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**Datasheet for the decision
of 6 October 2021**

Case Number: T 0877/18 - 3.3.03

Application Number: 06703268.0

Publication Number: 1848750

IPC: C08F210/02

Language of the proceedings: EN

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 2020 Art. 13(1), 13(2)

Keyword:

Amendment to appeal case - amendment of the main request
overcomes issues raised (yes) - amendment detrimental to
procedural economy (yes)

Novelty - Main request (no) - First auxiliary request (yes)

Inventive step - Fifth auxiliary request (no) - First auxiliary
request (yes)

Decisions cited:

G 0001/92, T 1833/14



Beschwerdekammern

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Case Number: T 0877/18 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 6 October 2021

Appellant: The Dow Chemical Company
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Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
25 January 2018 concerning maintenance of the
European Patent No. 1848750 in amended form.**

Composition of the Board:

Chairman D. Semino
Members: D. Marquis
W. Ungler
M. Barrère
A. Bacchin

Summary of Facts and Submissions

- I. The appeal lies against the interlocutory decision of the opposition division posted on 25 January 2018 in which it was found that European patent No. 1 848 750 as amended according to the claims of the main request filed with letter of 6 January 2016 and an adapted description met the requirements of the EPC.
- II. Claim 1 of that main request read as follows:
- "1. A copolymer of ethylene and an alpha-olefin, said copolymer having
- (a) a density in the range 0.900-0.940 g/cm³,
 - (b) a molecular weight distribution (Mw/Mn) in the range 3.5 to 4.5,
 - (c) a melt elastic modulus G' (G''= 500 Pa) in the range 40 to 150 Pa,
 - (d) an activation energy of flow (Ea) in the range 28-45 kJ/mol,
 - (e) long chain branching parameter g' of < 1.0, and
 - (f) a melt index (g/10 min) in the range 1.0-3.5".
- III. The following documents were *inter alia* filed in opposition:
- D1: WO 99/035174
D8A': Certificate of Analysis 1674387 dated 10 January 2003
D8B': Certificate of Analysis 1739662 dated 17 November 2003
D8C': Certificate of Analysis 1814653 dated 16 January 2004
D9A: Blown Film Resin ELITE 5100G Enhanced Polyethylene Resin dated January 2003

D9B: Blown Film Resin ELITE 5100G Enhanced Polyethylene Resin dated August 2005

D11': Certificate of Analysis 4861953 dated 25 May 2010

D16: WO 94/14855

D20: ASTM D 1238-98

D21C: Certificate of Analysis 1507826 dated 19 January 2004

D22: Stark et al., "Thermal and rheological studies on the molecular composition and structure of metallocene- and Ziegler-Natta-catalyzed ethylene- α -olefin copolymers", Journal of Applied Polymer Science, Volume 83, Issue 5, pages 1140-1156 (2002)

D23: Malmberg et al., "Long-Chain Branched Polyethene Polymerized by Metallocene Catalysts Et[Ind]₂ZrCl₂/MAO and Et[IndH₄]₂ZrCl₂/MAO", Macromolecules, 31 (24), pages 8448-8454 (1998)

D26: Scholte et al., "Mark-Houwink Equation and GPC Calibration for Linear Short-Chain Branched Polyolefins, Including Polypropylene and Ethylene-Propylene Copolymers", Journal of Applied Polymer Science, Vol. 29, pages, 3763-3782 (1984)

D27: Declaration of Mr. Wang dated 16 January 2015

D33: Declaration of Mr. Sluijts on batch TE24080303 dated 25 July 2017

D34: Experimental Report by Mr. Wang on batch TE24080303 dated 28 July 2017

D35: Declaration by Prof. J. Soares of the Department of Chemical and Materials Engineering at the University of Alberta, Canada, dated 8 August 2017

IV. As far as it is relevant to the present appeal, the decision of the opposition division can be summarized as follows:

- The claims of the main request found a support in the application as originally filed.
- The subject-matter of the main request was sufficiently disclosed. The methods for the determination of the dart drop impact (DDI), the haze and the gloss were well established standard methods known to the skilled person. These methods were also referred to in the patent in suit. The examples of the patent in suit further provided sufficient guidance as to the preparation of films having the required combination of DDI, haze and gloss.
- The main request did not validly claim the priority date of 9 February 2005. The main question regarding the objection of lack of novelty based on the prior use ELITE™ 5100G was whether the documents on file showed that the product made available prior to the filing date of the patent in suit also possessed the combination of features (b) to (e) as defined in operative claim 1. There was however no direct evidence on file regarding all relevant features showed in combination by the resin batches delivered to BPI Indupac in January and December 2004, notably features (b) to (e) according to operative claim 1. The prior use ELITE™ 5100G therefore did not take away the novelty of the main request.
- Tables I and II of D22 disclosed an ethylene/hexene copolymer (sample "me MD-24") but that document did not disclose the melt elastic modulus G' ($G''=500\text{Pa}$) nor the long chain branching parameter g' of that copolymer. It was not shown beyond reasonable doubt that the calculated value of the melt elastic

modulus G' and the assumed value of long chain branching parameter g' were according to operative claim 1. Claim 1 of the main request was therefore novel over D22 and for the same reasons over D23.

- As to inventive step starting from the retained sample of ELITE™ 5100G (batch TE24080303) produced in May 2005 at Terneuzen (D33), the only feature characterizing operative claim 1 was the slightly higher melt index of 1.0-3.5 g/10 min, as the melt index was 0.83 g/10 min for the sample of ELITE™ 5100G (batch TE24080303) representing the closest prior art.
- The examples of the patent in suit showed that the copolymers according to operative claim 1 had better haze, gloss and DDI. The problem was thus to provide a polyethylene resin suitable for producing films having an improved balance of properties in terms of DDI, gloss and haze.
- There was no indication in D9B that would have motivated the skilled person to raise the melt index with the expectation to solve the problem posed. Operative claim 1 was therefore inventive over that closest prior art.

V. The opponent (appellant) lodged an appeal against the decision of the opposition division and filed *inter alia* documents D46 (Declaration of Prof. Soares dated 1 June 2018) and D47 (Invoice Ardeer dated 31 May 2005) with the statement of grounds of appeal.

VI. With the reply to the statement setting out the grounds of appeal the patent proprietor (respondent) filed a main request (corresponding to the main request allowed

by the opposition division) and the first to fifth auxiliary requests.

- VII. With letter of 14 October 2019, the appellant filed *inter alia* document D48 (Statement of Prof. Soares dated 1 October 2019). The appellant also filed D50 (International standard ISO 1133 from 1 June 2005) with letter of 14 October 2020.
- VIII. With letter of 12 February 2020, the respondent filed a reply addressing sufficiency, novelty and inventive step.
- IX. With letter of 9 August 2021, the respondent filed a new main request as well as a new first, second, third and fifth auxiliary requests.
- The main request and the first auxiliary request filed with letter of 9 August 2021 corresponded to the main request and first auxiliary request filed with the statement setting out the grounds of appeal respectively from which claim 13 had been deleted. The fifth auxiliary request corresponded to the fifth auxiliary request filed with the statement setting out the grounds of appeal from which claim 12 had been deleted.
 - Claim 1 of the main request corresponded to claim 1 of the main request that was allowed by the opposition division. Claim 1 of the first auxiliary request differed from claim 1 of the main request in that the range defining the melt index (feature (f)) was limited to 1.2-1.6. Claim 1 of the fifth auxiliary request corresponded to claim 1 of the main request in which the range defining the molecular weight distribution (Mw/Mn) was limited

to 3.6 to 4.0 and the range defining the melt elastic modulus G' was limited to 45 to 100 Pa.

X. Oral proceedings were held on 6 October 2021, the parties being present by videoconference.

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

Novelty of the main request

- Claim 1 of the main request lacked novelty over D22 and D23. Sample "me MD-24" of D22 was a copolymer of ethylene and hexene for which Tables I and II of D22 showed that the density, molecular weight distribution, activation energy of flow and melt index were according to operative claim 1.
- It was established that copolymer "me MD-24" of D22 and copolymer C3 of D23 had the same composition. There was enough guidance in D22 and D23 for the reproduction of the copolymer and the skilled person had the necessary common general knowledge to select the parameters of the polymerization process such that a product corresponding to the properties disclosed in Tables I and II of D22 was obtained. The copolymer of D22/D23 had a long chain branching parameter g' that had to be below 1.0 as shown by the evidence provided in D1, D26, D35 and D46. Also, the extrapolations performed on the data of G' obtained at different G'' values in D27, D35, D46 and D48 showed that regardless of the mathematical model chosen, the value of melt elastic modulus G' at $G'' = 500$ Pa was according to the range defined in operative claim 1. Claim 1 of the main request therefore lacked novelty over D22/

D23.

- Admittance of the new line of defence against the prior use ELITE™ 5100G

The line of defence based on G 1/92 and T 1833/14 with regard to the prior use product ELITE™ 5100G was introduced late into the appeal proceedings and there was no reason as to why it had not been filed with the reply to the statement of grounds of appeal. That line of defence should therefore not be admitted into the proceedings.

- Inventive step of the fifth auxiliary request

The prior use product ELITE™ 5100G and in particular the retained sample TE24080303 disclosed in D33 as well as D34 and shown to have been made commercially available (D47) represented the closest prior art for the fifth auxiliary request. Claim 1 of the fifth auxiliary request differed from the prior used product of D33/D34 in the value of melt index. It was not shown that raising the melt index in the range according to operative claim 1 was associated to an effect, in particular since D9A/D9B showed that the copolymer of D33/D34 was known to be usable in the field of film preparation. The problem solved was thus the provision of an alternative ethylene copolymer for films.

The certificates of analysis D8A', D8B', D8C', D11' and D21C showed that the melt index of the commercially available product ELITE™ 5100G could be as high as 1.02 g/10 min. On that basis the retained sample of the prior use product ELITE™

5100G with a melt index modified according to operative claim 1 was an obvious solution to the problem posed. Claim 1 of the fifth auxiliary request lacked therefore an inventive step in view of D33/D34.

- Novelty of the first auxiliary request

Claim 1 of the first auxiliary request lacked novelty in view of D22/D23. In particular the melt index value of 1.1 g/10 min disclosed in Table I of D22 for the copolymer "me MD-24" was equivalent to a range of values extending up to 1.15 g/10 min in view of commonly known rounding rules. The same principles applied to the range of melt index defined in operative claim 1 led to a range extending down to 1.15 g/10 min. Since the equivalent ranges of melt index for the copolymer "me MD-24" of D22 and that defined in operative claim 1 overlapped, the first auxiliary request lacked novelty.

Alternatively, D20 and D50 established that a value of melt index was tainted by measurement errors that had to be taken into account when comparing the melt index disclosed in D22 with that defined in operative claim 1. D20 and D50 showed that these measurement errors amounted to at least 10% of the determined value. That showed that the lower value of the range defining the melt index in operative claim 1 was not distinguishable from the melt index disclosed for "me MD-24" in D22. Claim 1 of the first auxiliary request thus lacked novelty over D22/D23.

- Inventive step of the first auxiliary request

D22/D23 represented the closest prior art for the first auxiliary request. No effect was associated with an increase of melt index from 1.1 g/10 min disclosed for "me MD-24" to a value in the range of 1.2-1.6 g/10 min defined in operative claim 1. D22/D23 represented the same type of copolymers for the same applications as in the patent in suit and D16 showed that copolymers having a melt index of 0.5-1.5 g/10 min were suitable to the preparation of films with good dart impact properties, haze and gloss. Claim 1 of the first auxiliary request lacked therefore an inventive step over D22/D23.

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

- Novelty of the main request

The question of novelty in view of D22/D23 was whether the skilled person could have reproduced the composition of "me MD-24" and would have obtained a product whose properties were according to operative claim 1. While the copolymers of D22/D23 were enabled by the teachings contained in these documents, some process parameters nevertheless had to be guessed by the skilled person such as the pressure of hydrogen and the temperature during the polymerization. It had not been established that the copolymer obtained on the basis of the information available in D22 would be according to operative claim 1. Furthermore, G' at $G'' = 500$ Pa was not disclosed in D22/D23 such that the skilled person could not have used that property as a guide. Therefore novelty should be

acknowledged.

- Admittance of the new line of defence against the prior use ELITE™ 5100G

The defence based on G 1/92 and T 1833/14 was not a new argument, but simply a reminder of how the law on novelty should be applied in situations where not all features of a composition are explicitly disclosed. That defence had therefore to be considered by the Board.

- Inventive step of the fifth auxiliary request

Starting from the retained sample of ELITE™ 5100G disclosed in D33/D34, the examples of the patent in suit and in particular example 2 showed that the copolymers according to operative claim 1 had improved mechanical and optical properties as compared to the properties disclosed in D9B for the commercial product of ELITE™ 5100G. The problem to be solved was the provision of a film composition having improved impact and optical properties. The solution was a composition which had a higher melt index than ELITE™ 5100G. There was no motivation to raise the melt index of the retained sample of ELITE™ 5100G disclosed in D33/D34 from 0.83 g/10 min to a value in the range of 1.0 to 3.5 g/10 min especially since the skilled person knew that by doing so the impact properties of the copolymer would have worsened. Operative claim 1 involved therefore an inventive step.

- Novelty of the first auxiliary request

Claim 1 of the first auxiliary request was novel in

view of D22/D23 in particular since the melt index disclosed for the copolymer "me MD-24" was not in the range defined in operative claim 1.

Furthermore, the rounding rule was not applicable to the present case. Also, D20 and D50 did not disclose a reliable value of the measurement errors of the melt index. Operative claim 1 was thus novel over D22/D23.

- Inventive step of the first auxiliary request

The documents D22 and D23 were research papers on ethylene polymers that were not about films. Starting from D22/D23 to assess inventive step therefore did not make sense. Moreover, there would be no motivation to increase the melt index of the copolymer "me MD-24" and no reason to combine D22/D23 with D16. Operative claim 1 involved therefore an inventive step.

XIII. The appellant (opponent) requested that the decision under appeal be set aside and the patent be revoked.

XIV. The respondent (patent proprietor) requested that the decision be set aside and the patent be maintained on the basis of the main request, or on the basis of the fifth auxiliary request, or on the basis of any of the first to fourth auxiliary requests, wherein the fourth auxiliary request was filed with letter of 12 February 2020 and all other requests were filed with letter of 9 August 2021.

Reasons for the Decision

Main request

1. Admittance

1.1 The notification of the summons to oral proceedings of the present case is dated 12 November 2020, i.e. after the entry into force of the revised version of the Rules of Procedure of the Boards of Appeal on 1 January 2020. Therefore, in view of the transitional provisions laid out in Article 25 (1) and (3) RPBA 2020, Article 13 RPBA 2020 applies to the present case.

1.2 The admittance of the amendment to the respondent's case in the form of the main request (new claim requests filed on 9 August 2021) is therefore subject to the provisions of Article 13(2) RPBA 2020, which provide that amendments to a party's case made after notification of oral proceedings are not to be taken into account unless exceptional circumstances, justified by cogent reasons, exist.

1.3 The main request filed on 9 August 2021 corresponds to the request that was maintained by the opposition division (first auxiliary request filed on 8 January 2016) from which claim 13 was deleted. The respondent submitted with their letter of 9 August 2021 that the purpose and the effect of the amendment performed in the main request was to address the objection of lack of sufficiency of disclosure against claim 13 that was pursued in appeal by the appellant. Indeed, that objection is rendered moot by the deletion of claim 13 from the main request and the consequential renumbering of claim 14 submitted with the statement setting out

the grounds of appeal. That new main request therefore contributes to the procedural economy of the case since it simplifies the questions to be dealt with at the oral proceedings and does not change the factual and legal framework of this case. The admittance of the main request and that of the auxiliary requests was also not contested by the appellant.

1.4 The appellant and the Board were able to deal with the amended main request without undue delay at the oral proceedings, in particular since further objections on file including the novelty objection were directed against the subject-matter of claim 1 of the main request, which did not change. In view of the simplification of the case, the absence of new issues and the lack of objection on the side of the appellant the Board considers it appropriate to accept that "exceptional circumstances" within the meaning of Article 13(2) RPBA 2020 were present in the present case that justified to admit the main request into the proceedings.

1.5 The same conclusion applies to the first and fifth auxiliary requests in which the claim corresponding to claim 13 in the main request was deleted.

2. Novelty in view of D22/D23

2.1 Novelty of claim 1 of the main request was contested in view of the copolymer "me MD-24" in D22 (Tables I and II) and copolymer C3 in D23 (Table 1).

2.2 The copolymer "me MD-24" is disclosed in Tables I and II of D22 as being a copolymer of ethylene and 2.5 wt.-% of a "C6 olefin" (hexene on page 1142, right column, second paragraph) that has a density of 0.937 g/cm^3 , a

molecular weight distribution of 3.6, an activation energy of 34 kJ/mol and a melt index 1.1 g/10 min, all of these parameters being according to operative claim 1. Copolymer C3 of D23 is disclosed in Table 1 as being a copolymer of ethylene and 2.5 wt.-% "C6 olefin" (1-hexene on page 8448, right column, second paragraph) as well. Both copolymers "me MD-24" and C3 were prepared with the same metallocene catalyst (rac-[ethylenebis(tetra-hydroindenyl)]Zirconiumdichloride (Et[IndH₄]₂ZrCl₂) (D22, page 1142, right column, first paragraph; D23, page 8449, right column, last full paragraph; Cat 2 defined on page 8448, right column, second full paragraph). D22 (reference 32 on page 1142, second column, end of first paragraph) refers to D23 for the details of the polymerization procedure of "me MD-24".

- 2.3 Both samples of D22 and D23 display the same weight average molecular weight (117000) and the same molecular weight distribution (3.6) (D22, Table II and D23, Table 1). Another evidence of the similarity of "me MD-24" of D22 with the copolymer C3 of D23 derives from the superposition of the values of melt elastic moduli G' as a function of G'' reported in Table II in D22 with the digitized data reported in Figure 2 of D23. In particular, figures 1 and 2 of D35 show that the data points from D22 line up with those of D23 on the same curve, either in a G' x G'' or a log G' x log G'' plot, respectively. In that regard, it is apparent that the copolymer "me MD-24" of D22 and the copolymer C3 of D23 follow the same curve of G' as a function of G''. It was further made plausible that the difference in the activation energy E_a values disclosed in D22 (34 kJ/mol) and D23 (38 kJ/mol) could be explained by the use of different conditions during their measurements (D46, page 2, penultimate paragraph). It was thus made

plausible that the copolymer "me MD-24" of D22 and the copolymer C3 of D23 had the same activation energy E_a .

- 2.4 The copolymer of the sample "me MD-24" of D22 and copolymer C3 of D23 thus share the same preparation process, the same monomers and have the same values of several specific properties. Under these circumstances, the Board finds that the appellant has made it credible that both copolymers of "me MD-24" of D22 and C3 of D23 were identical, which point was not disputed by the respondent at the oral proceedings before the Board and is therefore accepted by the Board.
- 2.5 Since none of D22 and D23 disclosed the melt elastic modulus G' at $G'' = 500$ Pa and the long chain branching parameter g' of the copolymers "me MD-24" and C3, the question of novelty in the present case was whether it could be shown that these copolymers implicitly fulfilled the conditions on G' and g' as laid out in operative claim 1.
- 2.6 An extrapolation of the melt elastic modulus G' at $G'' = 500$ Pa was provided in D27 (part 2) for the copolymer "me MD-24" of D22 (125 Pa in Table 2 on page 3) and the copolymer C3 of D23 (117 Pa in Table 3 on page 4), both values being well within the range defined in operative claim 1 (40-150 Pa). The validity of that extrapolation was contested by the respondent on the grounds that the relation between G' and G'' would not be linear and that the extrapolation was conducted on three points only.
- 2.7 The appellant provided a series of additional extrapolations of G' as a function of G'' based on more elaborated mathematical models (quadratic polynomial fits) involving a higher number of points derived from

the values of melt elastic modulus G' disclosed in figure 2 of D23 for copolymer C3. The results of these extrapolations are summarized in Table 1, page 7 of D35. The values of melt elastic modulus G' at $G''= 500$ Pa obtained in D35 from two different models, 113 Pa and 108 Pa, are also according to operative claim 1. It has therefore been credibly shown with different models that the elastic modulus G' at $G''=500$ Pa of the copolymers "me MD-24" of D22 and C3 of D23 were according to operative claim 1.

2.8 The declaration D46 (last two paragraphs on page 1 also citing appendix A and B) as well as the declaration D48 (discussion of D23, on pages 2-4 of D48) further show that even considering different level of deviations arising from the data concerning G' of the sample C3 on Figure 2 in D23, the estimated values of melt elastic modulus G' at $G''= 500$ Pa that were obtained from the models of D35 were always well within the range of operative claim 1 (D48, page 4, Table 2). Considering the evidence provided by the appellant in D27, D35, D46 and D48, the Board is convinced that the melt elastic modulus G' at $G''= 500$ Pa for the sample C3 of D23 and thus that of sample "me MD-24" of D22 was shown to be according to operative claim 1 based on data available from these documents.

2.9 The respondent's arguments (reply to the statement setting out the grounds of appeal, page 4, paragraph 4 and page 5, paragraphs 3-5) raised doubts as to the choice of the method of extrapolation of the elastic modulus G' and as to the accuracy of the data used for the estimation of the melt elastic modulus G' . These arguments however were not substantiated by verifiable facts. Moreover, the appellant did address the arguments of the respondent with the additional

extrapolations in D35, D46 and D48. In that regard it cannot be concluded that the arguments of the respondent showed that the melt elastic modulus G' at $G'' = 500$ Pa of the samples of "me MD-24" of D22 and sample C3 of D23 were outside the range defined in operative claim 1.

2.10 As to the long chain branching parameter g' , claim 1 of the main request does not provide a specific definition of that parameter nor does it specify a method for its determination. According to paragraph 17 of the patent in suit however, the details of the long chain branching parameter g' can be found in EP 1045868, the European application following D1 which was cited by the appellant in place of EP 1045868 (see page 10, lines 14/15 of the letter of the appellant of 4 June 2018). On page 18, lines 1-27, D1 discusses the determination of the long chain branching parameter g' . It mentions that g' is the ratio of the measured intrinsic viscosity of a polymer to that of a linear polymer having the same molecular weight (lines 8-11). According to that definition, a linear polymer would have a parameter g' of 1 while a polymer having long chain branching would have a g' below 1.

2.11 D26 (page 3766) additionally shows in equation (12) defining the long chain branching g' in mathematical terms:

$$g' = (1-S)^{a+1} \quad (12)$$

(where S represents the mass fraction of short side chains and " a " is a constant), that even a small amount of short chain branching present on a polymer, for example resulting from the presence of comonomers in the polymer backbone, mathematically results in a

parameter g' being below 1 for that copolymer.

2.12 In order to provide a more accurate estimation of the long chain branching, D26 teaches that the value of g' must be corrected for the presence of short chain branching in the copolymer (D26, fourth paragraph, page 3768). The patent in suit however refers to the method of D1 which does not involve that correction (D1, page 18, lines 22/23). Applying that method to the copolymer "me MD-24" of D22 and the copolymer C3 of D23 containing a C6 olefin therefore results in a long chain branching g' as defined in the patent in suit that is necessarily below 1, as set out in operative claim 1.

2.13 The respondent acknowledged at the oral proceedings before the Board that the copolymer "me MD-24" of D22 was "enabled", meaning that "me MD-24" having the properties set out in Tables I and II of D22, was accessible for the skilled person, which ultimately is a copolymer that had a density, molecular weight distribution (M_w/M_n), activation energy E_a and melt index in the ranges defined in operative claim 1 for these features. It was also established in sections 2.8 and 2.12 above that copolymer "me MD-24" as disclosed in D22 also intrinsically possessed a melt elastic modulus G' at $G'' = 500$ Pa and a long chain branching parameter g' that were according to operative claim 1. The composition of "me MD-24" was thus available from D22 to the skilled person which could also reproduce it. On that basis the copolymer "me MD-24" as disclosed in D22 was part of the state of the art and the subject-matter of claim 1 of the main request lacks novelty with respect to it.

Fifth Auxiliary request

3. Admittance of the new line of defence based on lack of enablement
 - 3.1 The objections of lack of novelty and lack of inventive step based on the prior used product ELITE™ 5100G that were dealt with on pages 11 and 17 of the decision of the opposition division were pursued in appeal. With regard to these objections, the respondent provided a new line of defence with their letter dated 12 February 2020 (cf. pages 3 and 4 thereof) which was based on an alleged lack of enabling information relating to the product ELITE™ 5100G.
 - 3.2 It is apparent from the facts of the case that that line of defence had not been raised during the opposition proceedings nor with the reply to the statement of grounds of appeal on 18 October 2018. Since it was filed prior to the summons to attend oral proceedings before the Board and since it amounts to an amendment of the respondent's appeal case, the dispositions of Article 13(1) RPBA 2020 apply to the present situation.
 - 3.3 The filing of the new line of defence of the respondent does not result from a change in the proceedings. Also, the opinion given by the Enlarged Board of Appeal in G 1/92 (OJ 277, 1993, public availability 18 December 1992) and decision T 1833/14 (public availability 27 March 2018) upon which the new line of defence was based had already been made publicly available before the reply to the statement of grounds of appeal. There is therefore no apparent reason as to why the new line of defence was not filed at the latest with the reply to the statement of grounds of appeal, as it should be

according to Article 12(3) RPBA 2020 (the content of which is substantially identical to that of Article 12(2) RPBA 2007, applicable at the time when the reply was filed).

3.4 Article 13(1) RPBA 2020 sets out that "any amendment to a party's appeal 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". When exercising this discretion, *inter alia* the current state of the proceedings, the suitability of the amendment to resolve the issues which were admissibly raised by another party in the appeal proceedings or which were raised by the Board, and whether the amendment is detrimental to procedural economy shall be taken into consideration.

3.5 It is apparent that the new line of defence of the respondent was filed late into the appeal proceedings and that the Board sees no compelling reason as to why it could not have been filed with the reply to the statement setting out the grounds of appeal. The change in the argumentation of the respondent is also not such that it resolves issues admissibly raised in appeal, on the contrary, it raises a new issue that would have a significant impact on the case as it would, if admitted, necessitate the consideration of new arguments and possibly new evidence for the first time in a late stage of the appeal proceedings or, in order to give the parties the possibility to discuss the issue in two instances, a remittal of the case to the department of first instance that would ultimately be detrimental to procedural economy (letter of the appellant dated 14 October 2020, first paragraph on page 4). In view of the principle of procedural economy

the Board therefore exercised its discretion not to admit the new line of defence of the respondent that is based on the alleged lack of enablement of the prior used product ELITE™ 5100G.

4. Inventive step in view of the retained sample TE24080303 of ELITE™ 5100G analysed in D33
- 4.1 Claim 1 of the fifth auxiliary request corresponds to claim 1 of the main request, except for the further limitations of the molecular weight distribution to the range of 3.6 to 4.0, and the limitation of the melt elastic modulus G' ($G''=500$ Pa) to the range of 45 to 100 Pa.
- 4.2 The objection of lack of inventive step based on a retained sample TE24080303 of ELITE™ 5100G mentioned in D33 dealt with in the decision of the opposition division (page 17) was pursued in appeal. The public availability of a retained sample TE24080303 of ELITE™ 5100G prior to the earliest valid priority of the patent in suit was not contested in appeal (cf. Minutes of the oral proceedings before the Board, page 4/5, paragraph 5) nor does the Board see, in view of the evidence provided in particular on page 2 of D33 and on D47, a reason to take a different view.
- 4.3 The retained sample TE24080303 of ELITE™ 5100G was analysed and the properties of that product are reported in D34. This certificate of analysis discloses that the product had a density of 0.9201 g/cm^3 , a molecular weight distribution (Mw/Mn) of 3.77, a melt elastic modulus G' at $G''=500$ Pa of 84.1 Pa, an activation energy of flow E_a of 40.8 kJ/mol and a long chain branching parameter g' of 0.877. These properties are all according to operative claim 1. The melt index

of the sample however is 0.83 g/10 min according to D34, a value that is not according to operative claim 1 which requires a melt index in the range of 1.0 to 3.5 g/10 min (condition (f)). That distinguishing feature was not in dispute between the parties.

4.4 D9A (published 01/03) and D9B (published August 2005) are product datasheets for ELITE™ 5100G that were publicly available before the filing date of the patent in suit (earliest priority date of the patent in suit, section "priority", page 11 of the decision of the opposition division). Both D9A and D9B establish that the commercially available product ELITE™ 5100G had been used in blown film applications and that the product displayed improved handling and mechanical properties as well as tailored optical properties (D9A, first and last paragraphs and Table and D9B, first paragraph and Table). Hence, the copolymer of the retained sample with the batch number TE24080303 is in the same field as the patent in suit and it addresses the same general problem of providing films with tailored mechanical and optical properties. That sample is thus a reasonable starting point for an assessment of inventive step of operative claim 1.

4.5 The respondent referred to a comparison of the values of dart impact strength, gloss and haze disclosed in Table 2 for example 2 of the patent in suit with the corresponding properties disclosed in the tables of D9A/D9B and argued that the improved properties of the copolymers according to operative claim 1 over those of retained sample TE24080303 of ELITE™ 5100G derived from an increased melt index of the copolymer.

4.5.1 Beneficial effects or advantageous properties, if appropriately demonstrated by means of truly comparable

results, can in certain circumstances properly form a basis for the definition of the problem that the claimed invention sets out to solve and can, in principle, be regarded as an indication of inventive step. The only comparative tests suitable for this are, however, those which are concerned with the structurally closest state of the art to the invention, because it is only here that the factor of unexpectedness is to be sought (Case Law of the Boards of Appeal, 9th Edition, July 2019, I.D.4.2).

- 4.5.2 The direct comparison of the properties of the copolymers according to the patent in suit and the properties of the retained sample TE24080303 of ELITE™ 5100G of D33/D34 shown in D9A/D9B is however not a fair comparison to show an effect of the melt index of the copolymer since the copolymers of the patent in suit and of D33/D34 differ from one another in more than their melt index.
- 4.5.3 It is in particular immediately apparent that the copolymer of example 2 of the patent in suit differs from that of D33/D34 in its melt index (Patent example 2: 1.2 g/10 min; D33/D34: 0.83 g/10 min) and in their values of melt elastic modulus G' (Patent example 2: 51 Pa; D33/D34: 84.1 Pa) and activation energy of flow (Patent example 2: 32 kJ/mol; D33/D34: 40.8 kJ/mol). Considering the significant differences of melt elastic modulus G' and activation energy of flow it cannot be concluded that any effect observed on the properties of the copolymers according to the patent in suit is attributable to the choice of a copolymer having a melt index in the specific range of 1.0 to 3.5 g/10 min. The only problem that can be defined is thus the provision of alternative copolymers of ethylene and α -olefins for

preparing films.

4.6 The question to be answered regarding obviousness is whether it would have been expected that the copolymer according to the retained sample TE24080303 of ELITE™ 5100G analysed in D33/D34 but with a melt index in the range of 1.0-3.5 g/10 min could be processed into films. D9A/D9B already establishes that copolymers of ELITE™ 5100G with a melt index of 0.85 g/10 min were usable in blown film applications. It is also derivable from the certificate of analysis 2176543 of the retained sample TE24080303 of ELITE™ 5100G on page 2 of D33 that the melt index of these commercially available copolymers can generally vary in the range of 0.68-1.02 g/10 min, as it was also confirmed by D8A', D8B', D8C', D11' and D21C. It can thus be concluded that products of ELITE™ 5100G having a melt index of up to 1.02 g/10 min, a value according to operative claim 1, could be processed to films. It follows that operative claim 1 lacks an inventive step over the retained sample TE24080303 of ELITE™ 5100G disclosed in D33/D34.

4.7 It was additionally argued that the skilled person would not have considered increasing the melt index of the copolymer of the retained sample of D33/D34 since it was known that doing so would lead to poorer impact properties and also because it would not be guaranteed that raising the melt index of the retained sample of ELITE™ 5100G would have been possible whilst maintaining the other relevant properties according to operative claim 1 unchanged. It has however not been shown by the respondent to which extent raising the melt index of ELITE™ 5100G would have been relevant to the problem posed which is related to the mere preparation of films. The patent in suit does also not support the arguments of the respondent since the data

made available in the examples show that an increase of the melt index does not consistently lead to poorer impact properties of the produced films and it is also apparent from these examples that raising the melt index in the range of 0.95 to 1.3 g/10 min does not significantly impact any of the parameters (a) to (d) found to be relevant by the respondent.

First auxiliary request

5. Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the range defining the melt index (g/10 min) (f) was amended from a range of 1.0 to 3.5 to a range of 1.2 to 1.6.
6. Novelty in view of D22/D23
 - 6.1 It was not in dispute that the copolymer "me MD-24" disclosed in Tables I and II of D22 had a melt index of 1.1 g/10 min. Regarding the features (a)-(e) defined in operative claim 1, reference is made to the discussion of novelty of the main request from which it was concluded that these features were already disclosed for the copolymer "me MD-24" of D22.
 - 6.2 The question at this juncture was whether the value of the melt index of the copolymer "me MD-24" disclosed in D22 was according to operative claim 1. The appellant addressed the question of novelty over D22 under two aspects, that of the rounding rule applied to the values of melt index and that of the measurement errors deriving from the method applied to determine the melt index in D22.
 - 6.2.1 The appellant argued that by application of the rounding rule, the value of the melt index disclosed in

D22 for the copolymer "me MD-24" (1.1 g/10 min, Table I) would in fact correspond to any value between 1.05 and 1.15 g/10 min. Apply the same rounding rule to the minimum value defining operative claim 1 (1.2 g/10 min) would lead to a melt index of between 1.15 and 1.25 g/10 min. Since both "ranges" representing the melt index disclosed in D22 and in operative claim 1 coincided for a melt index of 1.15 g/10 min, the appellant concluded that operative claim 1 lacked novelty over D22.

6.2.2 It is however doubtful whether that approach is a valid application of the rounding rule. Indeed, rounding is commonly known as an operation by which a number is replaced by an approximate value that has a shorter, simpler, or more explicit representation and is often done to obtain a value that is easier to report and communicate than the original. The method proposed by the appellant by which a simpler value (1.1 g/10 min) is replaced by a range of more complex values (1.05 to 1.15 g/10 min) is precisely the opposite of the rounding rule and it ultimately results in an artificial creation of ranges of values for both the melt index of "me ME-24" of D22 and for the copolymer according to operative claim 1 that finds no basis in the facts of the present case. The interpretation of the values of the melt index in D22 and in operative claim 1 as proposed by the appellant does not correspond to the application of the rounding rule and has as such not been shown to be valid for the present situation. That argument of the appellant does not establish a lack of novelty of operative claim 1 over D22.

6.3 The appellant made a further argument related to the uncertainty of the value of melt index obtained by experimental measurement. That argument was that a

value of melt index that had been determined experimentally was affected by known measurement errors that had to be taken into account when comparing that value to the range defined in operative claim 1.

- 6.4 In particular, D22 (page 1142, right column, last paragraph) discloses that the melt flow rates of the copolymers disclosed therein were measured at 190°C according to ISO 1133 under a load of 2.16 kg (known as the melt index). The patent in suit also indicates in paragraph 94 that the measurement of the melt index was performed according to ISO 1133. That standard corresponds to D50 which therefore appears to be the relevant document to assess the precision to be applied to the melt index disclosed in D22. By contrast, the ASTM standard (D20) also provided by the appellant is not referred to in D22 and the assessment of the precision of the measurement in D20 (section 13, page 9), which differs substantially from that of D50 (section 11, page 16), is therefore of no relevance.
- 6.5 D50 discloses in its section 11 that the precision of the method for the measurement of the melt flow rate was not known because interlaboratory data were not available and that a single precision statement would not be suitable because of the number of materials covered. In that regard, it is doubtful whether any conclusion can be drawn up as to the variation of the melt index in D22. In addition, D50 discloses that one could expect a coefficient of variation between laboratories of about $\pm 10\%$. The respondent pointed out at the oral proceedings that the coefficient of variation was by definition different from the standard deviation characterizing a measured value and that D50 did not provide a meaningful tool to estimate the precision of the measurement of the melt index of

copolymer "me MD-24" (1.1 g/10 min) in D22. The coefficient of variation mentioned in D50 is thus not to be seen as an established value and as such cannot be relied upon as a recognized estimation of the measurement error applying to the melt index. Considering D50 the Board does not find evidence that the value of the melt index measured in D22 for copolymer "me MD-24" can be seen as falling under the range defined in operative claim 1 in view of measurement errors. Novelty of claim 1 of the first auxiliary request must thus be acknowledged.

7. Inventive step in view of D22/D23
 - 7.1 The appellant considered that D22/D23 would represent a valid closest prior art for the assessment of inventive step of claim 1 of the first auxiliary request.
 - 7.2 Having regard to paragraphs 10 and 72 of the patent in suit the purpose of the invention was to provide copolymers of ethylene and α -olefins suitable for films having balanced processing, optical and mechanical properties.
 - 7.3 D22 and D23 pertain to ethylene homopolymers and ethylene copolymers of 1-hexene prepared from metallocene and Ziegler-Natta (ZN) catalyst systems in slurry polymerizations. D22 and D23 represent studies of the relationship between the molecular structure and the thermal and rheological behaviour of the obtained copolymers but neither of these documents provides any explicit indication as to whether the copolymers described therein can be used for films at all.
 - 7.4 Merely the passage on page 1141, right column, penultimate paragraph of D22 mentions applications of

some of the polymers referred to in Table I. A film grade material is mentioned as an application of the ethylene homopolymer LD-2, with further mentions of extrusion coating material and wire cable material applications for other copolymers but there is no hint in D22 about the use of the ethylene copolymers disclosed therein in the preparation of films. There is in particular no application given for the ethylene/hexene copolymer "me MD-24" which was seen as the most relevant starting point within D22.

- 7.5 Neither D22 nor D23 have been otherwise shown to concern ethylene copolymers for films, let alone films with suitable processability, optical and mechanical properties. On that basis, the Board does not consider the specific copolymer in D22/D23 as a realistic starting point for the skilled person aiming at providing copolymers of ethylene and α -olefins suitable for films having balanced processing, optical and mechanical properties as disclosed in the patent in suit.
- 7.6 The choice of the copolymer "me MD-24" as the closest prior art appears to rely on the similarity of structural features and properties of that copolymer with operative claim 1 and as such that choice is tainted with hindsight. This is sufficient to conclude that the reasoning on inventive step offered by the appellant starting from the copolymer "me MD-24" of D22 (or the copolymer C3 of D23) as the closest prior art cannot convince as it lacks the required objectivity.
- 7.7 Under these circumstances, the Board finds that claim 1 of the first auxiliary request is inventive over D22/D23.

8. As the appellant confirmed at the oral proceedings that they had no further objections against the first auxiliary request, there is no further point on which the Board needs to decide.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of claims 1 to 13 of the first auxiliary request filed with letter of 9 August 2021 after necessary consequential amendments of the description.

The Registrar:

The Chairman:



H. Jenney

D. Semino

Decision electronically authenticated