE copolymer prepared using a high pressure polymerisation process are disclosed in the examples (D16: paragraphs 83-89, whereby polymers 1 and 2 are polyethylene copolymers and polymer 3 is an ethylene homopolymer; the polymerisation process is indicated in paragraph 86 and the fact that LDPE are produced is derivable from the density indication also provided in paragraph 86 of D16).

b) However, whereas the disclosures of D1 and D5 considered above as starting point for the assessment of inventive step are specifically directed to the preparation of insulating layers for power cables, D16 is generally directed to the preparation of cable layers with either semiconductive or insulating properties (paragraph 58). However, no information regarding the electrical properties of the compositions prepared in D16, in particular in the examples thereof, is disclosed therein or was provided by the parties. In addition, D16 is not concerned with the achievement of a specific level of insulation, let alone in relation to DC, but with the prevention of scorch (D16: paragraphs 9, 91 and 92), as stressed by appellant 1. For that reason, it cannot be concluded that D16 provides any motivation to use a LDPE copolymer instead of a LDPE homopolymer to prepare an insulating layer of a power cable that may be suitably used for DC applications. This is particularly true for the compositions prepared in the examples of D16, in particular with polymers 1 and 2 which are specific ethylene copolymers, which were not shown to have the insulating properties as the ones taught in the disclosures of D1 or D5 considered as closest prior

art. Under these circumstances, the modification of the disclosures of either D1 or D5 on the basis of D16 to solve the problem of providing a further cable suitable for DC applications is not obvious, as already concluded by the opposition division. Rather, in the Board's view, such a combination can only be based on hindsight, which is not allowable.

6.5 Appellant 2 further relied in writing on the combination of D1 or D5 with either D6 or D7 (statement of grounds of appeal: page 9, first two paragraphs; letter of 11 April 2019: bottom of page 9).

6.5.1 The passages of D6 which were relied upon by appellant 2 were claim 5, page 1, lines 15-18 and page 2, line 6.

In that respect, claim 5 of D6 is directed to the nature of the polyolefin comprised as a component of the lubricating oil object of the invention of D6 and not to a polyolefin prepared by a high pressure polymerisation process according to the disclosures of D1 or D5 constituting the above identified closest prior art. In addition, the passage at page 1, lines 15-18 of D6 concerns general background information regarding the preparation of low density homo- and copolymers of ethylene by a high pressure polymerisation process. However, it does not disclose that those copolymers are suitable for forming an insulation layer in cables, let alone under DC conditions. The same is valid regarding the passage at page 2, line 6 of D6, which merely discloses some drawbacks for cable applications related to the use of polyglycol lubricating agents. In view of the above, it is agreed with appellant 1 that D6 provides no hint that it would be obvious to replace the polyethylene

homopolymers used in the insulating layer of the power cables according to the closest prior art disclosures of D1 or D5 by polyethylene copolymers (letter of 18 June 2018: sections 50 and 81).

6.5.2 The passages of D7 which were relied upon by appellant 2 were taken from the first full paragraph on the last page of D7 (page 377: paragraph starting with "In general, ...").

However, that passage of D7 merely refers to the use of polybutenes as lubricants in particular in the manufacture of ethylene/vinyl acetate copolymers. Thus that passage of D7 is neither related to power cables, nor to insulating layers and cannot provide any hint that it would be obvious to replace the polyethylene homopolymers used in the insulating layer of the power cables according to the closest prior art disclosures of D1 or D5 by polyethylene copolymers (appellant 1's letter of 18 June 2018: sections 51 and 82).

6.5.3 For these reasons, the combination of D1 or D5 with either D6 or D7 do not render the subject-matter of operative claim 1 obvious.

6.6 In view of the above, the subject-matter of claim 1 of auxiliary request IV is inventive starting from either D1 or D5 as the closest prior art document, even in combination with D16, D6 or D7.

6.7 Since no additional or separate line of argumentation was put forward by appellant 2 in respect of any other claims of auxiliary request IV, the subject-matter of these claims is inventive for the same reasons as claim 1.

7. Considering that auxiliary request IV is identical to auxiliary request III which was allowed by the opposition division and that none of appellant 2's objections raised against said auxiliary request IV are successful, both appeals are to be dismissed.

Order

For these reasons it is decided that:

The appeals are dismissed

The Registrar: The Chairman:

B. ter Heijden F. Rousseau

Decision electronically authenticated