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**Datasheet for the decision
of 3 May 2022**

Case Number: T 0721/19 - 3.3.03

Application Number: 07728461.0

Publication Number: 2013249

IPC: C08F10/06, C08F4/649

Language of the proceedings: EN

Title of invention:

USE OF A ZIEGLER-NATTA CATALYST TO MAKE A POLYPROPYLENE RANDOM COPOLYMER HAVING A HIGH MELT FLOW RATE

Patent Proprietor:

TotalEnergies One Tech Belgium

Opponent:

Ineos Europe AG

Relevant legal provisions:

EPC Art. 100(b), 56

RPBA Art. 12(4)

RPBA 2020 Art. 13(1)

Keyword:

Grounds for opposition - insufficiency of disclosure (no)

Inventive step - (yes)

Late-filed evidence - admitted (no)



Beschwerdekammern

Boards of Appeal

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Case Number: T 0721/19 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 3 May 2022

Appellant: Ineos Europe AG
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted on 3 January 2019 rejecting the opposition filed against European patent No. 2013249 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman D. Semino
Members: O. Dury
W. Ungler

Summary of Facts and Submissions

I. The appeal of the opponent is against the decision of the opposition division rejecting the opposition filed against European Patent No. 2 013 249.

II. The following documents were *inter alia* cited in the decision under appeal:

D1: WO 03/085006 A1

D2: EP 0 309 138 A2

D3: Proceedings of Eighth International Business Forum on Specialty Polyolefins, SPO '98, 23-25 September 1998, Houston, Texas, USA, pages i-v, 181 and 183-207

D4: Polyolefin innovations & new catalyst systems, T. Merz & M. Mulrooney, 12th Saudi Arabia-Japan Symposium on Catalysts in Petroleum Refining & Petrochemicals, KFUPM-Research Institute, Dhahran, Saudi Arabia, 15-16 December 2002, pages 1/2-2/2 and 1-13

D4a: Slides 10-18 of D4

D5: US 2003/0027715 A1

D8: US 6 476 172 B1

D9: Reactive Polymers Fundamentals and Applications, J. K. Fink, 2005, Chapter 17, pages 587-592

III. In that decision the following conclusions were reached:

- Documents D8 and D9 were admitted into the proceedings;

- The patent in suit met the requirements of sufficiency of disclosure;
- The subject-matter of the claims of the main request involved an inventive step in view of D2 as the closest prior art document, even in the light of the teaching of D1, D3 to D5, D8 and D9.

For these reasons, the opposition was rejected.

IV. The opponent (appellant) filed an appeal against the above decision and, together with the statement of grounds of appeal, filed the following documents:

- D10: Succinate Catalysts for Polypropylene - The latest in a series of breakthroughs, M. Mulrooney and S. Ali, Basell Polyolefins, Asia Petrochemicals Technology Conference, 20 & 21 May 2003, Kuala Lumpur, Malaysia
- D11: EP 1 270 651 A1

V. With its rejoinder to the statement of grounds of appeal, the patent proprietor filed four sets of claims as auxiliary requests 1 to 4.

VI. With letter of 12 December 2019 the appellant filed the following document:

- D12: EP 1 223 181 A2

VII. With letter of 6 March 2020 the respondent filed three sets of claims as auxiliary requests 5 to 7.

VIII. The parties were summoned to oral proceedings and a communication pursuant to Article 15(1) RPBA 2020 was

issued by the Board.

IX. Oral proceedings were held on 3 May 2022 in the presence of both parties (videoconference).

X. **The final requests of the parties were as follows:**

(a) The appellant requested that the decision of the opposition division be set aside and that the patent be revoked.

(b) The respondent requested that the appeal be dismissed (main request) or, in the alternative, that the patent be maintained in amended form according to any of auxiliary requests 1 to 4 filed with the rejoinder to the statement of grounds of appeal or auxiliary requests 5 to 7 filed with letter of 6 March 2020.

XI. Claim 1 of the **main request (patent as granted)**, which is the sole claim relevant for the present decision, read as follows:

"1. Process for the production of propylene polymers having a melt flow index ranging from 45 to 150 dg/min (ASTM D 1238 condition L) directly in a polymerization reactor without the subsequent use of melt flow increasing agents, said process comprising the step of polymerizing propylene and one or more comonomers in presence of

- a Ziegler-Natta catalyst comprising a titanium compound having at least one titanium-halogen bond, and a diether compound as internal electron donor, both supported on a magnesium halide in active

form,

- an organoaluminium compound in such an amount that the aluminium concentration, by weight relative to the added monomer(s), in the polymerization medium ranges from 1 to 75 ppm,
- an external electron donor, and
- hydrogen,

wherein the molar ratio of organoaluminium compound to external electron donor ranges from 1 to 20,

wherein the propylene polymer is a random copolymer of propylene and one or more alpha-olefins comonomers and further wherein the propylene polymer comprises between 2 wt% and 6 wt% of comonomer."

XII. **Auxiliary requests 1 to 7** are not relevant to the present decision.

XIII. The appellant's arguments, in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

(a) Documents D10 to D12 should be admitted into the proceedings.

(b) Claim 1 of the main request did not meet the requirements of sufficiency of disclosure.

(c) The subject-matter of claim 1 of the main request was not inventive starting from D2 as closest prior art in view of the teaching of D1, D3, D4, D8, D9

and/or D10 to D12, should they be admitted.

XIV. The respondent's arguments, in so far as they are pertinent, may be derived from the reasons for the decision below. They are essentially as follows:

- (a) Documents D10 to D12 should be not admitted into the proceedings.
- (b) In view of the teaching of the patent in suit and of common general knowledge claim 1 of the main request met the requirements of sufficiency of disclosure.
- (c) The subject-matter of claim 1 of the main request was inventive starting from D2 as the closest prior art, even in the light of any of the prior art document(s) relied upon by the appellant.

Reasons for the Decision

Main request (patent as granted)

- 1. Admittance of documents D10 to D12
 - 1.1 The respondent requested that documents D10 and D11 be not admitted into the proceedings.
 - 1.1.1 Considering that D10 and D11 were both filed with the statement of grounds of appeal, the admittance of these documents is, in the present case, subject to the stipulations of Article 12(4) RPBA 2007 (see Article 25(2) RPBA 2020), according to which the Board has the power to hold inadmissible facts and evidence which

could have been presented in the first instance proceedings.

- 1.1.2 Regarding D10, the appellant argued that that document was submitted in appeal in reaction to the opposition division's decision in which it was indicated that D4 only discussed propylene homopolymers but not copolymers and that "there is no pointer... that the properties of the... homopolymers... can be extrapolated in the same way" (statement of grounds of appeal: page 5, first paragraph).

However, as indicated by the respondent (rejoinder: page 2, last paragraph), the issue of extrapolation of the teaching of D3 or D4 regarding homopolymers to copolymers retained by the opposition division was already addressed by the patent proprietor in its reply to the notice of opposition (letter of 17 August 2016: page 6, last paragraph; page 7, first paragraph; page 10, first, second and end of third paragraph; page 11, first paragraph). It was also mentioned in the preliminary opinion of the opposition division (page 3: third paragraph from the bottom) and in the patent proprietor's letter of 19 January 2018 (page 6, last paragraph). Under these circumstances, D10 could and should have been filed already during the first instance proceedings. In particular, it cannot be concluded that the circumstances of the present case justify the filing of D10 only with the statement of grounds of appeal.

- 1.1.3 Regarding D11, the appellant argued that that document was submitted to show that an argument regarding the obviousness of the ratio of organoaluminium compound (Al) to external donor (ED) made in relation to document D1, which was directed to homopolymers, was

equally valid for copolymers as defined in the operative claims (statement of grounds of appeal: page 7, end of second paragraph).

However, the issue of the (non)obviousness of the Al:ED ratio was already addressed by the respondent during the opposition proceedings (rejoinder to the notice of opposition: page 9, fifth and seventh paragraphs; page 11, first and second paragraphs). Therefore, there are good reasons why D11 could, and actually should, have been submitted already during the opposition proceedings. Further considering that the operative claims are the claims as granted, there are no valid reasons justifying the filing of D11 only with the statement of grounds of appeal.

- 1.1.4 In view of the above, the Board found it appropriate to make use of its power to hold documents D10 and D11 inadmissible pursuant to Article 12(4) RPBA 2007.
- 1.2 The respondent further requested that document D12 be not admitted into the proceedings.
 - 1.2.1 Considering that D12 was submitted after the statement of grounds of appeal (appellant's letter of 12 December 2019), its admittance underlies the stipulations of Article 13(1) RPBA 2020 (equivalent to Article 13(1) RPBA 2007), according to which any amendment to a party's case after it has filed its grounds of appeal or reply may be admitted only at the Board's discretion.
 - 1.2.2 The appellant argued that D12 was filed in reaction to the respondent's critics that document D11 concerned a different technical field and did not use a diether internal donor (letter of 12 December 2019: bottom of

page 6).

However, since D11 is not admitted (see section 1.1), there are no reason to reach a different conclusion for D12, which was filed even later. In addition, since the operative main request is the patent as granted, there is no reason to file D12 only in appeal for the same reasons as outlined above in respect of D11. This is all the more true considering that D12 was already cited during the examination proceedings, as indicated by the respondent (letter of 6 March 2020: section 2.3). Admitting D12 to the proceedings would run counter to the economy of the proceedings and would further not be in line with the requirements of Article 12(3) RPBA 2020, whose wording is in essence identical to the one of Article 12(2) RPBA 2007, which specifies that the statement of grounds of appeal shall contain a party's complete appeal case.

For these reasons, the Board found it appropriate to make use of its discretion by not admitting D12 into the proceedings (Article 13(1) RPBA 2020).

2. Article 100(b) EPC

2.1 In order to meet the requirements of sufficient disclosure, an invention has to be disclosed in a manner sufficiently clear and complete for it to be carried out by the skilled person, without undue burden, on the basis of the information provided in the patent specification, if needed in combination with the skilled person's common general knowledge. This means in the present case that the skilled person should in particular be able to carry out a process according to granted claim 1, which is contested by the appellant.

2.2 The appellant's objection is that the skilled person is not in a position, on the basis of the information provided in the patent in suit, to carry out the process of claim 1 as granted using internal donors which are not only diethers *per se*, but also mixtures of diethers with other internal donors.

2.2.1 However, it is derivable from the patent in suit as a whole and from paragraph 13 in particular that the essential component to be used as internal donor is the diether compound, whereby it is further indicated in paragraph 14 that suitable diethers are well known in the art and specific examples are further given in paragraph 15 of the patent in suit. Regarding the optional additional internal donors, a specific example is also given in the last sentence of paragraph 13, namely phthalates. There is no evidence on file that, should the skilled person contemplate using different optional additional internal donors, he or she would have any difficulty in carrying out the process according to claim 1 as granted. In particular, there is no evidence that such difficulties could not be overcome by merely adjusting the quantities of the diether component and of the additional internal donor so as to use mainly the diether component, which is the essential internal donor according to paragraph 13 of the patent in suit.

In that respect, the question whether or not a mixture of internal donors comprising a diether compound and an additional, different internal donor "shows comparable polymerization behavior as a Ziegler-Natta catalyst with only diether as internal donor" as indicated in paragraph 13 is not relevant for the issue of sufficiency of disclosure since said requirement is not specified in claim 1 as granted. In addition, that

issue is in the present case at most related to the scope of the claims, which is a matter of clarity.

- 2.3 In view of the above, the arguments put forward by the appellant provide no reason for the Board to overturn the opposition division's decision regarding sufficiency of disclosure.

- 3. Article 56 EPC
 - 3.1 Closest prior art - Distinguishing features - Problem effectively solved
 - 3.1.1 It is derivable from the rejoinder to the statement of grounds of appeal and from the respondent's letter of 6 March 2020 that the respondent initially had concerns against the selection of D2 as the closest prior art document. However, after the Board had indicated that the respondent's arguments did not appear convincing (section 6.1 of the communication), the respondent did not pursue that line of defense any further at the oral proceedings before the Board and even explicitly acknowledged that D2 was a suitable closest prior art.

 - 3.1.2 In section 6.3.3 of the Board's communication, it was further indicated that it was not clear to the Board from the written submissions if the respondent intended to formulate the problem effectively solved over D2 as also residing in the achievement of improved properties as compared to high melt flow index (MFI) polymers produced by visbreaking, in particular in respect of levels of volatile content. However, the respondent clarified at the oral proceedings before the Board that it did not rely on that argument (any further) and explicitly agreed with the formulation of the problem effectively solved over D2 indicated in section 6.3.1

of the Board's communication.

3.1.3 In view of the above, the following points were not in dispute between the parties and are further adhered to by the Board:

- (a) D2 is a suitable document to be taken as the closest prior art, whereby the random ethylene-propylene copolymers prepared in examples 5 to 7 thereof, which exhibit a MFI in the range defined in claim 1 as granted (see table I of D2), are particularly relevant and constitute an appropriate starting point for the analysis of the inventive step.
- (b) The subject-matter of claim 1 as granted differs from the process according to examples 5 to 7 of D2 in the following features:
 - The melt flow index specified therein should be obtained "directly in a polymerization reactor without the subsequent use of melt flow increasing agents" (whereas a mandatory visbreaking is disclosed in D2, in particular in examples 5 to 7 thereof, which cannot be equated with a "direct" obtention of a MFI in the range specified in said claim 1); and
 - The use of a specific catalyst system as defined in said claim 1 (Ziegler-Natta catalyst, diether compound, organoaluminium compounds in a specific amount, external electron donor, specific molar ratio Al:ED), for which no information at all is disclosed in D2.

(c) The problem effectively solved over D2 resides in the provision of a process for preparing a random copolymer of propylene with an alpha-olefin comonomer with high melt flow index, directly in the polymerization reaction (i.e. without visbreaking), which leads to a low level of xylene solubles at a good production rate.

3.2 Obviousness

3.2.1 The question has to be answered if the skilled person, desiring to solve the problem indicated in section 3.1.3.c 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.

3.2.2 In that respect, the respondent argued that since D2 only disclosed visbreaking to achieve high MFI values, the skilled person would have had no reason to modify the teaching of D2 by avoiding visbreaking. Therefore, the subject-matter of claim 1 as granted could already for that reason only be arrived at based on hindsight, which was not allowable.

However, as put forward by the appellant (statement of grounds of appeal: bottom of page 2), whereas D2 is a rather old document (priority of 1987) and was published at a time when visbreaking a low MFI propylene polymer was the standard way of making propylene polymers having high MFI, it was recognised in the art by the time of the invention that visbreaking may have disadvantages (paragraph 6 of the patent in suit; confirmed by D3: page 190, fourth and fifth paragraphs, D8: column 3, lines 26-42 and D9: top

of page 589 and page 590: last three paragraphs of section 17.3). Under these circumstances, it is agreed with the appellant that, at the time of the invention, the fact that the skilled person would have considered making the examples of D2 using an alternative process not involving visbreaking does not amount to hindsight.

- 3.2.3 The respondent further argued that, even if the skilled person were to have been looking for an alternative manner to produce the propylene copolymers according to D2 without visbreaking, he or she would have had no reason to do so by looking for specific catalyst-based methods for preparing random propylene copolymers since D2 contained no information regarding the catalyst to be used for the polymerisation process. Therefore, the combination of D2 with D3 and/or D4 relied upon by the appellant was also for that reason based on hindsight, so the respondent.

However, D3 and D4 both disclose the possibility of using the catalyst systems described therein to prepare a.o. random propylene copolymers while avoiding or at least reducing visbreaking and/or achieving high productivity (good hydrogen response) and low levels of xylene solubles (see e.g. D3: page 183, second half of the abstract, page 190: fourth and fifth paragraphs, page 191, section "Random Copolymers"; D4: pages 7-8, "Slide 16", "Slide 17" and "Slide 18"). Therefore, D3 and D4 are both related to the problems to be solved defined in section 3.1.3.c above. For that reason, the respondent's argument is rejected.

- 3.2.4 Regarding the combination of D2 with D3 and D4, it is undisputed that, as indicated in paragraph 19 of the patent in suit, the use of Ziegler Natta catalysts comprising a diether as internal donor for making

polypropylene, including polypropylene copolymers, is known in the art, as derivable from each of documents D3 and D4 (reference being particularly made to the commercial product "Avant ZN"). However, the passages of D3 and D4 which were relied upon by the appellant are of a very general nature and do not hint at the specific combination of features mentioned in claim 1 as granted for the following reasons:

a) In the Board's view, most of the information provided in D3 and D4 in respect of the avoidance of visbreaking, of high production rate or of low xylene soluble levels cannot be held to be specifically directed to propylene copolymers, in particular not to random propylene copolymers - according to the closest prior art D2, but are rather disclosed in a more generic manner (D3: abstract on page 183; page 188, first two paragraphs; page 189: second and last two paragraphs; page 190, first, second, fourth and fifth paragraphs; D4: page 7, first paragraph and "Slide 16" to "Slide 18") or only in relation to propylene homopolymers (D4: page 7, last paragraph, which is related to high melt flow homopolymers prepared without visbreaking). In particular, there is no evidence that D3 and/or D4 disclose any information regarding the preparation of high MFI random propylene copolymers according to the teaching of D2 (see in particular claim 1 thereof).

The Board further shares the view of the respondent that, contrary to the appellant's opinion, the mention of "isotacticity levels of up to 99%" in D3 (page 188, fourth paragraph) cannot be unambiguously related to copolymers and would rather be understood to be related to homopolymers (rejoinder to the statement of grounds of appeal: page 13, first full paragraph). Similarly,

the Board also agrees with the respondent that no direct link between molecular weight distribution and xylene soluble content can generally be made (rejoinder to the statement of grounds of appeal: bottom of page 13).

The appellant further argued that it was conventional for a catalyst manufacturer to provide data for a catalyst system relating to the preparation of homopolymers rather than copolymers because it ensured consistency (the data did not depend on the exact comonomer content, or the randomness of the comonomer incorporation, or the identity of the comonomer, and were therefore directly comparable with other catalyst systems tested on homopolymers: see letter of 12 December 2019: page 5, fifth paragraph). However, that argument did not convince because, in view of the level of generality of the information provided in D3 and D4 and in the absence of any pointers to the more specific features mentioned in claim 1 as granted, the information provided by D3 and/or D4 does not allow to conclude that it would have been obvious to use the diether based Avant ZN catalyst disclosed therein to obtain the combination of desired results aimed at (high MFI, random propylene copolymers with specific amount of comonomer, no visbreaking, low xylene soluble, good production rate).

The Board further shares the view of the opposition division (decision under appeal: page 6, middle of the page, dealing with the extrapolation from homopolymers to copolymers) that it cannot be expected that the teaching provided in D3 and/or D4 for homopolymers can be generalised to copolymers in view of the known effects of the comonomers on the polymerisation process (e.g. different kinetics; impact on isotacticity/xylene

solubles).

b) In addition, although D3 mentions that the diether based catalysts disclosed therein allow the production of reactor made polypropylene copolymers "with a significantly wider range in Melt Flow rate" (page 190, fourth paragraph), no specific value of MFI is indicated. The same is valid regarding the disclosure in D4 of higher melt flow rate (page 7, Slide 18, second paragraph). In that respect, the last paragraph on page 7 of D4 refers explicitly to homopolymers, while the first paragraph on page 8 of D4 is directed to heterophasic copolymers (and not to random copolymers as prepared in examples 5 to 7 of D2). For these reasons, the teaching of D3 and/or D4 in respect of the use of diether based Avant ZN catalysts for the preparation of high MFI polymers is of a rather qualitative nature and is not specifically directed to random copolymers according to the closest prior art. In particular, there is no specific disclosure of propylene copolymers with a specific MFI in the range mentioned in claim 1 as granted, in particular not for a random copolymer according to examples 5 to 7 of D2.

c) Also, it is indicated in D3 (page 190, fourth paragraph) that the required rheology properties (including MFI) may be achieved by greatly reducing and "in some cases" fully eliminating visbreaking. However, said wording does not allow to conclude that the melt flow rates according to D2 may mandatorily be achieved without visbreaking for any kind of polymers, in particular for random propylene copolymers with high MFI according to examples 5 to 7 of D2. The same is valid regarding the indication in D4 that visbreaking may be eliminated for high melt flow rate homopolymers or heterophasic copolymers (D4: page 7, last paragraph;

page 8, first paragraph).

d) Finally, at several passages of D3 and D4, mention is made that the use of diether based Avant ZN catalysts may render the use of external donors superfluous (D3: page 189, third paragraph from the bottom; page 190, first paragraph; D4: page 4, "Slide 7"). Therefore, these documents cannot lead in an obvious manner to a process according to claim 1 as granted in which use is made of a catalyst system comprising external donors as a mandatory component.

3.2.5 It was further in dispute between the parties whether the specific amounts of organoaluminium compound and the specific molar ratio of organoaluminium compound to external electron donor (hereinafter Al:ED ratio) mentioned in claim 1 as granted were obvious in the art.

a) In that respect, it was not shown that any of the cited documents, in particular D3 and D4, discloses any information regarding the amount of organoaluminium compound and/or Al:ED ratio that may be suitably used to prepare high melt flow polypropylene copolymers according to examples 5 to 7 of D2 or as defined in claim 1 as granted. The reference made by the appellant in that respect to D1 is not convincing because D1 does not specifically disclose specific values of organoaluminium compound and Al:ED ratio for high MFI propylene copolymers according to D2 and/or operative claim 1. In particular, the values for these features which are derivable from the examples of D1 are disclosed in respect of the preparation of homopolymers (this was undisputed) with lower MFI than the polymers prepared in examples 5 to 7 of D2 and as defined in claim 1 as granted (see D1: tables on page 37 and 43)

and, as explained above, cannot be held to be equally relevant for the preparation of copolymers, in particular with significantly higher MFI. In that respect, it is further taken into account that, as argued by both parties, the amounts of aluminium compound and external electron donor are not trivial process features and are particularly relevant for the polymerisation process as they have an impact on the level of xylene solubles and catalyst activity (see also the paragraph bridging pages 6 and 7 of the decision under appeal). In the absence of any evidence that the ranges defined in claim 1 as granted are usual in the art, there is no reason for the Board to deviate from the findings of the opposition division that there is no pointer to these ranges in the cited prior art (decision under appeal: section 16, last paragraph on page 7).

b) In its written submissions (statement of grounds of appeal: page 6, third paragraph; letter of 12 December 2019: page 3, second and third paragraphs) and at the oral proceedings before the Board the appellant put forward that it was derivable from the teaching of D3 and/or D4 that the use of diether based Avant ZN catalysts led to lower amount of xylene solubles. Therefore, the skilled person would understand that less external electron donor would be needed, the consequence being that less aluminium organoaluminium would be required (since the latter is used to counteract the negative effect on the catalyst of the external electron donor).

However, this argument is based on the premises that D3 and D4 teach the use of diether based Avant ZN catalysts to prepare random propylene copolymers with a high MFI according to examples 5 to 7 of D2 without

visbreaking at a good production rate and with low xylene solubles, which is in the Board's view not acceptable (see section 3.2.4 above). In addition, neither D3, nor D4 disclose any information regarding the absolute amounts of organoaluminium compound and Al/ED ratio required, whereby the appellant's arguments were noticeably not related to the latter feature. For these reasons, the appellant's view is not shared by the Board.

c) For these reasons, it cannot be concluded that the specific amounts of organoaluminium compound and the specific molar ratio of organoaluminium compound to external electron donor (hereinafter Al:ED ratio) mentioned in claim 1 as granted are obvious.

d) It is noted that the above conclusion is reached without considering any comparison between examples 1 and 3 and comparative examples 2 and 4 of the patent in suit (tables 1 and 2), as was done by the respondent (see e.g. page 6 of the rejoinder to the statement of grounds of appeal) and the opposition division (decision under appeal: page 7, in relation to an "unexpected effect"). In the present case, such a comparison is not necessary since it can already be concluded for other reasons that the ranges of organoaluminium compound and Al/ED ratio specified in claim 1 as granted were neither shown to be usual in the art, nor hinted at in an obvious manner in the cited prior art document.

3.2.6 The respondent further argued that the teaching of D2 was that the visbreaking process taught therein led to low molecular weight distribution. Since there was no evidence that the diether based Avant ZN catalyst taught in D3 and/or D4 led to such low molecular weight

distribution, the combination of D2 with D3 and/or D4 was also based on hindsight for that reason, so the respondent (rejoinder to the statement of grounds of appeal: page 8, last paragraph; page 11, fifth paragraph; respondent's letter of 6 March 2020: section 4.6; the argument being pursued at the oral proceedings before the Board).

In that respect, it is agreed with the respondent that D2 teaches that the visbreaking process taught therein leads to low molecular weight distribution, whereby molecular weight distribution of 2 to 2.5 are aimed at (D2: page 3, lines 3-7 and 53-56). In particular, the random propylene copolymers prepared in examples 5 to 7 of D2 exhibit a molecular weight distribution of 2.17, 2.16 and 2.11, respectively (D2: table I, page 7), which is in line with the general teaching of D2 indicated above. In addition, although both D3 and D4 make reference to low molecular weight distribution (D3: page 188, penultimate paragraph, page 191, section "Random Copolymers"; D4: page 7, line 4, page 8, second paragraph, page 11, fourth and seventh paragraphs), these documents at most disclose molecular weight distribution as low as 3 to 3.5, i.e. which are significantly higher than the ones disclosed for examples 5 to 7 of D2. In the absence of counter arguments provided by the appellant in that respect (in particular at the oral proceedings before the Board), it cannot be concluded that it was shown that D3 and/or D4 teach in an obvious manner that the diether based Avant ZN catalysts disclosed therein may suitably be used to prepare random propylene copolymers according to examples 5 to 7 of D2, let alone provide any teaching under which process conditions such copolymers may be prepared.

- 3.2.7 In view of the above, the Board cannot conclude that either D3 or D4 disclose in an obvious manner the use of diether based Avant ZN catalysts for making "directly" (i.e. without visbreaking) polypropylene copolymers comprising 2-6 wt.% comonomer having a (high) melt flow index according to examples 5 to 7 of D2 with a good production rate while leading to low xylene solubles. In particular, it was not shown that it would have been obvious to solve the problem defined in section 3.1.3.c above by preparing the random polypropylene copolymers of examples 5 to 7 of D2 using such a catalyst together with the specific amount of organoaluminium compound and a specific Al:ED ratio mentioned in claim 1 as granted. Rather, it is derivable from the above that the combination of documents relied upon by the appellant in order to arrive at the subject-matter defined in claim 1 as granted is based on hindsight, which is not allowable.
- 3.3 For these reasons, the appellant's arguments submitted in appeal do not provide any reason for the Board to deviate from the conclusion reached by the opposition division that the subject-matter of claim 1 as granted involves an inventive step in view of D2 as the closest prior art document.
4. As it was confirmed by the appellant at the end of the oral proceedings (see page 3 of the minutes, first paragraph) that they had no additional objections in respect of the main request and none of the ones put forward and decided upon above is successful, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



B. ter Heijden

D. Semino

Decision electronically authenticated