Internal distribution code:

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

Datasheet for the decision of 13 January 2022

Case Number: T 2395/17 - 3.3.03

Application Number: 10771774.6

Publication Number: 2499175

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

Language of the proceedings: EN

Title of invention:
A POLYMER COMPOSITION AND A POWER CABLE COMPRISING THE POLYMER COMPOSITION

Patent Proprietor:
Borealis AG

Opponent:
The Dow Chemical Company

Relevant legal provisions:
EPC Art. 56, 100(b), 123(2)
RPBA Art. 12(4), 13(1)

Keyword:

Amendments - allowable - main request (no)
Late-filed requests - admitted (no)
Late-filed evidence - admitted (no)
Grounds for opposition - insufficiency of disclosure (no)
Inventive step - auxiliary request IV (yes)

Decisions cited:

G 0007/93

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 2395/17 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 13 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 11 August 2017 concerning maintenance of the European Patent No. 2499175 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 11 August 2017 concerning maintenance of European Patent No. 2 499 175 in amended form according to the claims of auxiliary request I filed with letter of 1 June 2017 and an adapted description. The decision under appeal was also based on the patent as granted as main request.

II. Claims 1, 3, 9 and 10 of the application as filed read as follows:

"1. A polymer composition which is crosslinkable, wherein the polymer composition comprises a polyolefin and a crosslinking agent, and wherein the polymer composition has an electrical conductivity of 150 fS/m or less, when measured at 70 °C and 30 kV/mm mean electric field from a non-degassed, 1 mm thick plaque sample consisting of a crosslinked polymer composition according to DC conductivity method (1) as described under "Determination methods"."

"3. The polymer composition of claim 1 or 2, wherein the polyolefin is obtainable by a high pressure process comprising

(a) compressing one or more monomer(s) under pressure in a compressor, using a compressor lubricant 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."

"9. The polymer composition according to any of the preceding claims, wherein the polyolefin is a saturated LDPE homopolymer or a saturated LDPE copolymer of ethylene with one or more comonomer(s); or an unsaturated LDPE polymer, which is selected from an unsaturated LDPE homopolymer or an unsaturated LDPE copolymer of ethylene with one or more comonomer(s)."

"10. The polymer composition according to any of the preceding claims, wherein the polyolefin is an unsaturated LDPE polymer, which is selected from an unsaturated LDPE homopolymer or an unsaturated LDPE copolymer of ethylene with one or more comonomer(s), and comprises a total amount of carbon-carbon double bonds/1000 carbon atoms of more than 0.4/1000 carbon atoms, preferably the total amount of carbon-carbon double bonds present in the unsaturated LDPE is the amount of vinyl groups, vinylidene groups and *trans*-vinylene groups, if present, more preferably the unsaturated LDPE polymer contains vinyl groups and the total amount of vinyl groups present in the unsaturated LDPE is preferably higher than 0.05/1000 carbon atoms, still more preferably higher than 0.08/1000 carbon atoms, and most preferably higher than 0.11/1000 carbon atoms."

In addition the passages on page 14, lines 1 to 6 and the sentence on page 16, lines 13-16 read,

respectively, as follows:

"The Polymer composition, preferably the polyolefin component thereof, more preferably the LDPE polymer, may optionally be unsaturated, i.e. the polymer composition, preferably the polyolefin, preferably the LDPE polymer, may comprise carbon-carbon double bonds. The "unsaturated" means herein that the polymer composition, preferably the polyolefin, contains carbon-carbon double bonds/1000 carbon atoms in a total amount of at least 0.4/1000 carbon atoms."

"Accordingly, the polyolefin is preferably unsaturated and contains at least vinyl groups and the total amount of vinyl groups is preferably higher than 0.05/1000 carbon atoms, still more preferably higher than 0.08/1000 carbon atoms, and most preferably of higher than 0.11/1000 carbon atoms."

III. 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

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

D10: EP 1 695 996 A1

D12: Olsson et al., Experimental Determination of

DC Conductivity for XLPE Insulation, Nordic Insulation Symposium 2009 (Nord-IS 09), Gothenburg, Sweden, 15-17 June 2009, 55-58

D13: R. Bodega, Space Charge Accumulation in Polymeric High Voltage DC Cable Systems, Ph.D. Thesis, Technical University Delft, ISBN 90-8559-228-3, 2006, pp. vii, ix-xii, 9-12, 75-89

D17: Data Sheet for Shell Corena E 150, 13 February 2017

D18: Data Sheet for Mobil Rarus™ PE KPL 201, 01-2017

IV. Claim 1 of the **main request** read as follows:

"1. A polymer composition which is crosslinkable, wherein the polymer composition comprises a polyolefin and a crosslinking agent, and wherein the polymer composition has an electrical conductivity of 150 fS/m or less, when measured at 70 °C and 30 kV/mm mean electric field from a non-degassed, 1 mm thick plaque sample consisting of a crosslinked polymer composition according to DC conductivity method (1) as described under "Determination methods"; and

wherein the polyolefin is an unsaturated LDPE polymer, which is selected from an unsaturated LDPE homopolymer or an unsaturated LDPE copolymer of ethylene with one or more comonomer(s), and wherein the unsaturated LDPE polymer contains vinyl groups and the total amount of vinyl groups present in the unsaturated LDPE is higher than 0.05/1000 carbon atoms, and

wherein the polyolefin is obtainable by a high pressure process comprising

(a) compressing one or more monomer(s) under pressure in a compressor, using a compressor lubricant 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."

The description of the granted patent further differed from the description of the application as filed in that several passages thereof had been amended. In particular paragraph 58 and the first sentence of paragraph 69 read as follows (as compared to the passages on page 14, lines 1 to 6 and to the sentence on page 16, lines 13-16 of the application as filed, respectively, additions are indicated in **bold**, deletions in ~~strikethrough~~):

"[0058] The ~~Polymer composition, preferably the polyolefin component thereof, more preferably the~~ LDPE polymer~~, may optionally be~~ **is** unsaturated, i.e. ~~the polymer composition, preferably the polyolefin, preferably the~~ LDPE polymer~~, may~~ comprise**s** carbon-carbon double bonds. The "unsaturated" means herein that ~~the polymer composition, preferably the polyolefin, contains carbon-carbon double bonds/ 1000 carbon atoms in a total amount of at least 0.4/1000 carbon atoms~~ **the unsaturated LDPE polymer contains vinyl groups, and the total amount of vinyl groups present in the unsaturated LDPE is higher than**

0.05/1000 carbon atoms."

"[0069] Accordingly, the polyolefin is ~~preferably~~ unsaturated and contains at least vinyl groups and the total amount of vinyl groups is ~~preferably~~ higher than 0.05/1000 carbon atoms, ~~still more~~ preferably higher than 0.08/1000 carbon atoms, and most preferably of higher than 0.11/1000 carbon atoms."

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

"wherein the polyolefin is ~~an unsaturated LDPE polymer, which is selected from an unsaturated LDPE homopolymer or~~ an unsaturated LDPE copolymer of ethylene with one or more comonomer(s), and wherein the unsaturated LDPE **co**polymer **comprises a total amount of carbon-carbon double bonds/1000 carbon atoms of more than 0.4/1000 carbon atoms, and** contains vinyl groups and the total amount of vinyl groups present in the unsaturated LDPE is higher than 0.05/1000 carbon atoms, and"

The remaining claims of auxiliary request I were directed to:

- Further embodiments of the polymer composition according to claim 1 (dependent claims 2-9);

- Polymer compositions according to claims 1-9 which have been crosslinked (claims 10-11);

- The use of polymer compositions according to claims 1-9 for producing at least one layer of a crosslinkable power cable (claim 12);

- A crosslinkable power cable or a crosslinked power cable comprising a conductor surrounded by at least one insulation layer, the latter comprising the polymer composition according to claims 1-9 or 10-11, respectively (claims 13 and 14);

- A process for producing a power cable according to claims 13 or 14 (claim 15).

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

- The main request, which corresponded to the patent as granted and had been resubmitted on 4 May 2017, i.e. about two months before the oral proceedings, in replacement of the then pending main request (filed on 25 May 2016), was admitted into the proceedings. However, said replaced main request (filed on 25 May 2016), which had not been defended any further and was resubmitted as an auxiliary request during the oral proceedings, was not admitted into the proceedings;

- According to the application as filed, an "unsaturated" polyolefin had to contain carbon-carbon double bonds/1000 carbon atoms in a total amount of at least 0.4/1000 carbon atoms. Considering that that requirement was neither reflected in claim 1 of the main request, nor in the description of the patent in suit, the subject-matter of the main request extended beyond the content of the application as filed;

- The objections of lack of sufficiency of disclosure raised against auxiliary request I were rejected

because they were not supported by any evidence;

- Regarding inventive step of said auxiliary request I, D10, which was relied upon by the opponent, would not be considered as a suitable starting point to solve the technical problem addressed in the patent in suit. The skilled person would rather start from D1. In that respect, an inventive step was acknowledged considering that it was at least not obvious to replace the homopolymer according to the closest prior art D1 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 I met the requirements of the EPC.

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

VII. 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 on the basis of the claims as granted together with an amended paragraph 58 as **main request**, or, in the alternative, that the patent be maintained in amended form on the basis of any of **auxiliary requests I to IV** filed therewith.

Amended paragraph 58 of the main request read as follows:

"[0058] The LDPE polymer is unsaturated, i.e. LDPE polymer comprises carbon-carbon double bonds. The

"unsaturated" means herein that the polyolefin contains carbon-carbon double bonds/1000 carbon atoms in a total amount of at least 0.4/1000 carbon atoms and the LDPE polymer contains vinyl groups, and the total amount of vinyl groups present in the unsaturated LDPE is higher than 0.05/1000 carbon atoms."

Claim 1 of **auxiliary request I** differed from claim 1 as granted in the following amended passage (additions in **bold**):

"wherein the polyolefin is an unsaturated LDPE polymer, which is selected from an unsaturated LDPE homopolymer or an unsaturated LDPE copolymer of ethylene with one or more comonomer(s), and wherein the unsaturated LDPE polymer **comprises a total amount of carbon-carbon double bonds/1000 carbon atoms of more than 0.4/1000 carbon atoms, and** contains vinyl groups and the total amount of vinyl groups present in the unsaturated LDPE is higher than 0.05/1000 carbon atoms, and"

Claim 1 of each of **auxiliary requests II and III** was based on claim 1 of auxiliary request I, whereby a distinction was in both cases made between two embodiments for the definition of the polyolefin. Whereas an embodiment directed to LDPE copolymers was defined according to auxiliary request I, an embodiment directed to LDPE homopolymers differed from the corresponding embodiment of claim 1 of auxiliary request I in that it was further indicated that the polymer composition

- **"comprises prior to crosslinking at least 35 mmol -O-O-/kg polymer composition of peroxide"** (auxiliary request II); or

- **"comprises at least 75 wt.% of a polyolefin based on the total weight of the polymer components present in the polymer composition** (auxiliary request III).

The claims of **auxiliary request IV** were identical to the ones of auxiliary request I on which the decision under appeal was based.

VIII. 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:

D23: Experimental Report, T.J. Person, dated 13 December 2017

IX. With letter of 14 May 2018 appellant 1 replied to the statements of grounds of appeal of appellant 2 and additionally requested that the patent be maintained in amended form according to any of auxiliary requests V to XIV filed therewith (these auxiliary requests are however not relevant to the present decision).

X. With letter of 14 May 2018 appellant 2 replied to the statements of grounds of appeal of appellant 1 and additionally requested that auxiliary requests I to III be not admitted into the proceedings.

XI. With letter of 14 February 2019, appellant 2 filed the following document:

D25: Temperature Dependence of tan δ in Polyethylene, G. Tanimoto et al., Proc. 3rd Int. Conf. on Properties and Applications of Dielectric Materials, 8-12 July 1991, Tokyo,

Japan, pages 1068-1071

XII. With letter of 1 November 2019, appellant 2 filed the following document:

D29: Experimental Report, T.J. Person, dated 25 October 2019

XIII. 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.

XIV. Oral proceedings were held on 13 January 2022 in the form of a videoconference. During these oral proceedings, appellant 1 additionally requested that D25 be not admitted into the proceedings. Also, appellant 2 withdrew its objection of lack of inventive step starting from D1 as the closest prior art document, which had been previously put forward in writing.

XV. 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 - Extension beyond the content of the application as filed

(a) The subject-matter of claim 1 as granted was based on the combination of claims 1, 3 and 9 with the passage at page 16, lines 13-16 of the application as filed. The revised paragraph 58 filed with the statement of grounds of appeal removed any ambiguity in relation to the meaning of the term "unsaturated". For these reasons, claim 1 did not

extend beyond the content of the application as filed.

Auxiliary requests I to III - Admittance

(b) Auxiliary request I was identical to the auxiliary request which was not admitted by the opposition division for the reason that the opponent would be taken by surprise. However, that request only addressed the objection of added matter retained against the main request, whereby the amendments made should have been expected by the opponent. The amendments were further purely formal and irrelevant for the remaining objections.

(c) Auxiliary requests II and III were new requests, which were filed in reaction to the decision of the opposition division not to admit the then pending auxiliary request, which prevented the patent proprietor to defend any requests directed to homopolymers.

(d) For these reasons, each of auxiliary requests I to III should be admitted into the proceedings.

Documents D23, D29 and D25 - Admittance

(e) D23 and D29 were experimental reports which had been both 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 these documents could not have been filed already during the opposition proceedings.

(f) D25 was filed in relation to the issue of the relationship between tan delta and DC electrical conductivity. However, said issue was in dispute between the parties already during the opposition proceedings, during which it was discussed at length in respect of inventive step. There was no justification for filing D25 so late.

(g) For these reasons, D23, D29 and D25 should be not admitted into the proceedings.

Auxiliary request IV - Sufficiency of disclosure

(h) The patent in suit, if needed complemented by common general knowledge, provided sufficient information to prepare a composition according to the operative claims.

Auxiliary request IV - Inventive step

(i) D10 constituted a suitable closest prior art document, whereby the compositions prepared in the examples with polymers 1 and 2 were particularly relevant.

The subject-matter of operative claim 1 differed from D10 in that it required a very low electrical conductivity and the mandatory presence of mineral oil, both of which was not disclosed in D10.

Considering that it was undisputed that the examples of the patent in suit showed that using a mineral oil as lubricant was beneficial in terms of electrical conductivity as compared to the usual polyalkylene glycol based lubricants, the technical problem solved over D10 was to provide an

advantageous composition for use as an insulating layer in a DC cable.

D10 provided no information regarding the nature of the lubricant used and was further not directed to the above technical problem. In addition, D5, which was relied upon by appellant 2 as a combination document, dealt with different polymers than the ones according to D10 and did not contain any teaching regarding the reduction of electrical conductivity in DC cables. Therefore, it was not obvious in the light of D10, even in combination with D5, to solve the above problem by using a mineral oil as lubricant in the preparation process of the examples of D10. Also, none of the other cited documents provided any teaching regarding the use of mineral oils to provide low electrical conductivity.

For these reasons, the subject-matter of auxiliary request IV was not obvious starting from D10 as closest prior art and should be acknowledged an inventive step.

XVI. 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 - Extension beyond the content of the application as filed

(a) Claim 1 of the main request extended beyond the content of the application as filed for the reasons indicated by the opposition division. In that respect, considering that the term "unsaturated" was clear in itself, there was no reason to turn to

the description to interpret it. Therefore, the revised version of paragraph 58 of the patent in suit filed with appellant 1's statement of grounds of appeal would be of no help to overcome the opposition division's decision on added matter.

Auxiliary requests I to III - Admittance

(b) Auxiliary request I was identical to the auxiliary request which was not admitted by the opposition division. Considering that the issue of added matter retained against the main request was well known, such a request should have been filed and defended already during the opposition proceedings. Contrary to auxiliary request I allowed by the opposition division (now auxiliary request IV), auxiliary request I filed with appellant 1's statement of grounds of appeal was directed to LDPE homopolymers, which meant that admitting said request to the proceedings would possibly expand the scope of discussion and, thus, run against the economy of the procedure. It would further not be in line with the primary aim of the appeal proceedings.

(c) For the same reasons as outlined for auxiliary request I, there was no justification for filing new auxiliary requests II and III for the first time with the statement of grounds of appeal. Admitting these requests which were also directed to homopolymers should not be allowed for the same reasons as outlined for auxiliary request I.

(d) For these reasons, each of auxiliary requests I to III should be not admitted into the proceedings.

Documents D23, D29 and D25 - Admittance

(e) D23 and D29 were experimental reports which were both filed in appeal in relation to an objection of lack of sufficiency of disclosure which was already raised during the opposition proceedings. They were 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. D29 was further filed to refute an objection consistently put forward by appellant 1 against the method of determination of the electrical conductivity used in D23: D29 showed that the differences between the method used in D23 and the one specified in the patent in suit were not significant, as always argued by appellant 2.

(f) D25 was filed in support of the line of argumentation regarding the relationship between tan delta and DC electrical conductivity, which was an issue already discussed during the opposition proceedings and which had been in dispute between the parties from the outset of the appeal proceedings. The filing of D25 was further necessary to refute some arguments put forward by appellant 1 in respect of said relationship, in particular in its submission dated 14 May 2018.

(g) For these reasons, D23, D29 and D25 should be admitted into the proceedings.

Auxiliary request IV - Sufficiency of disclosure

(h) The open formulation of operative claim 1 allowed the presence of additives, which could negatively affect the electrical conductivity of the claimed

compositions. Consequently, the use of a mineral oil compressor lubricant did not mandatorily give the conductivity specified in operative claims 1, 7 or 8. In addition, D23 and D29 further confirmed that said low conductivity was not always obtained. For these reasons, the requirements of sufficiency of disclosure were not met.

Auxiliary request IV - Inventive step

(i) D10 constituted a suitable closest prior art document, whereby the compositions prepared in the examples with polymers 1 and 2, which were LDPE copolymers, were particularly relevant.

The subject-matter of claim 1 of auxiliary request IV differed from D10 only in that it required a very low electrical conductivity. Although in practice some lubricant always leaked into the polymer composition, the wording of claim 1 covered polymer compositions prepared in a process in which either no lubricant leaked and/or such little amounts of lubricant leaked that they would not be detected in the final product. Therefore, the compositions claimed did not necessarily contain any mineral oil or could contain mineral oil in an amount which could not be analysed.

In the absence of any fair comparison between a composition according to operative claim 1 with a composition according to the examples of D10 prepared using polymer 1 or 2, the technical problem solved over D10 resided in the provision of an alternative polymer composition.

It was obvious to solve that problem by using any known lubricant in the process according to D10, in particular a mineral oil. Even if the polymer compositions being claimed were to be held to be characterised by the mandatory presence of a mineral oil and if the problem to be solved were to provide a composition that exhibited reduced electrical conductivity, it was obvious to solve that problem by using in the examples of D10 a mineral oil as compressor lubricant, in particular instead of polyalkylene glycol, in the light of the teaching of D5. Alternatively, the subject-matter of claim 1 was obvious in the light of the combination of D10 with any of D6, D7, D12, D13, D17 or D18.

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

XVII. Appellant 1 requested that the decision under appeal be set aside and the patent be maintained with the claims as granted and an amended paragraph 58 of the description (main request), or alternatively that the patent be maintained in amended form on the basis of the claims of one of auxiliary requests I to IV filed with its statement of grounds of appeal (auxiliary request IV corresponding to the claims allowed by the opposition division) or of auxiliary requests V to XIV filed with its letter of 14 May 2018.

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

Reasons for the Decision

Main request

1. Extension beyond the content of the application as filed

1.1 Whereas appellant 2 agrees with the finding of the opposition division according to which claim 1 as granted extended beyond the content of the application as filed because it failed to require an overall unsaturation of more than 0.4 carbon-carbon double bonds/1000 carbon atoms, appellant 1 argued that said claim was based on original claims 1, 3 and 9 together with page 16, lines 14-15 of the application as filed.

1.2 Claim 1 as granted is based on claim 9 of the application as filed, which was amended *inter alia* by insertion of the following feature to define the polyolefin specified therein:

"and wherein the unsaturated LDPE polymer contains vinyl groups and the total amount of vinyl groups present in the unsaturated LDPE is higher than 0.05/1000 carbon atoms".

As put forward by appellant 1, a basis in the application as filed for that feature is the sentence on page 16, lines 13-16 of the application as filed (see text indicated in the last paragraph of section II above). Said sentence belongs to a part of the description which provides information regarding the polyolefin used in the claimed compositions (starting on page 12, line 6 and ending on page 17, line 12). Said part first describes the nature of the polyolefin

(page 12, line 12 to page 13, line 30: homo/co-polymers, nature of monomers, definition of LDPE) and then provides further details on unsaturated polyolefins (page 14, first paragraph to page 16, penultimate paragraph) before turning to saturated polyolefins (bottom of page 16). The part of the application as filed directed to unsaturated polyolefins in its turn starts with a general statement regarding the definition of the term “unsaturated” (page 14, lines 1 to 6: see section II above, penultimate paragraph) and then continues by disclosing further preferred embodiments, in particular regarding the amounts and nature of the unsaturations (starting at the bottom of page 15 and ending with the penultimate paragraph on page 16, which includes the sentence on page 16, lines 13-16 relied upon by appellant 1). Read in that context, the Board shares the view of the opposition division that the sentence on page 16, lines 13-16 of the application as filed would be read as a preferred embodiment of the general disclosure mentioned on page 14, lines 1-6, i.e. it discloses the combination of a total amount of carbon-carbon double bonds of at least 0.4/1000 carbon atoms (according to page 14, lines 1-6) together with a total amount of vinyl groups higher than 0.05/1000 carbon atoms (according to page 16, lines 13-16).

1.3 The Board further shares appellant 2's view (letter of 14 May 2018: page 5, third paragraph from the bottom) that that reading of pages 14 and 16 of the application as filed is further confirmed by the fact that claim 10 of the application as filed, in which the polyolefin which is comprised in the claimed composition is defined as "an unsaturated LDPE polymer" which "comprises a total amount of carbon-carbon double bonds/1000 carbon atoms of more than 0.4/1000 carbon

atoms" and which may further comprise vinyl groups in a total amount "higher than 0.05/1000 carbon atoms". In that context, the latter feature - which corresponds to the feature according to page 16, lines 13-16 of the application as filed - is also indicated in combination with the feature according to page 14, lines 1-6 of the application as filed.

1.4 Considering that the polyolefin defined in claim 1 as granted is characterised by the feature “and wherein the unsaturated LDPE polymer … higher than 0.05/1000 carbon atoms” but without being limited in respect of the total amount of C-C double bond as defined on page 14, lines 1-6 of the application as filed, the subject-matter so defined extends beyond the content of the application as filed.

1.5 Contrary to appellant 1’s view, said deficiency cannot be overcome by indicating a more restricted meaning for the term “unsaturated” in the description, as contemplated by the modification of paragraph 58 of the patent specification which was filed together with appellant 1's statement of grounds of appeal (section VII above). Indeed, a term present in a claim and having an accepted, generic meaning may not be held to have a limited meaning in view of the description of the patent specification (here according to modified paragraph 58). In that respect, it was not shown that there would be any reason to turn to the description to interpret the term "unsaturated" mentioned in claim 1 as granted, for which the Board is satisfied that it would be understood, in its broadest sense, as encompassing any level of unsaturation.

1.6 Appellant 1 also argued, with reference to Article 69 EPC, that the description shall be used to

interpret the claims (section 8 of the statement of grounds of appeal). However, Article 69 EPC deals with the determination of the extent of protection of a claim, which may be possibly relevant for the purposes of Article 123(3) EPC and in infringement proceedings, but not for Article 123(2) EPC.

1.7 In view of the above, appellant 1's arguments provide no reason for the Board to overturn the opposition division's decision that claim 1 as granted extends beyond the content of the application as filed.

1.8 For these reasons, the main request is not allowable.

1.9 In view of this finding, there is no need for the Board to address the issue of the admittance of modified paragraph 58, which was contested by appellant 2 (letter of 14 May 2018: page 6, second full paragraph).

Auxiliary requests I to III - Admittance

2. Auxiliary request I

2.1 Auxiliary request I corresponds to the main request in which the polyolefin defined in claim 1 was limited by inserting the feature whose absence was held by appellant 2 and the opposition division to result in claim 1 of the main request to extend beyond the content of the application as filed.

2.2 Although auxiliary request I may be held to have been filed in direct reaction to the decision under appeal, it was undisputed that said auxiliary request I corresponds to the auxiliary request which was submitted by appellant 1 during the oral proceedings before the opposition division but which was not

admitted by the opposition division (points 11.4 to 11.4.6 of the reasons for the decision).

2.3 In that respect, a decision taken by a department of first instance in the exercise of its discretion may be overruled by a Board of Appeal only if it is concluded that the department exercised its discretion in accordance with the wrong principles, without taking the right principles into account or in an arbitrarily or unreasonable way, thereby exceeding the proper limits of its discretion (Case Law of the Boards of Appeal of the EPO, 9th edition, 2019, V.A.3.5.1.b, see in particular decision G 7/93 in OJ EPO 1994, 775, reasons 2.6).

2.4 In the present case, appellant 1 requested that the opposition division's decision to admit said auxiliary request into the proceedings be overturned because the opposition division did not correctly exercise its discretion.

2.5 In that respect, it is agreed with appellant 2 and the opposition division that the objection of added matter which was retained by the opposition division was already raised against claim 1 as granted in the notice of opposition, whereby said objection was held by the opposition division to be overcome by the main request filed with letter of 25 May 2016 (section 6.1.3 of the opposition division’s preliminary opinion). However, at a later stage of the opposition proceedings, appellant 1 decided to revert to the claims as granted as main request, whereby an auxiliary request corresponding to the main request filed with letter of 25 May 2016 and to present auxiliary request I was not defended any further until the oral proceedings before the opposition division (during which it was

resubmitted and not admitted). It is further derivable from the file history that the objection of added matter against the claims as granted was constantly pursued by appellant 2 during the opposition proceedings and eventually completed in appellant 2's last written submission (letter of 4 May 2017: page 2). In view of the circumstances of the present case, the Board considers that the patent proprietor (now appellant 1) was aware that the claims as granted could possibly not be allowed for reasons of added matter based on the opponent's submissions. Therefore, should the patent proprietor have wanted to defend a request corresponding to operative auxiliary request I, he should not have refrained from defending it, as was eventually done with its last written submission before the oral proceedings before the opposition division (letter of 1 June 2017).

2.6 In addition, it is agreed with the opposition division and with appellant 2 that whereas each of appellant 1's auxiliary requests pending before the date of the oral proceedings before the opposition division was limited to polyolefins being copolymers, the auxiliary request which was not admitted further encompassed polyolefins being homopolymers as for the main request but containing a further limitation defining the total amount of carbon-carbon double bonds/1000 carbon atoms. Therefore, the Board considers that the opposition division's finding that admitting the auxiliary request into the proceedings "would unfairly place the opponent at a disadvantage" was not unreasonable and provides no reason for the Board to overturn the decision of the opposition division not to admit the auxiliary request.

2.7 For these reasons, the Board finds it justified to make use of its power pursuant to Article 12(4) RPBA 2007

(which applies here in view of the transitional provisions of Article 25(2) RPBA 2020) by holding auxiliary request I (which corresponds to the auxiliary request that was not admitted by the opposition division) inadmissible.

3. Auxiliary requests II and III

3.1 Auxiliary requests II and III are requests which were submitted for the first time in appeal in order to overcome the objection of added matter which was retained by the opposition division against the main request. The subject-matter of claim 1 of each of auxiliary requests II and III corresponds to the one of claim 1 of auxiliary request I, in which the embodiment concerning the unsaturated LDPE homopolymer was further restricted by the feature(s) indicated in section VII above.

3.2 However, the Board considers that the circumstances of the present case do not justify the filing of these requests for the first time in appeal. As already outlined in respect of auxiliary request I, the file history shows that the decision not to file such requests during the opposition phase amounted to a deliberate choice of appellant 1, which effectively prevented the opposition division from deciding e.g. on novelty of these request(s), which are also directed *inter alia* to homopolymers (as auxiliary request I), thereby shifting the whole case to the appeal stage as far as these specific compositions relating to LDPE homopolymers are concerned. Should appellant 1 have intended to defend such requests, these should have been submitted during the first instance proceedings.

3.3 Therefore, the Board also finds it justified to hold auxiliary requests II and III inadmissible pursuant to Article 12(4) RPBA 2007.

Auxiliary request IV

4. Admittance of documents

4.1 Document D23

4.1.1 D23 is an experimental report on conductivity tests of various polymers and was filed in support of appellant 2's objection 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. D23 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 it was primarily filed in respect of sufficiency of disclosure, D23 was further used in support of objections of lack of inventive step (claimed effect not achieved on the whole scope of the claims; see statement of grounds of appeal: page 7, second full paragraph and page 15, last paragraph).

4.1.2 Appellant 2 argued that D23 was filed in reaction to the opposition division's decision (statement of grounds of appeal: page 5, first paragraph).

a) However, an objection of lack of sufficiency 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.

b) In its letter of 10 August 2020 (page 2, second paragraph) and at the oral proceedings before the Board, appellant 2 argued that they already put forward such an objection during the opposition proceedings, whereby reference was made to their letter of 4 May 2017 (page 3, second paragraph). However, the sole objection made in that letter was that the patent in suit contained a single example illustrative of the subject-matter being claimed, which was insufficient to demonstrate that the invention could be carried out on the whole breadth of the claims. In that respect, no reference was made 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.

c) In addition, it is noted that in the opposition division’s preliminary opinion, which was sent to the parties well in advance of the oral proceedings (12 December 2016 vs. 6 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 6.3.3). Therefore, appellant 2 not only could have filed D23 (and the objection based thereon) already at the opposition stage but he would even have had good reasons to do so. The same is valid regarding the use of D23 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.

d) In that regard, it is further noted that since copolymers were explicitly disclosed in claim 7 as granted, there is no reason why appellant 2's objections based on D23, 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.

e) Under these circumstances, the argument that D23 was filed to answer a point raised by the opposition division in their decision (appellant 2's statement of grounds of appeal: page 5, first paragraph) is not persuasive.

4.1.3 Appellant 2 argued that D23 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 14 February 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 minutes of the oral proceedings before the opposition division: page 3, first full paragraph, first sentence).

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 23, to be read in the light of paragraphs 4 to 11). 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, the evidence in support of that objection should have been filed already during the opposition proceedings.

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 D23 for the first time together with appellant 2's statement of grounds of appeal.

4.1.4 For these reasons, the filing of D23 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 D23 inadmissible pursuant to Article 12(4) RPBA 2007.

4.2 Document D29

4.2.1 D29 is an experimental report, which was filed by appellant 2 with letter of 1 November 2019 i.e. after the reply to the statement of grounds of appeal of appellant 1 was filed. Therefore, its admittance is subject to the stipulations of Article 13(1) RPBA 2020 (see Article 25(1) RPBA 2020), according to which any amendment to a party's case after it has filed its

grounds of appeal or reply is subject to the party's justification for its amendment and may be admitted only at the discretion of the Board.

4.2.2 D29 is and experimental report whose aim is to demonstrate that the same copolymer with polar groups as the one tested in D23 (ethylene copolymer with ethylacrylate, comprising 19 wt.% ethylacrylate) has an electrical conductivity well above the upper limit of 150 fS/m set out in operative claim 1 when the electrical conductivity is carried out using the same method as in the patent in suit, which was admittedly not the case in D23. However, as shown in above points 4.1.2 and 4.1.3, the reason not to admit experimental data meant to show that copolymers comprising polar monomeric units might not meet the DC electrical requirement defined in operative claim 1 is independent of the method of measurement used in the experimental report. Already on that ground, the same reasons as those outlined above for the admittance of D23 are equally valid for D29.

4.2.3 For these reasons, the Board finds it appropriate to make use of its discretion pursuant to Article 13(1) RPBA 2020 and decides not to admit D29 into the proceedings.

4.3 Document D25

4.3.1 The admittance of D25, which was filed by appellant 2 with letter of 14 February 2019, i.e. after the reply to the statement of grounds of appeal of appellant 1, is also subject to the stipulations of Article 13(1) RPBA 2020.

4.3.2 D25 was filed in support of appellant 2's objection regarding an alleged lack of inventive step. It is alleged to show a relationship between parameter tan delta and DC electrical conductivity (letter of 14 February 2019: page 2, fourth full paragraph). In that respect, it makes no doubt for the Board that the existence of such relationship was debated during the opposition proceedings, as is e.g. derivable from the preliminary opinion of the opposition division (sections 6.4.2.3 and 6.4.2.6) and the response to the notice of opposition (paragraphs 44 to 49 and 55 to 58). Under these circumstances, there are no compelling reasons why D25 could not have been filed during the opposition proceedings. Since the issue was also addressed in the decision under appeal (page 11, second full paragraph; page 14, second full paragraph), which was not in favour of appellant 2 in respect of inventive step of auxiliary request IV, it would further have been appropriate to file D25 and any arguments based thereon either with appellant 2's statement of grounds of appeal or, at the latest, with the rejoinder to appellant 1's statement of grounds of appeal, which was not done.

4.3.3 In its letter of 14 February 2019 (page 2, fourth full paragraph; bottom of page 5 to top of page 6) and during the oral proceedings before the Board, appellant 2 argued that D25 was filed in reaction to new arguments put forward by appellant 1 for the first time in its letter of 14 May 2018 (paragraphs 25-30), which are also related to the issue of the relationship between parameter tan delta and DC electrical conductivity. However, as argued by appellant 1 in particular during the oral proceedings before the Board, appellant 1's submissions in the letter of 14 May 2018 are essentially the same as those already

put forward before the opposition division (see point 4.3.2 above). It is further referred to point 29 of appellant 1's rejoinder and point 47 of the response to the notice of opposition. Under these circumstances, appellant 2's argument is rejected.

4.3.4 For these reasons, the Board finds it appropriate to make use of its discretion pursuant to Article 13(1) RPBA 2020 and decides not to admit D25 into the proceedings.

5. Sufficiency of disclosure

5.1 Appellant 2 submitted that "claim 1 at least" of auxiliary request IV, reference being also made to claims 7 and 8, 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 able to prepare compositions in accordance with claims 1, 7 or 8 of auxiliary request IV over the full breadth of those claims.

5.3 Appellant 2 essentially argued that the use of a mineral oil compressor lubricant did not mandatorily give the required conductivity, in particular for unsaturated LDPE copolymers (appellant 2’s statement of grounds of appeal: top of page 3).

5.3.1 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, *supra*, II.C.9).

5.3.2 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, second 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 (section 14 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 8).

5.3.3 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, third paragraph).

5.3.4 Considering that D23 and D29 are not admitted into the proceedings (see sections 4.1 and 4.2 above), there is no need for the Board to address appellant 2's objections relying thereon.

5.3.5 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 D1 as the closest prior art document was withdrawn by appellant 2 during the oral proceedings before the Board (see section XV above), the sole objection of lack of inventive step that needs to be addressed in the present decision is the one starting from D10.

6.1.2 Although it appears to be derivable from the decision under appeal (page 12, last paragraph) that the opposition division held that the skilled person would not consider D10 as a suitable starting point from which to solve the technical problem addressed in the patent in suit, both parties considered that the compositions prepared in the examples from polymers 1 and 2 (paragraph 83) of D10 were a suitable starting point for analysing inventive step.

6.1.3 The compositions prepared in the examples from polymers 1 and 2 of D10 (paragraph 83), for which it was undisputed that they were LDPE copolymers having an unsaturation level according to operative claim 1 (paragraph 84 and table 1 of D10), are contemplated as being used for producing a layer of a crosslinkable power cable (see e.g. tables 2-3 and paragraph 92 of D10). The Board, on the basis of the parties submissions, takes therefore said compositions

prepared with polymers 1 and 2 as starting point for analysing inventive step.

6.2 Distinguishing feature(s)

6.2.1 It was undisputed that the subject-matter of operative claim 1 at least differs from the above indicated closest prior art in the specific low electrical conductivity feature of 150 fS/m or less, which is not derivable from the disclosure of D10.

6.2.2 In the Board's communication (section 7.2), 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 further raised, in view of apparently contradictory statements made in the decision under appeal, 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 compressor lubricant inevitably leaks into the process stream and ends up in the polymer composition being prepared (appellant 1: in section 47 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: letter of 14 May 2018, sentence bridging pages 10 and 11; letter of 14 February 2019: last paragraph on page 8; letter

of 10 August 2020: paragraph bridging pages 5 and 6). This view is further confirmed by D7 (page 376, last paragraph), which is a textbook on lubricants, whereby the passages relied upon are especially directed to compressor lubricants in high pressure processes for making polyolefins, i.e. it precisely deals with a process specified in operative claim 1.

In view of the above, although it may be derivable from various statements made elsewhere (paragraph 86 of the patent in suit; D2: middle of page 1; D5a: paragraph 2; decision under appeal: page 13, second paragraph) that no trace of the mineral oil may be present in the polymer composition produced by a process defined in operative claim 1, this is considered, in view of the position of both parties, to constitute a purely theoretical situation, which is therefore technically not sensible and would thus be disregarded for a proper interpretation of claim 1 as granted and in the form of auxiliary request IV.

Appellant 2 further held that the presence of mineral oil should also not be considered as a limiting feature of operative claim 1 because the language of claim 1 encompassed processes in which so little mineral oil would leak in the process stream that it could not be detected in the final product (letter of 10 August 2020: paragraph bridging pages 5 and 6). However, appellant 2 has provided no evidence that such processes were effectively possible in practice, which, as explained above (see second paragraph of the present section) is not credible to the Board. Therefore, that argument is rejected.

In view of the above, the mineral oil specified in operative claim 1 effectively characterises and limits

the subject-matter defined therein, which means that the subject-matter of said claim 1 requires that some mineral oil is effectively present in the polymer composition being claimed.

Considering that it was not shown that D10 discloses the presence of mineral oil in polymer compositions prepared therein or contains any information regarding the nature of the lubricant used in the high pressure process described therein, the presence of mineral oil is a further feature distinguishing the subject-matter of operative claim 1 from the disclosure of the closest prior art D10.

6.3 Problem effectively solved over the closest prior art

6.3.1 Appellant 1 argued that in view of the examples of the patent in suit the technical problem solved over D10 was to provide an advantageous composition for use as an insulating layer in a DC cable.

6.3.2 D10 does not disclose the DC conductivity exhibited by the crosslinked composition obtained with polymers 1 and 2. It was also not argued, let alone shown, that the measures disclosed for the preparation of the polymers would necessarily imply a certain level of DC conductivity.

6.3.3 Appellant 2 argued that the effect relied upon by appellant 1 was not credible over the whole breadth of the claims, in particular not for all copolymers defined in operative claim 1 and not when using mixtures of lubricants, also considering that no comparison with the compositions of D10 had been provided.

However, considering that operative claim 1 contains as a functional limitation that the polymer composition being claimed should have a low electrical conductivity of 150 fS/m or less, appellant 2's argument is not convincing since such a degree of electrical DC conductivity already per definition implies that the claimed composition is advantageous for use as insulating layer in a DC cable.

6.3.4 In view of the above, it is agreed with appellant 1 that the technical problem effectively solved over D10 may be formulated as to provide an advantageous composition for use as an insulating layer in a DC cable.

6.4 Obviousness

6.4.1 The question remains to be answered if the skilled person, desiring to solve the problem identified in section 6.3.4, would, in view of the closest prior art, possibly in combination with other prior art or with common general knowledge, have modified the disclosure of the closest prior art in such a way as to arrive at the claimed subject matter.

6.4.2 It is undisputed that D10 neither provides information regarding the nature of the compressor lubricant used for the high pressure polymerisation process employed for preparing polymers 1 and 2 (D10: paragraph 86), nor on electrical conductivity, in particular not when measured under DC conditions (see also above point 6.3.2). Further considering that at least three kinds of compressor lubricants are known in the art (polyalkylene glycols, polybutenes and mineral oils: see e.g. D7) and that it is undisputed that not all compressor lubricants would provide a DC conductivity

of 150 fS/m or less, D10 on its own cannot provide any hint to use a mineral oil in order to provide a polyolefin composition having an electrical conductivity of 150 fS/m or less, and thus solve the above problem of providing an advantageous composition suitable for DC cables.

6.4.3 Appellant 2 argued that it would be obvious to solve the above problem in view of the combination of D10 with D5, whereby the latter taught to use a hydrocarbon lubricant rather than a polyalkylene glycol lubricant to provide LDPE having lower tan delta. In that respect, tan delta was a factor which was relevant both for AC and DC cables, so appellant 2.

a) 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.

b) In that respect, appellant 2 put forward at the oral proceedings before the Board 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. Therefore, its teaching encompassed LDPE copolymers, 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.

c) But more importantly, whereas the teaching of D5 is undisputedly implicitly directed to the preparation of insulating layers for AC cables (paragraphs 1, 5, 6 and 17), D10 is generally directed to the preparation of cable layers with either semiconductive or insulating properties (paragraph 58), whereby the voltage applied can be alternating (AC), direct (DC) or transient (impulse) (paragraph 50 of D10), as outlined by appellant 1. However, no information regarding the electrical properties of the compositions prepared in the examples of D10 are disclosed. Therefore, it cannot be ascertained that the compositions prepared in the examples of D10 with polymers 1 and 2 indeed have insulating properties making them suitable for an insulation layer in a DC cable. In that respect, since it remained undisputed that D10 provides no information regarding the nature of the compressor lubricant used for the preparation of polymers 1 and 2, there is also no reason to consider that such insulating properties could have been implicitly met (since according to the patent in suit and appellant 1's statements, the mere use of a mineral oil as compressor lubricant would lead to the required low electrical conductivity).
As outlined by appellant 1, the teaching of D10 concerns prevention of scorch (paragraphs 9, 91 and 92) but is not concerned with a reduction of the DC

conductivity of the insulation layer. Under these circumstances, considering that polymers 1 and 2 of D10 are taught therein to be useful as insulating layer in DC cables can only be the result of hindsight knowledge, as was submitted by appellant 1. This is even more the case as D10 does not only concern polymers prepared by a high pressure process (see paragraph 27). Accordingly, D10 does not teach that unsaturated polyolefins prepared by high pressure polymerisation necessitating the use of a compressor lubricant are used for forming an insulation layer, in particular in a DC cable (or at least in a cable useful under DC conditions).

Already on that basis, the combined teaching of D10 and D5 cannot be held to suggest that preparing polymers 1 and 2 of D10 while using a mineral oil lubricant for the compressor would provide compositions useful as insulating layers under DC conditions. In other words, faced with the problem identified in above point 6.3.4, the skilled person would find no suggestion to modify the teaching of polymers 1 and 2 of D10 by the mere use of a mineral oil, i.e. while keeping the other measures described in relation to those polymers 1 and 2.

d) In view of the above finding, the question whether hydrocarbon compressor lubricants used in D5 are mineral oils or the teaching of D5 in respect of low tan delta linked to the use of a hydrocarbon lubricant would provide an indication in respect of the electrical conductivity under DC conditions (an issue which was in dispute between the parties, in particular at the oral proceedings before the Board) have no impact on the assessment of obviousness of the solution and can be left unanswered.

6.4.4 Appellant 2 put forward that in view of the teaching of D12 (page 55, section 1, first paragraph) that compounds that increase manufacturability could influence the electrical conductivity of the final polymer, it would have been obvious to use a mineral oil, which was a known compressor lubricant i.e. a compound that increased manufacturability, in the examples of D10 (argument put forward at the oral proceedings before the Board).

However, it was not shown by appellant 2 that D12 provides any teaching related to the process used for preparing the polyolefins to be crosslinked, in particular in respect of the nature of the compressor lubricant to be used, let alone on its effect on DC electrical conductivity. There is also no indication in D12 that would suggest that compounds increasing the manufacturability of the polyolefins could be mineral oils. In addition, as explained by appellant 2 itself (statement of grounds of appeal: top of page 8), the teaching of D12 in respect of achieving low electrical conductivity is rather directed to lowering the amounts of crosslinking by-products. For that reason, appellant 2's argument does not convince.

6.4.5 Appellant 2's arguments based on the teaching of D13, which was also considered by appellant 2 as a combination document with D10 (statement of grounds of appeal: page 8, first full paragraph), are also directed to the improvement of insulating properties by removing crosslinking by-products. Therefore, these arguments fail to persuade for the same reasons as the ones based on the disclosure of D12.

6.4.6 Appellant 2 further relied on the combination of D10 with each of D6, D7, D17 and D18 (statement of grounds

of appeal: bottom of page 9 to first paragraph on page 11).

However, as put forward by appellant 1 (statement of grounds of appeal: section 66; letter of 16 November 2021: sections 72, 74-78), although these documents disclose that mineral oils are known compressor lubricants, they fail to disclose any teaching related to their effect on electrical conductivity, in particular that they are suitable to achieve very low electrical conductivity under DC conditions as defined in operative claim 1. Therefore, it cannot be held that it would have been obvious to solve the above problem by combining any of these documents with D10. Again, for the same reasons indicated in point 6.4.3.c above, such a combination can only be based on hindsight.

6.5 In view of the above, the subject-matter of claim 1 of auxiliary request IV is inventive starting from the compositions prepared with polymers 1 and 2 of D10 as the closest prior art, even in the light of any of the additional documents relied upon by appellant 2.

6.6 Considering that 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 I 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