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Datasheet for the decision of 8 July 2022

Case Number: T 1188/20 - 3.3.03

Application Number: 11768212.0

Publication Number: 2622012

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Language of the proceedings: EN

Title of invention:
RECYCLABLE THERMOPLASTIC INSULATION WITH IMPROVED BREAKDOWN STRENGTH

Patent Proprietors:
Dow Global Technologies LLC
Dow Chemical Company Ltd
University Of Southampton
Gnosys Global Ltd

Opponent:
Borealis AG

Relevant legal provisions:
EPC Art. 56, 83

Keyword:

Sufficiency of disclosure - (yes)
Inventive step - closest prior art - ex post facto analysis
Inventive step - main request (yes)

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Case Number: T 1188/20 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 8 July 2022

Appellant: (Opponent)	Borealis AG Trabrennstrasse 6-8 1020 Vienna (AT)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted on 27 February 2020 concerning maintenance of the European Patent No. 2622012 in amended form.**

Composition of the Board:

Chairman D. Semino
Members: M. Barrère
R. Cramer

Summary of Facts and Submissions

I. The appeal of the opponent lies against the interlocutory decision of the opposition division concerning maintenance of European Patent number 2 622 012 in amended form on the basis of the claims of the main request filed with letter of 21 February 2019 and an adapted description.

II. The independent claims of the main request read as follows:

"1. A process comprising:

heating a polymeric composition comprising a low density polyethylene (LDPE) and a minority amount of a high density polyethylene (HDPE) to at least the melting temperature of the HDPE and to at least 130°C, wherein the polymeric composition is formed by melt blending from 5 wt.% to 35 wt.% HDPE and from 95 wt.% to 65 wt.% of LDPE;

control-cooling the heated polymeric composition at a cooling rate from 0.1°C/min to 20°C/min from 130°C to 90°C; and

quenching when the temperature of the heated polymeric composition is less than 90°C; and

forming a polymeric composition."

"4. A process for producing a coated conductor comprising:

heating a polymeric composition comprising 65 wt.% to 95 wt.% of a low density polyethylene (LDPE) and 5 wt.% to 35 wt.% of a high density polyethylene (HDPE) to above the melting temperature of the HDPE and to at least 130°C;

extruding the heated polymeric composition onto a conductor;

control-cooling the heated polymeric composition located on the conductor at a cooling rate between 0.1°C/min and 20°C/min from 130°C to 90°C;

quenching the coated conductor when the temperature of the heated polymeric composition located on the conductor is less than 90°C; and

forming a coating on the conductor, the coating comprising the polymeric composition."

"6. A coated conductor comprising:

a conductor; and

a coating on the conductor, the coating comprising a polymeric composition comprising a minority amount of high density polyethylene (HDPE) lamellae dispersed in a majority amount of low density polyethylene (LDPE),

wherein the polymeric composition comprises a blend of from 5 wt.% to 35 wt.% of the HDPE and from 95 wt.% to 65 wt.% of the LDPE,

wherein the HDPE comprises at least 70 % crystalline content and has a peak melting temperature of at least 130°C as measured using differential scanning calorimetry following ISO 11357-3, using a heating rate of 10°C/min,

wherein the LDPE has a crystallinity of 35% and a peak melting temperature from 105°C to 120°C as measured using differential scanning calorimetry following ISO 11357-3, using a heating rate of 10°C/min."

The dependent claims of the main request are not relevant to this decision.

III. The following documents were *inter alia* cited in the opposition division's decision:

D1: Biggs, R.D and Guenther, R.O. "The Cooling Rate Of Polyethylene Insulated Wire During The Extrusion Process", The Eleventh Annual Wire and Cable Symposium (1967)

D2: Satkowski, Michael M. "The Crystallization And Morphology Of Polyethylene And Its Blends", Doctoral Dissertation, University of Massachusetts Amherst (1990)

D4: Lin, Y. et al. "Space charge distribution and crystalline structure in low density polyethylene (LDPE) blended with high density polyethylene (HDPE)", Polym. Int., 54, p. 465-470 (2005)

IV. The contested decision, as far as it is relevant to the present appeal, can be summarized as follows:

- The claimed invention was sufficiently disclosed for it to be carried out by a person skilled in the art. With regard to the expression "controlled cooling", the opposed patent provided sufficient guidance to achieve a cooling rate between 0.1°C/min and 20°C/min. Furthermore, at least one way of carrying out the invention was disclosed. Following the described process steps, the person skilled in the art could obtain a coating comprising high density polyethylene (HDPE) lamellae as set out in claim 6.

- D4 was the closest prior art for claim 1 of the main request. The subject-matter of claim 1 differed from the disclosure of D4 in that

  i) the polymeric composition was formed by blending from 5 wt% to 35 wt % HDPE and from 95 wt % to 65 wt% of a low density polyethylene (LDPE); and
  ii) the step of quenching was carried out when the temperature of the heated polymeric composition was less than 90°C.

  The problem to be solved was the provision of a further process for forming a polymeric composition. The skilled person would not consider changing the HDPE/LDPE weight ratio when looking for a further process for making polymer compositions suitable for wires and cables. Although D2 disclosed such ratios, the compositions derived therefrom were not used as insulating layers for conductors. Therefore claim 1 involved an inventive step over D4 as the closest prior art.

- D1 was the closest prior art for claim 6 of the main request. The subject matter of claim 6 differed from the disclosure of D1 in that:

  i) the coating comprised a polymeric composition comprising a minority amount of HDPE lamellae dispersed in a majority amount of LDPE,
  ii) the HDPE comprised at least 70 % crystalline content and had a peak melting temperature of at least 130°C and
  iii) the LDPE had a crystallinity of 35% and a peak melting temperature from 105°C to 120°C.

  The problem to be solved was the provision of an alternative coated conductor. Although D4 disclosed LDPE compositions comprising up to 3wt% of HDPE, this document taught away from the specific HDPE/ LDPE ratio recited in claim 6. Therefore claim 6 involved an inventive step over D1 as the closest prior art.

V. The opponent (appellant) filed an appeal against said decision.

VI. Oral proceedings were held before the Board on 8 July 2022.

VII. The appellant requested that the decision under appeal be set aside and the patent be revoked.

The patent proprietors (respondents) requested that the appeal be dismissed (main request). Alternatively they requested that the decision under appeal be set aside

and the patent be maintained on the basis of the claims of one of auxiliary requests 1 to 7, whereby:

auxiliary requests 1 to 3 were filed with letter of 14 November 2019,

auxiliary requests 4 and 5 were filed with the rejoinder to the statement of grounds of appeal and

auxiliary requests 6 and 7 were filed with letter of 29 June 2022.

VIII. The claims of auxiliary requests 1-7 are not relevant to this decision.

IX. The appellant's submissions, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. They were essentially as follows:

(a) Sufficiency of disclosure

The opposed patent did not enable the skilled person to carry out the process of claim 4 of the main request and, in particular, to achieve the required control-cooling of the polymeric composition.

Furthermore, the opposed patent did not teach how to obtain a coated conductor as set out in claim 6 comprising HDPE lamellae and a LDPE having a crystallinity of 35%.

Therefore the invention was not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

(b) Inventive step

D2 was the closest prior art for the subject matter of claim 1 of the main request and said claim lacked an inventive step over this document.

Claims 4 and 6 of the main request lacked an inventive step over D4 as the closest prior art.

X. The respondents' submissions, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. They were essentially as follows:

(a) Sufficiency of disclosure

The opposed patent provided sufficient information to achieve the control-cooling described in claim 4 of the main request.

Furthermore, the opposed patent taught how to obtain a coated conductor according to claim 6 of the main request.

Therefore the invention was disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

(b) Inventive step

D4 was the closest prior art for the subject matter of claims 1 to 8 of the main request and the said claims involved an inventive step over this document.

Reasons for the Decision

Main request (patent as maintained by the opposition division)

1. Sufficiency of disclosure

1.1 Claim 4

1.1.1 Claim 4 of the main request requires that the heated polymeric composition located on the conductor be cooled at a cooling rate between 0.1°C/min and 20°C/min from 130°C to 90°C. This process step is referred to as "control-cooling".

1.1.2 The appellant is of the opinion that the process of claim 4 is insufficiently disclosed with regard to the "control-cooling" step. In particular the opposed patent would not teach how a cooling rate of 0.1 to 20°C/minute can be achieved in the case of a thick polymeric layer and how it may be measured. In this regard, the appellant refers to D1 as evidence that measuring the cooling rate of a polyethylene insulated wire is not straightforward.

While it is not disputed that a thin film of polymeric material can be cooled at a rate of 0.1°C/min to 20°C/min (as shown in paragraph [0088] of the opposed patent), a comparatively thick polymeric layer could not be expected to cool as quickly as a thin layer. The appellant holds that the patent provides no example or teaching to achieve the same cooling rate across the whole thickness of a thick insulating polymeric layer. Furthermore, said layer is not necessary the outer layer of the cable which would make a control of the cooling rate even more difficult.

As the application as filed does not include one way of carrying out the process of claim 4, the appellant considers that the burden of proof to provide evidence that the said process can be put into practice is on the patent proprietor. Besides the appellant cannot show that the process of claim 4 may not be reproduced as it would be impossible to prove a negative.

1.1.3 The respondents take the view that the "control-cooling" step is clearly defined in the opposed patent and means that the temperature of the polymeric composition is lowered at a rate of 0.1 to 20°C/minute. Furthermore information concerning possible methods to achieve "control-cooling" is provided. The skilled person is also aware of conventional heat-treatment methods, where the temperature is monitored and the cooling/heating rate controlled accordingly.

1.1.4 For the Board, a successful objection of lack of sufficient disclosure presupposes that there are serious doubts, substantiated by verifiable facts, that the process of claim 4 may not be carried out by a skilled person (see Case Law of the Boards of Appeal, 10th edition 2022, II.C.9).

In the present case, the appellant's objection is only based on allegations that the skilled person would not have sufficient information in the application as filed to cool a polymeric material located on a conductor at a cooling rate of 0.1 to 20°C/minute. However no evidence was provided by the appellant to support their case. In this regard, it is pointed out that document D1 does not relate to the ability to cool a polyethylene coating but only to the potential difficulties in measuring the cooling rate of a polyethylene insulated wire. Besides, even if the

teaching of D1 were relevant for the present objection, this document was made available to the public in 1967, about 43 years before the priority date of the opposed patent. Therefore the Board does not consider that D1 reflects the state of knowledge of the skilled person at the time of filing the opposed patent.

In the absence of verifiable facts, the Board is of the opinion that the doubts raised by the appellant should at least be convincing on their own and be serious on a *prima facie* basis. However as acknowledged by the appellant, cooling a thin layer of polymeric material at a rate of 0.1 to 20°C/minute does not pose a problem for the skilled person (see opposed patent, paragraph [0088]). While it is true that the thickness of the polymeric layer or the presence of additional layers may represent additional hurdles, the Board notes that the range of the cooling rate is broad and does not see on a *prima facie* basis why it would not be possible to overcome these potential technical difficulties. In particular, even if admittedly the surface and the core of a cable are cooled at different rates, the Board does not see why it would not be possible to have both rates within the broad range of 0.1 to 20°C/minute. It is furthermore pointed out that the opposed patent provides some guidance to cool the coated conductor (see opposed patent, paragraph [0046]). Hence the doubts raised by the appellant are not convincing on a *prima facie* basis.

1.1.5 The appellant further argued that the burden of proof was on the patent proprietors to show that the process of claim 4 can be put into practice.

According to established case law, the burden of proof of insufficiency is as a general rule on the opponent,

who should prove that despite making all reasonable efforts they were unable to put the invention into practice. Only when the patent does not give any information as to how a feature of the invention can be put into practice, the appellant may discharge their burden by plausibly arguing that common general knowledge would not enable the skilled person to put this feature into practice (see Case Law of the Boards of Appeal, 10th edition 2022, II.C.9 and III.G.5.1.2 c)). However, as pointed out previously, the opposed patent provides some guidance as to how the cooling rate of a cable can be controlled. For those reasons the appellant can neither shift the burden of proof on the patent proprietors nor discharge their burden only by alleging that the process of claim 4 cannot be put into practice.

Furthermore, contrary to the appellant's view, the Board does not see why it would not be possible to provide some direct or indirect evidence that the process of claim 4 cannot be put into practice.

1.1.6 Consequently, the appellant's objection is not sufficient to raise serious doubts as to whether the skilled person can carry out the process according to claim 4.

1.2 Claim 6

1.2.1 The appellant considers that the opposed patent does not teach:

(a) how determine whether HDPE lamellae are present in the compositions of the opposed patent and
(b) how to prepare a LDPE having a crystallinity of 35% with a specific melting point.

In particular, with regard to point (a), the patent would not give any definition of HDPE lamellae.

Therefore the opposed patent would be insufficiently disclosed to be carried out over the whole scope of claim 6.

1.2.2 The respondents hold that polymer microstructures such as lamellae form part of the common general knowledge. Furthermore the opposed patent teaches how to obtain a composition with the required microstructure.

1.2.3 The Board agrees with the respondents that polymer microstructures such as HDPE lamellae form part of the skilled person's common general knowledge. Furthermore, as explained previously, the appellant's objection is only based on allegations, so that it is insufficient to raise serious doubts as to the ability of the skilled person to obtain LDPEs as well as compositions according to claim 6. In particular, it is not credible that the skilled person would not know based on the common general knowledge how to obtain a LDPE with a crystallinity of 35%. Moreover, it has not been shown that this is an unusual value or one that cannot be achieved.

Furthermore, in the absence of experimental counter-evidence, it is considered that the polymeric microstructure of the coating is the direct result of the process of the patent (as set out in claims 1 and 4 of the main request). Therefore, even if the skilled person could not identify the presence of HDPE lamellae (which is not the Board's position), he could at least prepare a coating according to claim 6 by following the process steps described in the patent.

1.3 Therefore, the Board does not see any reason to depart from the opposition division's findings on the basis of the arguments of the appellant (see section 14.2 of the contested decision).

2. Inventive step

2.1 Claim 1

2.1.1 Closest prior art

(a) The appellant holds that D2 is the closest prior art for claim 1 of the main request because the only distinguishing feature is the step of quenching. Said step having no technical effect, the subject-matter of claim 1 is not inventive over D2.

A piece of prior art on the basis of which the claimed invention is considered non-obvious cannot be "closer" than a document on the basis of which the claimed invention appears obvious. Therefore the appellant considers that D2 cannot be ruled out as closest prior art.

The appellant further argued that the process of claim 1 is not limited to a particular technical field. Therefore the technical field of the available documents is irrelevant for the selection of the closest prior art.

Finally, the appellant pointed out that D2 is concerned with the question of recyclability which is a problem to be solved in the opposed patent.

(b) The respondents are of the opinion that D4 is the closest prior art because, contrary to D2, it relates to insulating materials for cables and wires.

The Board finds that D2 is not a reasonable document to be taken as the closest prior art for the following reasons:

According to established case law, a central consideration in selecting the closest prior art is that it must be directed to the same purpose or effect as the invention. Furthermore, a document cannot qualify as the closest prior art for an invention merely because of similarity in terms of technical features; its suitability for the desired use of the invention also has to be described (see Case Law of the Boards of Appeal, 10th edition 2022, I.D.3.2).

In the present case, the opposed patent pertains to insulating layers in wires and cables (see opposed patent, paragraph [0004]). Specifically, as shown in the examples of the patent (see table 2), compositions derived for a process according to claim 1 have interesting insulating properties, such as an improved alternative current breakdown strength.

D2 is however silent about any application in the field of insulating materials or cables and wires. In fact, this document is a purely academic study having no recognisable industrial application. Contrary to D2, documents exist, such as D4, which relate to polymeric compositions for use as insulation material in electric power cables (see D4, page 465, left-hand column, first paragraph). Already for that reason, the Board considers that the skilled person wishing to provide an

insulating material, would have no reason to start from D2 as the closest prior art, but would consider documents such as D4 which pertain to the use of interest.

The appellant argued that D2 addressed the recycling issue, which was also a problem to be solved in the opposed patent. However, the Board notes that the question of recycling is very specific in the patent in suit. According to paragraphs [0001] and [0004] thereof, crosslinked insulating layers are not readily recyclable. The solution proposed in the opposed patent is to provide a crosslink-free insulating material. Although D2 refers to the question of recycling (see page 7, first paragraph), this document does not disclose in which context. Hence the skilled person would have no reason to assume that the issue of recycling as mentioned in D2 relates to crosslinked materials.

The appellant selected D2 as the closest prior art essentially because it requires the minimum of structural modifications to arrive at the subject-matter of claim 1. This approach would be allowable if D2 were a realistic starting point for a further development in the field of insulating materials. However, as explained previously, D2 has no connection whatsoever to the technological field of the opposed patent. Hence, D2 is not considered to be a reasonable starting point and the choice of D2 as closest prior art is an inadmissible *ex post facto* approach which draws on knowledge of the invention.

For these reasons, the only objection of lack of inventive step raised by the opponent in appeal against

claim 1, namely the one starting from document D2, fails.

2.2 Claim 4

The parties agree that D4 is the closest prior art for the subject-matter of claim 4. The Board sees no reason to take a different view.

2.2.1 Technical differences

The parties agree that the process of claim 4 differs from the disclosure in D4 (see page 466, table 1 and right-hand column, first paragraph) in that:

(i) the polymeric composition comprises from 5 wt.% to 35 wt.% HDPE and from 95 wt.% to 65 wt.% of LDPE; and
(ii) the process comprises a step of quenching the composition when the temperature thereof is less than 90°C.

The Board also agrees with this analysis.

2.2.2 Problem to be solved

(a) According to the appellant no technical effect is associated with either of the distinguishing features. Therefore the problem to be solved should be formulated as the provision of an alternative process for making an insulating material.

(b) According to the respondents the objective problem to be solved over D4 may be seen as to provide a process to make a LDPE-HDPE blend having improved alternative current (AC) breakdown strength.

The Board notes that the polymeric compositions of D4 comprise from 0,5 to 3 wt% of HDPE (see D4, page 466, table 1). In the absence of comparative examples comprising 0,5-3 wt% of HDPE, it cannot be established that the compositions produced by the process of claim 4 have improved properties compared to the blends of D4.

Although no improvement is shown compared to D4, it is nevertheless acknowledged that

(c) the blends prepared by the process of claim 4 are suitable to provide an insulation layer for AC cables and in particular that

(d) the AC breakdown strength is appropriate for this application (see opposed patent, example 1).

Consequently the Board considers that the problem to be solved over D4 should be formulated as the provision of an alternative manufacturing process for polymeric blends for use as insulating layer for AC wires/cables.

The appellant argued that the problem to be solved should not be limited to AC wires and cables because the compositions derived from the process of claim 4 can also be used in other products such as in direct current (DC) cables and wires.

The Board cannot agree with this. Contrary to the appellant's view, the suitability of compositions derived from the process of claim 4 for DC applications is not based on experimental evidence and is therefore purely speculative. While it is true that the scope of claim 4 is not limited to AC applications, the Board is

of the opinion that the scope of the claims is to be distinguished from the effect of the claimed invention. In the present case, although the scope of claim 4 covers a process for producing a material theoretically for any application (including DC cables), it has been shown by convincing evidence that said material is specifically suitable for AC applications.

2.2.3 Obviousness of the solution

(a) The appellant takes the view that it is obvious to quench the compositions of D4 below 90°C because the crystallisation of the HDPE/LDPE blend is complete at this temperature. Furthermore, even if D4 teaches that increasing the content of HDPE leads to a reduction in electrical properties, it would nevertheless be obvious to increase the HDPE content in order to obtain a foreseeable disadvantageous effect (see grounds of appeal, pages 21-22, paragraphs 92-96).

The Board cannot follow this line of argument for the following reason:

As pointed out previously, the problem to be solved over D4 is seen as the provision of an alternative process for the manufacture of polymeric blends for use as insulating layer for AC wires/cables. Even assuming that the materials of D4 would implicitly be suitable for this application, this document refers to the space charge distribution of LDPE in a DC electrical field and does not provide any teaching for the AC field (see D4, page 465, abstract and page 470, conclusion). Already for that reason it is not an obvious option for a person skilled in the art wishing to provide an alternative process for providing an insulating layer

in the AC field to modify the process of D4, let alone increase the amount of LDPE above 3 wt% and quenching the composition at a temperature below 90°C.

In fact, if the teaching of D4 with regard to the DC field were also applicable to the AC field, the skilled person would not increase the HDPE content above 5 wt% because this would be detrimental to the electrical properties (see D4, page 470, left-hand column, lines 12-16). Again, contrary to the appellant's view, the problem to be solved is not the provision of an insulating material for DC cables with poorer electrical properties.

For these reasons, it is not an obvious option for a person skilled in the art wishing to provide a composition insulating layer for AC wires/cables to increase the HDPE content above 5 wt%.

Therefore the subject-matter of claim 4 of the main request involves an inventive step over D4 as the closest prior art.

2.3 Claim 6

The above argumentation (see point 2.2 of the reasons) applies *mutatis mutandis* to the coated conductor of claim 6 because it differs from the one of D4 at least in that the polymeric composition contains more than 5 wt.% of HDPE. In this respect it is worth noting that the appellant applied the same arguments developed for claim 4 to claim 6 (grounds of appeal, page 22, paragraph 98).

2.4 As an inventive step is acknowledged for the subject-matter of independent claims 1, 4 and 6, there is no need to analyse the issue for the dependent claims.

3. Since none of the appellant's objections against the main request is successful, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

B. ter Heijden D. Semino

Decision electronically authenticated