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**Datasheet for the decision
of 23 September 2022**

Case Number: T 2279/19 - 3.3.03

Application Number: 09790097.1

Publication Number: 2300529

IPC: C08L23/04, C08F10/00, F16L9/12

Language of the proceedings: EN

Title of invention:
POLYETHYLENE COMPOSITIONS

Patent Proprietor:
Univation Technologies, LLC

Opponent:
TotalEnergies OneTech Belgium

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

Keyword:
Documents submitted with statement of grounds - not admitted
Inventive step - non-obvious modification



Beschwerdekammern

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Case Number: T 2279/19 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 23 September 2022

Appellant: TotalEnergies OneTech Belgium
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 11 June 2019
rejecting the opposition filed against European
patent No. 2300529 pursuant to Article 101(2)
EPC.**

Composition of the Board:

Chairman D. Semino
Members: F. Rousseau
R. Cramer

Summary of Facts and Submissions

I. The appeal lies against the decision rejecting the opposition against European patent No. 2 300 529 whose sole independent claim reads as follows:

"1. A bimodal polyethylene composition having a density of 0.940 g/cc or more, the composition comprising a high molecular weight polyethylene component and a low molecular weight polyethylene component wherein the high and low molecular weight polyethylene components are formed in a single reactor, wherein:

the composition qualifies as a PE 100 material such that in accordance with ISO 1167 a pipe formed from the composition that is subjected to internal pipe resistance has an extrapolated stress of 10 MPa or more when the internal pipe resistance curve is extrapolated to 50 or 100 years in accordance with ISO 9080:2003(E);

the composition has a melt strength of 18 cN or greater; and

the ratio of the weight average molecular weight of the high molecular weight component ($M_{w_{HMW}}$) to the weight average molecular weight of the low molecular weight component ($M_{w_{LMW}}$) of the composition is greater than 15:1 and less than 28:1."

II. The opposition proceedings were based among others on the following items of evidence:

F6: Handbook of polyethylene, Andrew J. PEACOCK, 2000, pages 236-237 ISBN:0-8247-9546-6

F8: WO 02/074816 A2

F10: Data sheet for Borstar® HE3490-LS, Borealis, 18 August 2003 Ed. 9

F11 : WO 00/22040

F12: US 5,582,923

F13 WO 2002/035008 A1.

III. According to the reasons for the contested decision which are pertinent for the appeal proceedings:

The closest prior art was the commercial product Borstar® HE3490-LS, F10 being a data sheet for said commercial product, F13 describing that Borstar® HE3490-LS was prepared with a process according to F11.

The subject matter of claim 1 differed from the closest prior art in that the melt strength was below 18 cN and in that the composition was formed in a single reactor, whereas Borstar® HE3490-LS was produced in at least two reactors, and it was not known whether or not Borstar® HE3490-LS could be obtainable by a single reactor process.

As it had been shown in the experimental part of the contested patent that a polyethylene composition with higher melt strength was obtained, the problem solved over the closest prior art resided in the provision of an improved composition suitable for producing pipes.

The solution was not obvious, not only because F10 did not refer to the melt strength of Borstar® HE3490-LS, but also because a composition having the combination of features as defined in claim 1 would not appear obvious without knowledge of the invention. The opponent's argument that F6 would teach that a higher melt strength could be obtained by increasing the average molecular weight, the breadth of the molecular weight distribution or the degree of long chain branching did not convince, because it could not be seen in how far any of these measures would inevitably lead to the claimed composition. There was not enough information disclosed about the commercial product Borstar® HE3490-LS, e.g. the properties of the HMW and LMW components and the way they were produced. Without knowing the precise composition of Borstar® HE3490-LS and its way of production, the person skilled in the art would not know how to modify the composition in order to increase its melt strength. In fact, it could not be derived from F11 how Borstar® HE3490-LS was prepared with the consequence that the skilled person would not know how to modify that product. F8 and F12 also relied upon by the opponent were not relevant, since they did not concern PE 100 materials.

Accordingly, the subject matter of claim 1 was not obvious in view of F10, taken alone or in combination with F8, F11 or F12.

IV. An appeal against that decision was lodged by the opponent (appellant). With the statement of grounds of appeal the appellant submitted the following documents:

F14: EP 1 201 713 A1

F15: Bill Michie et al, "High Melt Strength PE-100 Pipe Resin"

F16: Michie et al, "High Melt Strength PE-100 Pipe Resin [PE]", 2006 Washington DC, www.pe100plus.com/PPCA/High-Melt-Strength-PE-100-Pipe-Resin-p337.html

F17: Bill Michie et al, abstract of a presentation "High Melt Strength (HMS) PE100 Pipe Resin" made at the SPE International Polyolefins Conference, 2007

F18: Table of content of the publication of the conference papers of the SPE International Polyolefins Conference, 2007, Houston, Texas, volume 1

F19: Enlargement of the figure 1 of F15

F20: WO 2006/065651 A2

F21: US 2003/0065097 A1.

- V. In their response to the statement of grounds of appeal the patent proprietor (respondent) referred to auxiliary requests 3, 4 or 5 filed before the opposition division with letter of 22 June 2018. The wording of these auxiliary requests is not relevant for the present decision.
- VI. Oral proceedings before the Board were held on 23 September 2022.
- VII. The appellant requested that the decision under appeal be set aside and the patent be revoked.
- VIII. The respondent requested that the appeal be dismissed, or alternatively that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of any of auxiliary requests 3, 4 or 5 filed with letter of 22 June 2018.
- IX. The appellant's submissions, in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

- (a) F14 to F21 should be admitted into the proceedings.
- (b) The subject-matter of claim 1 lacked an inventive step over the commercially available resin Borstar® HE3490-LS. The skilled person would be able based on the information provided in the examples of F11 to prepare a resin similar to Borstar® HE3490-LS. Moreover, they would know on the basis of F6 how to increase the melt strength of such a resin so as to arrive in an obvious way at the resin of granted claim 1.

X. The submissions of the respondent, in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

- (a) F14 to F21 should not be admitted into the proceedings.
- (b) The skilled person would not find in F11 a teaching as to how to produce a resin similar to Borstar® HE3490-LS. A fortiori the skilled person would not know how to modify such a process so as to arrive at the resin of granted claim 1.

Reasons for the Decision

Admittance of F14 to F21

1. F14 to F21 are items of evidence submitted by the appellant with their statement of grounds of appeal. Their admission to the proceedings, which was contested by the respondent, is subject to the discretionary power of the Board in accordance with Article 12(4)

RPBA 2007 (see Article 25(2) RPBA 2020). The appellant's sole argument that F14 to F21 had been filed to illustrate their submissions made on appeal concerns at most the reason for their filing, but not a justification for their filing at the appeal stage. It was also not argued that the filing of these items of evidence resulted from an unexpected development of the case before the opposition division. On that basis and in the absence of additional arguments as to why they should be taken into account, the Board considers that the documents could and should have been filed during opposition proceedings, if the opponent intended to rely on them, and decides therefore to hold documents F14 to F21 inadmissible pursuant to Article 12(4) RPBA 2007.

Main request

2. The sole substantive issue in dispute is inventive step of the subject-matter of claim 1 over the commercially available resin Borstar® HE3490-LS considered by the appellant to represent the closest prior art. A technical data sheet of that product is F10.

Closest prior art and distinguishing feature(s)

3. In agreement with the parties and the reasons for the contested decision, the Board considers that commercial product Borstar® HE3490-LS which is indicated in F10 to be suitable for the production of pipes (section Applications) and qualifies as a PE 100 material (i.e. is classified as a Minimum Required Strength (MRS) 10.0 material in section "Description") represents a suitable starting point for assessing inventive step.

3.1 Figure 2 of the patent in suit shows the melt strength versus pull-off speed for samples according to the present invention and comparative commercial samples, in particular a sample designated "Borealis 3490 LS", which undisputedly corresponds to Borstar® HE3490-LS (statement of grounds of appeal, page 3, first and second paragraphs of item 4; tables 1 and 2 on pages 11 and 12 of the patent in suit). Having regard to the results shown in figure 2 of the patent in suit, it is undisputed that the composition in accordance with granted claim 1 which is defined to exhibit a melt strength of 18 cN or greater, differs from that of the closest prior art in that it has a higher melt strength.

3.2 The parties, in agreement with the opposition division, consider that the process feature according to which "*the high and low molecular weight polyethylene components are formed in a single reactor*" represents an additional distinguishing feature over the closest prior art. Noting that the subject-matter of present claim 1 concerns a product, the question could nevertheless arise whether, taking into account the case law of the Boards of appeal in relation to product-by-process features, the above mentioned process feature necessarily results in a further structural or functional feature distinguishing the subject-matter of claim 1 from the closest prior art. However, as shown below, the question whether the subject-matter of present claim 1 comprises a further distinguishing feature over the closest prior art is not decisive and accordingly can be left unanswered. In this respect, it is accepted to the benefit of the appellant that the first mentioned distinguishing feature, i.e. a higher melt strength with a value of 18 cN or greater, and the alleged second distinguishing

feature are not functionally interdependent, as submitted by that party, so that the (partial) problem solved by said first distinguishing feature and the obviousness for the skilled person to have recourse to the measure defined by this first distinguishing feature can be assessed independently from the second alleged distinguishing feature (Case Law of the Boards of Appeal of the EPO, 10th edition, 2022, I.D.9.3.2).

Problem successfully solved

4. The appellant formulates the partial problem solved by the distinguishing feature that the composition has a melt strength of 18 cN or greater over the commercial product Borstar® HE3490-LS as the provision of a composition having a higher melt strength. It is in this regard questionable whether such a formulation of said partial problem allows for an objective assessment of inventive step, as by defining a minimum level for the melt strength (i.e. 18 cN or greater) it incorporates elements of the solution, which should be avoided (Case Law, supra, I.D.4.2.1).

However, even accepting to the benefit of the appellant their formulation of the partial problem successfully solved by the distinguishing feature that the composition has a melt strength of 18 cN or greater, the Board, as shown hereafter, arrives at the conclusion that the bimodal polyethylene composition of operative claim 1 has not been shown to be obvious for a person skilled in the art. Under these circumstances and taking also into account the remark provided in above point 3.2, it is accepted for the sake of reasoning that the partial problem successfully solved over the commercially available resin Borstar® HE3490-LS by the feature defining that the composition has a

melt strength of 18 cN or greater is the provision of a composition having a higher melt strength.

Obviousness of the solution

5. With regard to obviousness, the appellant's submission is that the skilled person would not only know how to prepare a resin similar to Borstar® HE3490-LS, but also how to modify its preparation method so as to increase the melt strength of the product obtained to a value of at least 18 cN.
- 5.1 Concerning the preparation of a resin similar to Borstar® HE3490-LS, the indication by the appellant that F13 teaches in its example 1 on page 17 and its example 7 on page 19 that Borstar® HE3490-LS is produced according to WO 00/22040, i.e. F11 in the present proceedings, is not disputed. In this respect, the appellant referred during the oral proceedings to a catalyst preparation in example 1 on page 28 of F11 and to the preparation of bimodal resin compositions in examples 2 and 3 of that document using said catalyst.
 - 5.1.1 Table 1 on page 30 of F11 shows the properties of material A (produced in example 2) and materials B to D (produced in example 3). The properties of the same materials A to D compounded with a carbon black master batch, whose nature is not further specified, are also shown in table 2 on page 31. The first question which arises is whether the description in F11 of uncompounded and compounded materials A to D in table 1 and 2, respectively, allows to determine if one of these materials corresponds to Borstar® HE3490-LS.
 - 5.1.2 According to F10, Borstar® HE3490-LS is a bimodal high density polyethylene resin compounded with carbon

black, the base and compounded resins having densities of 0.950 g/cc and 0.960 g/cc, respectively.

A density for the base resin of Borstar® HE3490-LS of 0.950 g/cc would mean that the sole material exemplified in table 1 of F11 which could represent the base material used for Borstar® HE3490-LS is uncompounded material B of example 3, since uncompounded materials A, C and D have a density higher than 0.950 g/cc (table 1). However, it follows from the description of the compounded resins in table 2, i.e. base materials A to D to which a carbon black master batch of an unspecified nature has been added, that compounded material B does not correspond to Borstar® HE3490-LS, since the density of compounded material B with 0.962 g/cc is above the density of (compounded) Borstar® HE3490-LS. The analysis of these values, in particular, would indicate that compounded material B has a content of carbon black master batch which is too high to obtain the density of 0.960 g/cc of Borstar® HE3490-LS, since the addition of the carbon black master batch leads to a density increase, as can be seen from a comparison of the density values obtained for base materials A to D in table 1 and their respective compounded materials in table 2.

- 5.1.3 Furthermore, F10 teaches that Borstar® HE3490-LS, i.e. implicitly the compounded resin, has a MFR₅ of 0.25 g/10 min. As shown in table 1 of F11, none of the uncompounded materials A to D has a MFR₅ of 0.25 g/10 min, the values closer to the one of Borstar® HE3490-LS indicated in F10 being 0,27 and 0,24 for materials C and D, their densities with 0.952 g/cc and 0.953 g/cc, respectively, being however higher than the density of uncompounded Borstar® HE3490-LS.

The MFR₅ values of compounded materials A to D are indicated in table 2. It can be seen that by a comparison between the results shown in tables 1 and 2 that compounding the base resin materials A to D with the carbon black master batch (whose polymer component is not specified) leads to a reduction of the MFR₅ values.

Should one consider that only uncompounded material B could correspond to the base material of Borstar® HE3490-LS, as is indicated in above point 5.1.2, a MFR₅ of 0.29 g/10 min for compounded material B as described in table 2 would mean, taking into account a MFR₅ of 0.25 g/10 min for Borstar® HE3490-LS and the above remark concerning the influence of the addition of the carbon black master batch on the MFR₅, that compounded material B described in table 2 was prepared by adding less carbon black master batch than for Borstar® HE3490-LS. This, however, would be inconsistent with the finding in above point 5.1.2 based on the lower density for Borstar® HE3490-LS, compared to compounded material B. Accordingly, the base material of Borstar® HE3490-LS cannot be uncompounded material B.

- 5.1.4 Moreover, whereas Borstar® HE3490-LS classifies as a Minimum Required Strength (MRS) 10.0 (see above point 3), no indication in respect of that property is provided for materials A to D of F11. F11 merely describes on page 14, lines 10-16, that this property is most preferably, but not necessarily met, in line with its dependent claims 13 and 14. Concerning the RCP-S4 value, materials B, C and D of F11 are described to have a RCP-S4 value of at most -7°C (which is the highest temperature for qualifying as a PE 100 resin; F11, pages 14, lines 1-5), but that temperature is not given for Borstar® HE3490-LS. Regarding the impact

strength, Borstar® HE3490-LS exhibits according to F10 a value of 16 kJ/m² measured in accordance with ISO 179, whereas the impact strength measured according to the same standard is of 19, 13, 12, and 15 kJ/m² for materials A, B, C and D, respectively (page 14, lines 18-19 and table 2 on page 31).

5.1.5 Hence, the appellant's argument during the oral proceedings that a seven point-comparison based on the bimodal character, the presence of carbon black, the density with or without carbon black, the qualification as PE100 material and the impact strength shows that the materials of F11 to which the appellant referred to are similar to Borstar® HE3490-LS fails to convince. This conclusion is further supported by the fact, as argued by the respondent, that a split of 57,6% for Borstar® HE3490-LS, identified in the experimental part of the patent in suit (Table 2; paragraph [0094]), does not match with the split of material B indicated in table 1, on page 30 of F11, nor with any of the splits indicated for the other materials A, C and D provided in the same table.

5.1.6 Accordingly, the appellant's submission that the skilled person would identify the processes described in examples 1 to 3 of F11 as processes to prepare a product similar to commercial product Borstar® HE3490-LS fails to convince. It was not explained either how the skilled person would modify the processes described in the examples of F11 in order to prepare a product similar to Borstar® HE3490-LS. The indication in F13 that Borstar® HE3490-LS is prepared according to F11 is not in contradiction with the above analysis, since the general teaching of F11 comprises a multitude of possibilities, in particular with respect to the catalyst. The appellant did not address the general

teaching of F11, let alone submitted that it would allow the skilled person to prepare a product similar to commercial product Borstar® HE3490-LS. Therefore, based on the submissions of the appellant, it cannot be concluded that the skilled person had access to a process for preparing a product similar to Borstar® HE3490-LS.

- 5.2 On that basis, the appellant's submissions in respect of obviousness of the solution which are based on the premise that the skilled person would know how to prepare a resin similar to Borstar® HE3490-LS and modify said preparation method so as to increase the melt strength of said resin cannot convince.
- 5.3 Moreover, even if to the benefit of the appellant, it were accepted that the teaching of F6, according to which an increase of the melt strength can be achieved by an increase of the average molecular weight, the breadth of the molecular weight distribution or the degree of long-chain branching, would be found by the skilled person to be applicable to the base resin of the type of Borstar® HE3490-LS, the appellant has not demonstrated that such a modification aimed at increasing the melt strength of the resin up to a value of at least 18 cN would necessarily result in a resin which still qualifies as a PE 100 material, as required by operative claim 1. Submissions in this respect were not made by the appellant.
- 5.4 Even if, to the appellant's benefit, the Board ignores the existence of a possible second distinguishing feature over the closest prior art and its functional interdependence with the first distinguishing feature and also accepts the formulation of the partial problem proposed by the appellant in respect of said first

distinguishing feature, it must be concluded on the basis of the reasons discussed above that the subject-matter of operative claim 1 has not been shown to be obvious for the skilled person having regard to the state of the art.

6. On that basis, the subject-matter of claim 1 of the granted patent involves an inventive step within the meaning of Article 56 EPC.

Order

For these reasons it is decided that:

1. The appeal is dismissed

The Registrar:

The Chairman:



D. Hampe

D. Semino

Decision electronically authenticated