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**Datasheet for the decision
of 24 February 2021**

Case Number: T 0376/18 - 3.3.03

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Title of invention:
COPOLYMERS AND FILMS THEREOF

Patent Proprietor:
Ineos Sales (UK) Limited

Opponent:
THE DOW CHEMICAL COMPANY

Relevant legal provisions:
EPC Art. 54, 56
RPBA Art. 12(4), 13(1)

Keyword:
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Novelty - (yes)
Inventive step - (no)



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Case Number: T 0376/18 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 24 February 2021

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 6 December 2017
revoking European patent No. 2344550 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman D. Semino
Members: O. Dury
A. Bacchin

Summary of Facts and Submissions

- I. The appeal by the patent proprietor lies against the decision of the opposition division posted on 6 December 2017 revoking European patent No. 2 344 550.
- II. A notice of opposition against the patent was filed, in which the revocation of the patent in its entirety was requested.
- III. The decision under appeal was based on the main request and on the 1st and 2nd auxiliary requests, all filed with letter of 21 September 2017, as well as on the 3rd auxiliary request filed with letter of 2 October 2017, whereby only the main request and the 2nd auxiliary request are relevant to the present decision.

Claim 1 of the main request read as follows:

"1. A copolymer of ethylene and 1-octene, said copolymer having

- (a) a density (D) in the range 0.900 - 0.940 g/cm³,
 - (b) a melt index MI₂ (2.16 kg, 190°C) in the range of 0.01 - 50 g/10 min,
 - (c) a melt elastic modulus G' (G''= 500 Pa) in the range 20 to 150 Pa, and
 - (d) a tear strength (MD) of ≥ 220 g,
a tear strength (TD) of ≥ 470 g, and
a Dart Drop Impact (DDI) of ≥ 1800 g
- of a blown film having a thickness of 25 µm produced from the copolymer, where MD is referred to the machine

direction and TD is the transverse direction of the blown film."

Claim 1 of the 2nd auxiliary request differed from claim 1 of the main request in that the following feature was added at the end of the claim:

"wherein the copolymer has a Compositional Distribution Breadth Index (CDBI) in % satisfying the equation $CDBI \leq (-192D + 241.5)$ ".

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

D1: WO 2006/085051

D2: WO 2008/074689

D3: Intrinsic Tear Strengths and Their Correlation with Properties of Polymers Made Using Insite* Technology, T.A. Plumley et al., Journal of Plastic Film & Sheeting, Vol. 11, October 1995

D4: The effects of comonomer type on the blow film performance of LLDPE resins made using a metallocene single-site catalyst, A.M. Sukhadia et al., 2001 PFFC Peer Reviewed Paper, February 2001

D9: WO 2011/002868

D15: Pankaj Gupta et al., Polymer 46 (2005), 8819-8837

V. In that decision, the opposition division *inter alia* held that:

(a) The subject-matter of claim 1 of the main request was novel over D1 and D2 because the combination of features defining the copolymer of ethylene and

1-octene of the main request was not clearly and unambiguously disclosed in these documents;

- (b) Regarding inventive step of claim 1 of the main request starting from example 1 of D1 as closest prior art, the difference was the presence of 1-octene instead of 1-hexene as comonomer. The problem posed resided in the provision of ethylene copolymers suitable to form blown films having improved dart impact and tear strength. However, in view of the teachings of D3, D4 and D15, it was obvious to solve that problem by employing 1-octene instead of 1-hexene as comonomer. The reasoning starting from D2 as closest prior art was similar to the one starting from D1. Therefore, an inventive step was denied;
- (c) The 1st to 3rd auxiliary requests were likewise considered not to meet the requirements of inventive step. In particular, the patent did not demonstrate that the feature relating to the Composition Distribution Breadth Index ("CDBI") specified in claim 1 of the 2nd auxiliary request exerted a beneficial effect. Consequently this additional feature (as compared to claim 1 of the main request) did not support an inventive step for the 2nd auxiliary request;
- (d) In view of the above, the patent was revoked.

VI. The patent proprietor (appellant) appealed the above decision. With the statement setting out the grounds of appeal the appellant requested that the decision be set aside and the patent be maintained on the basis of the main request or of the auxiliary request, both as attached to the statement of grounds of appeal, whereby

said main request and auxiliary request corresponded to the main request and 2nd auxiliary request, respectively, dealt with in the contested decision. In addition, the appellant filed new experimental data (statement of grounds of appeal: last paragraph on page 3 and table on page 4).

VII. In its reply to the statement of grounds of appeal the opponent (respondent) requested that the appeal be dismissed.

VIII. With letter dated 3 January 2019, the appellant submitted the following document:

D19: Declaration by D. Jan, dated 14 December 2018,
one page

Said document was filed anew twice in a corrected version with letters of 10 January 2019 and 10 June 2019 (declaration dated 29 May 2019, one page).

IX. With letters dated 15 May 2019 and 4 September 2019 the respondent requested that D19, in any of its versions, be not admitted into the proceedings.

X. The parties were summoned to oral proceedings. Issues to be discussed at the oral proceedings were then specified by the Board in a communication pursuant to Article 15(1) RPBA 2020.

It was in particular noted in section 7.1 thereof that whereas the opposition division and the appellant appeared to consider the film properties according to feature (d) of claim 1 of the main request to form part of the characteristics of the claimed subject-matter, thus indicating that the claim was interpreted as being

directed to a film, the respondent argued that said feature (d) was only limiting in as far as it imposed a requirement that the claimed compositions should be "capable of" being blown into a film as defined therein. In that respect, it was indicated that the preliminary position of the Board was that the claim was to be interpreted as directed to a polymer composition satisfying features (a) to (c) and which was further characterised by a functional feature relating to the properties of a film that can be prepared therefrom, whereby there was no limitation in the manner of forming the film (i .e. the composition should be suitable for making such a blown film, as put forward by the respondent). In particular the claim was not to be interpreted as limited to the film forming steps exemplified in the patent in suit (section 7.1.5 of the Board's communication).

XI. With the explicit agreement of both parties, oral proceedings were held on 24 February 2021 in the form of a videoconference (the board was in a room at the premises in Haar and both parties were connected via video link).

XII. The appellant's arguments, insofar as relevant to the decision, may be summarised as follows:

Admittance of D19

(a) The experimental data in respect of examples 3 to 5 of D1 filed with the statement of grounds of appeal were retrieved from an in-house database. D19 filed with letters of 3 January 2019, 10 January 2019 and 10 June 2019 contained experimental data for examples 2 to 6 of D1 and comprised some corrections as compared to the data in respect of

examples 3 to 5 of D1 filed with the statement of grounds of appeal. These data had been filed as soon as possible not only to address the findings of the decision under appeal with respect to the formulation of the technical problem in view of D1 but also as a precautionary measure to demonstrate novelty over D1. For these reasons, D19 should be admitted into the proceedings.

Main request - Novelty over the examples of D2

- (b) During the oral proceedings before the Board, it was explicitly stated that claim 1 of the main request was to be read in accordance with the preliminary view of the Board as indicated in the communication (see section X above).
- (c) The examples of D2 were carried out using 1-hexene and not 1-octene as comonomer. At least for that reason, the subject-matter of claim 1 of the main request was novel over the examples of D2.
- (d) In reply to a question of the Chairman of the Board, it was stated at the oral proceedings that if 1-hexene was replaced with 1-octene in the process for producing the copolymers of D2, values of the mechanical properties above the minimum specified in claim 1 of the main request would follow.

Main request - Inventive step

- (e) The subject-matter of claim 1 of the main request differed from the copolymers prepared in the examples of D2, which was a suitable closest prior art document, in the use of 1-octene instead

of 1-hexene as comonomer;

- (f) The problem effectively solved resided in the provision of ethylene copolymers for making blown films with improved mechanical properties, which was shown to be solved in the examples and comparative examples of the patent in suit;
- (g) D2 itself provided no hint to use 1-octene instead of 1-hexene as comonomer to improve the mechanical properties of blown films prepared therewith.

At the oral proceedings before the Board, it was pointed out that D3 dealt with compression moulded films and not with blown films as in D2 or in the patent in suit. Therefore, D3 could provide no hint how to improve the mechanical properties of the blown films prepared in D2.

D4 and D15 contained similar information and were directed to ethylene copolymers prepared using very specific catalysts and preparation processes, which were not the ones used in D2. The skilled person had no reason to expect that any effect shown in D4 or D15 would mandatorily apply to the copolymers prepared in D2. In addition, D4 did not support the improvement in terms of MD and TD (as defined in claim 1 of the main request) shown in the patent in suit.

It was further argued in writing that, even if D3, D4 and/or D15 were held to show that blown films prepared from ethylene 1-octene copolymers exhibited improvements over those prepared from ethylene 1-hexene copolymers, these results were not consistent with those of D9. Therefore, the

skilled person would not be unequivocally certain that blown films based on 1-octene resins would have the improved balance of properties of dart impact and tear strength over similar films based on 1-hexene resins.

Therefore, the arguments of the respondent based on the combination of D2 with D3, D4 and/or D15 should be rejected.

- (h) For these reasons, the subject-matter of claim 1 of the main request was inventive starting from D2 as closest prior art.

Auxiliary request - Inventive step

- (i) Questioned by the Chairman of the Board, it was acknowledged during the oral proceedings that, in respect of inventive step, the same conclusion had to be reached for the auxiliary request as for the main request. In particular, it was not contested that the amendment made in claim 1 of the auxiliary request did not represent a further limitation of the subject-matter being claimed but merely explained, on the basis of a feature characterising the polymers being claimed at a molecular level, why the parameters indicated in feature (d) of claim 1 were in the ranges defined therein.

XIII. The respondent's arguments, insofar as relevant to the decision, may be summarised as follows:

Admittance of D19

- (a) It was indicated in the statement of grounds of appeal that the additional experimental data in

respect of examples 3 to 5 of D1 were filed to address the findings of the decision under appeal with respect to the formulation of the technical problem, namely improvement in film properties and the obviousness of employing 1-octene as the monomer. However, since that issue had been raised at the very outset of the opposition proceedings, there was no reason to file these data only at the appeal stage. This was all the more true because these data were apparently already in the possession of the appellant at that stage. Therefore there was no reason why these data could not have been submitted earlier, e.g. with the reply to the notice of opposition. Therefore, D19 should not be admitted into the proceedings.

Main request - Novelty over the examples of D2

- (b) During the oral proceedings before the Board, it was explicitly stated that claim 1 of the main request was to be read in accordance with the preliminary view of the Board as indicated in the communication (see section X above).
- (c) It was not contested that the subject-matter of claim 1 of the main request was novel over the examples of D2, since these examples were carried out using 1-hexene and not 1-octene as comonomer.
- (d) However, the subject-matter of claim 1 of the main request was not novel in view of the disclosure of D2 as a whole.

Main request - Inventive step

- (e) The subject-matter of claim 1 of the main request differed from the copolymers prepared in any of examples 5 to 7 of D2, which was a suitable closest prior art document, in the use of 1-octene instead of 1-hexene as comonomer;
- (f) Although the patent in suit contained examples according to operative claim 1 and comparative examples illustrating examples 5 and 6 of D2, no comparison with example 7 of D2 was made. Therefore, the improvements relied upon by the appellant had not been shown to be also present over example 7 of D2.

In addition, the values of MD and TD for the comparative examples indicated in the patent in suit were almost identical to the ones of the examples illustrative of the subject-matter being claimed. In fact, the small differences reported in the tables of the patent in suit were within the error of measurement of the determination method and could not support the improvement claimed by the appellant to be achieved.

Under these circumstances, the problem effectively solved resided in the provision of further copolymers for making blown films with good mechanical properties, in alternative to the ones of the examples of D2;

- (g) D2 itself disclosed 1-octene as a preferred alternative to 1-hexene as comonomer. Therefore, should the problem reside in the provision of an

alternative, D2 alone rendered the subject-matter of claim 1 of the main request obvious;

- (h) The outcome did not change, should the problem solved be held to reside - as held by the appellant - in the provision of ethylene copolymers which led to blown films with improved mechanical properties, since it was derivable from each of D3, D4 and D15 that it was known in the art that improved mechanical properties of blown films could be obtained by using 1-octene instead of 1-hexene as comonomer. In particular, the teaching of D3, D4 and D15 was not limited to specific catalysts and processes and all the information contained therein consistently taught the same effect of the chain length of the comonomer on the mechanical properties of the films made therewith, whereby D4 and D15 especially aimed at isolating the chain length as sole variable.

D9 was not a valid prior art document for assessing inventive step. In addition, it contained no information to refute the above findings derived from the disclosures of D3, D4 and/or D15.

In view of the above, it was obvious to solve the problem posed by using 1-octene instead of 1-hexene as comonomer in the examples of D2.

- (i) For these reasons, the subject-matter of claim 1 of the main request was not inventive.

Auxiliary request - Inventive step

- (j) In view of section XII (h) above, it was stated at the oral proceedings before the Board that the same

conclusion in respect of inventive step as for the main request had to be reached.

XIV. The appellant requested that the decision under appeal be set aside and the patent be maintained on the basis of the main request or of the auxiliary request, both filed with the statement setting out the grounds of appeal

The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. Admittance of D19

1.1 The declaration D19 filed by the appellant with letter of 10 June 2019 contains experimental data related to examples 2 to 6 of D1, which is a prior art document in the name of the appellant. Part of these data, in respect of examples 3 to 5 of D1, was filed for the first time with the statement of grounds of appeal. Some of these data were afterwards corrected (TD of example 3; MD of example 4) on 3 January 2019 and were finally complemented with similar data on 10 June 2019 in respect of examples 2 and 6 of D1. The respondent contested the admission of D19 into the appeal proceedings as late filed.

1.2 Since these data were said to have been retrieved from an in-house database of the appellant, it makes no doubt that these data *could* have been filed earlier.

1.3 However, it is questionable whether under the present circumstances these data also *should* have been filed

earlier.

In that respect, during opposition proceedings the appellant immediately reacted to the objection of inventive step raised by the respondent in the notice of opposition with regard to the formulation of the technical problem as improvement in film properties and with regard to the obviousness of employing 1-octene as comonomer (cf. appellant's reply to the notice of opposition of 3 August 2016, page 7, third paragraph). The opposition division in its preliminary opinion of 1 December 2016 merely summarised the parties' submissions without giving any indication on their content. Thus the parties were not given any reason to react and thus to make proper use of the procedural measures still available. Nevertheless they both presented further arguments respectively on 21 and 22 September 2017 and on 2 and 19 October 2017. Thus, the data first filed in the statement of grounds of appeal were provided at the first opportunity in appeal to address the opposition division's finding of lack of inventive step, by showing that the claimed *combination* of film properties, i.e. dart drop impact and tear strength, was not exhibited by the examples 3 to 5 of D1. In addition, on the basis of these data, the appellant pursued in appeal the same line of argumentation as during the opposition proceedings in support of the inventive step of the same requests. It is further noted that the corrections of the initial data made by the appellant had no relevance on the appellant's arguments, thus they cannot be considered as an amendment of the appellant's appeal case.

Furthermore, these data were held to be relevant to support the appellant's line of defense against the objection of novelty over D1. Although novelty of the

main request over D1 had been acknowledged by the opposition division, the appellant did not know when filing its appeal whether or not the Board would adhere to the findings of the opposition division in that respect, especially because the objection was still pursued by the respondent in appeal. Therefore, the filing of the data contained in D19 may be held to constitute a precautionary measure to strengthen the line of defense of the appellant.

Under these circumstances, the Board finds that it cannot be concluded that D9 *should* have been filed earlier. Therefore, it would not be justified to hold the data of D19 filed with letter of 10 June 2019 which were already filed with the statement of grounds of appeal inadmissible pursuant to Article 12(4) RPBA 2007 (which applies in view of Article 25(2) RPBA 2020), nor that it would be appropriate to make use of its discretion pursuant to Article 13(1) RPBA 2007 or equivalently Article 13(1) RPBA 2020 in order not to admit the corrected data or additional experimental data of D19 filed with letter of 10 June 2019.

1.4 Therefore, D19, in the version filed on 10 June 2019, is admitted into the proceedings.

2. Main request - Novelty

2.1 The Board has no reason to deviate from the view of both parties that the examples of D2 (Table 1) all disclose the preparation of ethylene 1-hexene copolymers and not of ethylene 1-octene copolymers as defined in claim 1 of the main request. Therefore, the subject-matter of claim 1 of the main request is novel over these examples of D2 in view of the nature of the

comonomer (1-octene instead of 1-hexene).

2.2 The respondent further argued that the subject-matter of claim 1 of the main request was not novel over D2 as a whole. However, in view of the Board's conclusion that the subject-matter of claim 1 of the main request lacks inventive step starting from the examples of D2 as closest prior art (see section 3 below), there is no need for the Board to deal with that objection in the present decision.

3. Main request - Inventive step

3.1 Closest prior art

3.1.1 The parties agreed that the copolymers prepared in the examples of D2 (examples 5 to 7 carried out according to the polymerisation conditions reported in Table 1) constituted the closest prior art for claim 1 of the main request.

3.1.2 At the oral proceedings before the Board, the respondent argued in particular that any of examples 5 to 7 of D2 constituted a suitable starting point for the assessment of the inventive step, independently of whether or not these examples were carried out using the so-called "condensed mode" preparation process (as defined in paragraphs 80-81 of the patent in suit or on page 12, lines 15-21 of D2 and which was used in examples 6 and 7 of D2 but not in example 5). That view was not contested by the appellant and the Board sees no reason to deviate from that view.

3.2 Distinguishing feature(s)

3.2.1 Considering that the parties had interpreted the subject-matter of claim 1 of the main request in different manners in their written submissions, the Board indicated in its preliminary opinion how it considered that the subject-matter of claim 1 were to be read (see section X, second paragraph, above). That view was not contested in writing and was even explicitly adhered to by both parties at the oral proceedings before the Board. Therefore, it is this interpretation which is applied in the following analysis.

3.2.2 In view of that reading of operative claim 1, both parties agreed at the oral proceedings before the Board that the copolymers so defined differed from the ones according to the disclosures of examples 5 to 7 of D2 in the nature of the comonomer being used, as indicated in section 2.2 above.

Considering that it was in particular accepted by the appellant at the oral proceedings before the Board that if 1-hexene is replaced with 1-octene in the process for producing the copolymers of D2, values of the mechanical properties above the minimum specified in claim 1 of the main request would follow, the Board also has no reason to deviate from the view of the parties regarding the identification of the distinguishing feature.

3.3 Problem effectively solved over the closest prior art

3.3.1 The appellant argued that the problem solved over the examples of D2 resided in the provision of ethylene copolymers which may be used to prepare blown films with improved mechanical properties and that the comparison of the examples with the comparative

examples of the patent in suit showed that said problem was effectively solved.

3.3.2 In that respect, it was not in dispute between the parties that examples 1 and 2 of the patent in suit illustrate the subject-matter of claim 1 of the main request, whereby the ethylene 1-octene copolymers are prepared using the condensed mode preparation process (Tables 1 to 3 of the patent in suit). It was also not in dispute between the parties that comparative examples CE1 and CE2 of the patent in suit are based on examples 5 and 6 of D2, as indicated in paragraph 128 of the patent in suit, and that a fair comparison may be made between these comparative examples - which illustrate the teaching of the closest prior art - and examples 1 and 2 of the patent in suit. In that respect, the Board notes that although comparative example 6 of D2 was carried out with the "condensed mode", as in examples 1 and 2 of the patent in suit, this was not the case for comparative example 5 of D2. Therefore the question arises if examples 1 and 2 may be fairly compared with comparative example 5. However, since examples 1 and 2 of the patent in suit show the same pattern of improved mechanical properties over both comparative examples according to said comparative examples 5 and 6 of D2 (significant increase in DDI, small increase in TD, marginal increase in MD), the question of the fairness of the comparison between these examples of the patent in suit, which was never in dispute between the parties, is not relevant and does not need to be dealt with here any further.

3.3.3 The respondent argued that the values of MD and TD reported for comparative examples CE1 and CE2 in the patent in suit were so close to the values indicated for examples 1 and 2 that they were within the

precision error and could not be seen as an improvement.

However, considering that both examples 1 and 2 of the patent in suit showed the same trend supporting an improvement as compared to comparative examples CE1 and CE2 and in the absence of any evidence to the contrary provided by the respondent, the argument did not convince. Therefore, it may be concluded from the data reported in Tables 3 and 4 of the patent in suit that the copolymers prepared in examples 1 and 2 of the patent in suit lead, in comparison to the copolymer prepared in comparative examples CE1 and CE2 according to the closest prior art, to 25 μm thick blown films exhibiting improved DDI, MD and TD values.

- 3.3.4 The respondent further argued that since no comparison was made with example 7 of D2, for which D2 does not provide data of the values of the mechanical properties of interest, no improvement was shown over all the examples identified as suitable closest prior art, so that the problem solved was to be formulated as residing in the provision of further ethylene copolymers in alternative to the ones of D2.

However, considering that examples 1 and 2 of the patent in suit were shown to demonstrate an improvement over two examples of D2 which illustrate the teaching of the closest prior art, and in the absence of appropriate data in D2 it would have been the duty of the respondent to provide evidence to the contrary in order to refute the presumption created by the patent in suit, e.g. by showing that said improvement was not achieved over example 7 of D2. In the absence of such evidence, the respondent's argument is rejected.

3.3.5 Therefore, it is agreed with the appellant that the problem effectively solved over the examples of D2 resides in the provision of ethylene copolymers which may be used to prepare blown films with improved mechanical properties. In that respect, the Board is satisfied that such a formulation of the problem solved does not contain elements of the solution as it was accepted by the appellant that the critical distinguishing feature is the comonomer used (hexene rather than octene), while the obtention of values of mechanical properties above the minimum specified in operative claim 1 follows from that use (see section 3.2.2, second paragraph, above).

3.4 Obviousness

3.4.1 The question remains to be answered if the skilled person, desiring to solve the problem identified in section 3.3.5 above, 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. This means, in the case in hand, that it has to be assessed if the skilled person would have had a motivation to solve that problem by preparing ethylene copolymers according to D2 but using 1-octene instead of 1-hexene as comonomer.

3.4.2 In that respect, although D2 teaches that 1-hexene is the most preferred comonomer, it also discloses the use of 1-octene as an alternative and preferred embodiment (D2: page 4, lines 11-13). However, D2 provides no explanation for which reasons 1-hexene is a more preferred alternative to 1-octene and in particular contains no disclosure relating that preference to

improved mechanical properties of blown films prepared with these copolymers. This means that D2 contains no indication that would have taught the skilled person away from using 1-octene instead of 1-hexene as comonomer, but also no hint to do so in order to solve the problem defined.

3.4.3 The respondent's objection was based, among others, on the combination of D2 with D4.

a) In that respect, D4 is a study which was carried out to examine the effects of comonomer type (comparing 1-butene, 1-hexene and 1-octene), on the blown film properties of metallocene catalyst based linear low density polyethylene (mLLDPE) resins and teaches that the copolymers prepared therein, despite their great similarities in their molecular, rheological and thermal properties, led to the preparation of blown films exhibiting increasing mechanical performance with increasing length of the alpha-olefin comonomer employed (page 1: abstract, in particular the last sentence thereof; page 7, paragraph "Conclusions"). In particular, D4 aimed at eliminating as far as possible any other factors than the comonomer chain length which may have had an influence on the mechanical properties (D4, section "Introduction": second paragraph on page 1, paragraph bridging pages 1 and 2 and first full paragraph on page 2; paragraph bridging pages 4 and 5). In other words, the aim of D4 was to isolate the comonomer chain length as the sole variable.

b) In the experimental section of D4, Figures 2A, 2C and 2D show a general trend of improvement with chain length in terms of DDI, MD and TD for films of various thicknesses, whereby for 25 μm films in particular, the DDI is significantly improved for 1-octene as compared

to 1-hexene, whereas TD is simultaneously only slightly improved and no difference in MD may be seen.

The appellant argued that Figures 2C and 2D of D4 did not demonstrate any improvement in terms of MD and TD when using 1-octene instead of 1-hexene in the copolymer used to prepare 25 μm blown films. However, whereas it may be agreed with the appellant that Figure 2C does not show an improvement in terms of MD when using 1-octene instead of 1-hexene, Figure 2D of D4 does show a - slight - improvement in terms of TD. In view of the general trend shown in Figures 2A, 2C and 2D supporting an improvement of the mechanical properties of the blown films when using 1-octene instead of 1-hexene as comonomer and of the general conclusion drawn by the authors of D4 in the abstract and concluding paragraph, the Board is satisfied that the skilled person would, in view of the teaching of D4 as a whole, have been motivated to replace 1-hexene with 1-octene in the examples of D2 in order to provide copolymers which are suitable to prepare blown films with improved mechanical properties. That conclusion is further supported by the fact that the improvements in terms of MD and TD shown in the patent in suit for example 2 as compared to comparative example CE2 also show a similar picture than the ones illustrated in Figure 2C and 2D of D4 (i.e. very limited improvement in MD; higher but still marginal improvement in TD). Therefore, Figure 2C and 2D of D4 would not have taught the skilled person away from using 1-octene instead of 1-hexene as comonomer in order to solve the problem posed, contrary to the appellant's view.

The appellant further argued that Figures 2A, 2C and 2D of D4 showed significant improvements when using 1-hexene instead of 1-butene but very little or no

improvement when using 1-octene instead of 1-hexene. However, as explained in the preceding paragraph, the Board considers that the skilled person would, in view of the general trend shown in Figures 2A, 2C and 2D and of the general conclusions indicated in D4 that the skilled person would have concluded that the use of 1-octene instead of 1-hexene as comonomer would lead to an improvement of the mechanical properties of the blown films prepared with these copolymers.

c) The appellant additionally argued that the copolymers of D4 were prepared with a very specific catalyst and process, which were different from the ones used in D2. Therefore, the skilled person would have had no reason to expect that the results of D4 would also be valid for the copolymers prepared in D2.

However, the catalyst used in D4 (page 2: section "Resin Synthesis") belongs to the same family of catalysts (metallocene catalysts having constrained geometry configuration) and is of the same general type than the ones used in the examples of D2 (page 5, lines 7-12; Table 1, with reference to examples 3 and 4). In addition, no evidence was submitted by the appellant to show that the skilled person would have any reason to consider that the teaching of D4 could not be valid for other metallocene catalysts and processes, different from the ones used in D4, in particular the ones used in D2. In particular, no evidence was submitted to refute the decision of the opposition division in that respect, which already arrived at that conclusion. Furthermore, as indicated in section 3.4.3.a) above, the aim of D4 was clearly to isolate the comonomer chain length as sole variable, which supports the respondent's view that the teaching of D4 could be generalised, in particular to similar

catalysts as used in D2. Finally, the appellant's argument is also not supported by the patent in suit, which neither shows, nor indicates that the type of metallocene catalyst and/or process may play a role (paragraphs 32 and 75). Under these circumstances, the appellant's argument did not convince.

d) The above conclusions are further supported by the fact that D4 (page 1, second paragraph) indicates that several earlier studies had already pointed out that film performance properties such as impact (toughness) and tear strengths increased with an increase in the comonomer length i.e., 1-butene < 1-hexene < 1-octene) and that D4 merely confirmed that conclusion, by more specifically isolating the feature "comonomer chain length" as sole variable (last sentence of the abstract; paragraph bridging pages 1 and 2; bottom of page 4 and table 1; page 7: paragraph "Conclusions").

e) In view of the above, it is concluded that, in view of the teaching of D4 as a whole, the skilled person would have been motivated to solve the above identified problem, with a reasonable expectation of success, by preparing ethylene copolymers according to the examples of D2 but using 1-octene instead of 1-hexene as comonomer. In that respect it is agreed with the respondent (letter of 15 May 2019: page 6, second full paragraph; letter of 22 December 2020: page 3, fifth full paragraph) that, according to established case law, a course of action can be considered obvious within the meaning of Article 56 EPC if the skilled person would have carried it out in expectation of some improvement or advantage, i.e. obviousness is not only at hand when the results are clearly predictable but also when there is a reasonable expectation of success (Case Law of the Boards of Appeal of the EPO, 9th

edition, 2019, I.D.7.1: see in particular the first paragraph).

- 3.4.4 Similar conclusions to the ones drawn for D4 are also reached in view of the disclosure of D15 (abstract; paragraph bridging pages 8819 and 8820; paragraph bridging the columns on page 8821; section 3.1 and Table 1; section 3.3; section 3.4: first paragraph, first sentence and second paragraph, first sentence; Figures 12 - DDI - and 13(a) - MD and TD -; section 5: page 8835, left hand side column and paragraph bridging pages 8835 and 8836), whereby it was not contested by the parties at the oral proceedings before the Board that the information contained in both documents (D15 and D4) was very similar. In that respect, it is in particular noted that, in contrast to Figures 2C/2D of D4, Figure 13(a) of D15 shows an improvement in both MD and TD when using 1-octene instead of 1-hexene as comonomer (see also the sentence on page 8831, left hand side column: "Of particular importance is that for any given direction (MD or TD), the Elmendorf tear strength and Spencer impact strength increase in the order: 'O' > 'H' > 'B'", whereby O, H and B stand for 1-octene, 1-hexene and 1-butene, respectively). Therefore, D15 provides an even stronger motivation than D4 to use 1-octene instead of 1-hexene to solve the above problem, as already concluded in section 3.4.3.e) above.
- 3.4.5 The respondent further considered the combination of D2 with the teaching of D3.

However, although the appellant first considered in writing that D3 was directed to blown films (statement of grounds of appeal: page 4, last paragraph), it argued at the oral proceedings before the Board that D3

was rather only related to compression moulded films. The latter view of the appellant is agreed upon by the Board, in particular in view of the first paragraph of the section "The Intrinsic Tear Test" on page 270 of D3. Further considering that it is known in the art that blown films undergo high deformation rates upon processing which have an impact on the mechanical properties of the films so produced, which is not the case of compression moulded films, it is the Board's view that the skilled person would have no reason to expect that any conclusion drawn from D3 would also apply to the blown films prepared according to the examples of D2. Therefore, the respondent's conclusions based on the combination of D2 with D3, which were also retained by the opposition division, are rejected.

- 3.4.6 The appellant had further argued in writing that even if it were to be held that D3, D4 and D15 showed that films based on ethylene 1-octene copolymers showed improvements over those based on ethylene 1-hexene copolymers, these results were not consistent with those of D9. Therefore, the skilled person would not be unequivocally certain that blown films based on 1-octene resins would have the improved balance of properties of dart impact and tear strength over similar films based on 1-hexene resins prepared using the same catalyst systems (statement of grounds of appeal: page 6, third to ninth paragraphs).

However, it was not contested by the appellant that D9 is not a valid prior art for the assessment of inventive step, as noted by the respondent (letter of 22 December 2020: page 3, fourth full paragraph). To the contrary, the appellant did not contest that argument in writing and the line of defense based on D9 was eventually not pursued by the appellant at the oral

proceedings before the Board. In addition, D9 in any case contains no information which would go against the teaching derived from D4 and D15 that an improvement in terms of tear and impact properties is attributable to an increase of the comonomer chain length. For these reasons, the appellant's arguments based on D9 are rejected.

- 3.4.7 In view of the above, it is concluded that it was obvious to provide ethylene copolymers which are suitable for preparing blown films with improved mechanical properties by using 1-octene comonomer instead of 1-hexene as comonomer in the preparation processes of the examples of D2, whereby it was accepted by the appellant that said measure would lead to values of the mechanical properties above the minimum specified in claim 1 of the main request (see section 3.2.2, second paragraph, above).
- 3.4.8 Therefore, the subject-matter of claim 1 of the main request is not inventive and the main request is not allowable.
4. Auxiliary request - Inventive step

As compared to claim 1 of the main request, claim 1 of the auxiliary request was amended by indicating that the copolymer being claimed should satisfy an additional requirement in terms of Compositional Distribution Breadth Index (CDBI). However, as was clarified with the appellant during the oral proceedings before the Board, all the arguments put forward in writing in that respect (see statement of grounds of appeal: page 7, seventh and eighth full paragraphs; letter of 3 January 2019: page 5, first paragraph) indicated that said requirement in terms of

CDBI did not represent a further limitation of the subject-matter being claimed but merely explained, on the basis of a feature characterising the copolymers being claimed at a molecular level, why the parameters indicated in feature (d) of claim 1 were in the ranges defined therein. In particular, the amendments made were not shown to distinguish the subject-matter of claim 1 of the auxiliary request from the one of claim 1 of the main request. This conclusion was confirmed by the fact that no additional arguments as compared to the main request were put forward by the appellant at the oral proceedings before the Board. Under these circumstances, the auxiliary request can only share the same fate as the main request, i.e. be found not to be inventive.

5. Since none of the requests of the appellant is allowable, 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