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**Datasheet for the decision
of 30 August 2018**

Case Number: T 0777/16 - 3.3.03

Application Number: 07727516.2

Publication Number: 1999161

IPC: C08F2/14, C08F4/659, C08F10/00,
C08F2/00

Language of the proceedings: EN

Title of invention:

SLURRY POLYMERISATION PROCESS OF ETHYLENE IN THE PRESENCE OF
LOW AMOUNT OF SCAVENGER.

Patent Proprietor:

TOTAL RESEARCH & TECHNOLOGY FELUY

Opponent:

INEOS Europe AG

Relevant legal provisions:

EPC Art. 56
RPBA Art. 12(4)

Keyword:

Inventive step - (all requests: no)
Auxiliary requests submitted with the statement of grounds of
appeal - not held inadmissible



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Case Number: T 0777/16 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 30 August 2018

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 8 February 2016
revoking European patent No. 1999161 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman D. Semino
Members: O. Dury
C. Brandt

Summary of Facts and Submissions

I. The appeal by the patent proprietor lies against the decision of the opposition division posted on 8 February 2016 revoking European patent No. 1 999 161.

II. Claims 1 and 2 of the granted patent, which are the sole granted claims relevant to the present decision, read as follows:

"1. A slurry process for producing polyethylene in two loop reactors connected in series, the process comprising polymerising ethylene alone or in combination with one or more alpha-olefinic comonomers in the presence of a supported metallocene catalyst, a polymerisation diluent, and a scavenger represented by the formula AlR_x wherein each R is the same or different and is an alkyl group having from 3 to 8 carbon atoms, and x is 3, said scavenger being introduced in an amount of from 5 to 40 ppm by weight based on the total amount of the diluent and reactants introduced to a first reactor."

"2. A process according to claim 1 wherein additional ethylene, additional polymerisation diluent and additional scavenger are introduced into the second reactor, the amount of the additional scavenger introduced into the second reactor being in the range of from 5 to 40 ppm by weight based on the additional diluent and additional reactants introduced into the second reactor."

III. A notice of opposition against the patent was filed, in which the revocation of the patent in its entirety was

requested.

- IV. The contested decision was based on the patent as granted as main request and on the auxiliary request filed with letter of 19 November 2015. Claim 1 of said auxiliary request corresponded to granted claim 2.
- V. The following documents were, *inter alia*, cited in the contested decision:

D1: US 2006/0009584

D4: US 6,180,736

D5: US 2005/0153830

D6: WO 97/22635

D7: US 2005/0070675

Annex 1: Experimental report filed by the patent proprietor with letter dated 19 November 2015

- VI. In the contested decision the opposition division held *inter alia* that claim 1 of both the main request and the auxiliary request lacked an inventive step when starting from example 7 of D1 as closest prior art. Also, Annex 1 was admitted into the proceedings.

Regarding inventive step, granted claim 1 was interpreted by the opposition division as encompassing two embodiments (see top of page 5), namely:

- "case 1", which covered processes in which the scavenger was introduced into the first reactor in an amount of 5 to 40 ppm based on the total amount of the diluent and reactants introduced to a first reactor; and
- "case 2", which covered processes in which only a part of the total scavenger was introduced into the first reactor, the other part being introduced into

the second reactor, meaning that less than 5 ppm of the scavenger could actually be introduced in each reactor.

The technical problem effectively solved by granted claim 1 was formulated differently for both cases, namely:

- as the provision of a process exhibiting less fouling while maintaining a stable, increased catalyst activity for "case 1" (see page 5, section 5.2, second paragraph; in particular taking into account the data provided in Annex 1);
- as the provision of an alternative process for "case 2" (see page 7, section 5.3.2, first paragraph).

In any case, the opposition division hold that for both cases, no inventive step could be acknowledged in the view of the teaching of D1 and D5 and, for "case 1", also D7 (sections 5.2.4 and 5.3.1-5.3.2 of the contested decision).

VII. The patent proprietor (appellant) appealed the above decision. With the statement setting out the grounds of appeal the appellant requested that the opposition division's decision be set aside and that the opposition be rejected (main request) or, in the alternative, that the patent be maintained in amended form according to any of auxiliary requests 1 to 4 filed therewith.

Claim 1 of auxiliary request 1 read as follows (as compared to granted claim 1, additions are indicated in **bold**):

"1. A slurry process for producing polyethylene in two

loop reactors connected in series, the process comprising polymerising ethylene alone or in combination with one or more alpha-olefinic comonomers in the presence of a supported metallocene catalyst, a polymerisation diluent, and a scavenger represented by the formula AlR_x wherein each R is the same or different and is an alkyl group having from 3 to 8 carbon atoms, and x is 3, said scavenger being introduced **into the first reactor** in an amount of from 5 to 40 ppm by weight based on the total amount of the diluent and reactants introduced to a first reactor **and wherein additional ethylene, additional polymerisation diluent and additional scavenger are introduced into the second reactor, the amount of the additional scavenger introduced into the second reactor being in the range of from 5 to 40 ppm by weight based on the additional diluent and additional reactants introduced into the second reactor.**"

Claim 1 of auxiliary request 2 corresponded to claim 1 of auxiliary request 1, whereby the scavenger introduced into the first reactor was defined as follows (as compared to granted claim 1, deletions are indicated in ~~strikethrough~~, additions in **bold**):

"and a scavenger **being triisobutylaluminium** ~~represented by the formula AlR_x wherein each R is the same or different and is an alkyl group having from 3 to 8 carbon atoms, and x is 3,~~"

Claim 1 of auxiliary request 3 corresponded to claim 1 of auxiliary request 1, whereby the additional scavenger introduced into the second reactor was further defined as being **"represented by the formula AlR_x wherein each R is the same or different and is an alkyl group having from 3 to 8 carbon atoms, and x is**

3".

Claim 1 of auxiliary request 4 corresponded to claim 1 of auxiliary request 3, whereby the scavenger introduced into the first and into the second reactor is "**triisobutylaluminium**".

- VIII. In its reply to the statement of grounds of appeal the respondent (opponent) requested that the appeal be dismissed and that auxiliary requests 1 to 4 be not admitted into the proceedings.
- IX. Issues to be discussed at the oral proceedings were specified by the Board in a communication.
- X. Oral proceedings were held on 30 August 2018 in the presence of both parties.
- XI. The appellant's arguments, insofar as relevant to the decision, may be summarised as follows:

Main request - Inventive step

- (a) The closest prior art was example 7 of D1.

The subject-matter of granted claim 1 differed from example 7 of D1 in that the scavenger should be used in a specific amount.

Regarding the embodiment of granted claim 1 referred to as "case 1" by the opposition division (see section VI above), which was the only one covered by the claims, the technical problem to be solved resided in the provision of a process that allowed reducing the amount of sheeting/fouling which occurred in the reactor during the slurry

polymerisation of ethylene using supported metallocene catalyst while keeping a good and stable activity of the catalyst all along the polymerisation process in the two loop reactors.

The examples of the patent in suit together with the data of Annex 1 showed that that problem was effectively solved.

The solution to that problem provided by the process according to granted claim 1 was not to be found in D1, which failed to disclose any information regarding reduced fouling and/or amount of scavenger. Also, none of the other documents relied upon by the respondent, in particular D4 to D7, contained a hint to solve the technical problem defined above according to granted claim 1.

Therefore, the subject-matter of granted claim 1 was inventive.

Auxiliary requests 1 to 4 - Admittance

- (b) The appellant had been surprised by the interpretation of granted claim 1 contemplated by the opposition division at the oral proceedings. Auxiliary requests 1 to 4 were filed together with the statement of grounds of appeal, i.e. right at the beginning of the appeal proceedings, in order to take that interpretation into account. Besides, the subject-matter of those auxiliary requests was very similar to the one of the auxiliary request defended before the opposition division. Those auxiliary requests did not expand the scope of discussion. In the appellant's view, those auxiliary requests were also clearly allowable and

did not raise new issues. Under those circumstances, auxiliary requests 1 to 4 should be admitted into the proceedings.

Auxiliary requests 1 to 4 - Inventive step

- (c) As compared to the main request the process of claim 1 of auxiliary request 1 was further distinguished from the one according to example 7 of D1 in that a scavenger was added in both reactors. Whereas D1 taught that additional diluent and reactants may be added to the second reactor, it failed to teach to add scavengers thereto. In that respect, the process defined in claim 1 of auxiliary request 1 ensured that a sufficient scavenger concentration remained in both reactors, even if additional reactants and diluent were added to the second reactor.

As for the main request, the examples of the patent in suit and of Annex 1 showed that the technical problem effectively solved was to provide a process that allowed reducing the amount of sheeting/fouling which occurred in the reactor during the slurry polymerisation of ethylene using supported metallocene catalyst while keeping a good and stable activity of the catalyst all along the polymerisation process in the two loop reactors.

Neither D1 nor any of the documents cited by the respondent taught to add further scavenger to the second reactor, in particular to do so in order to solve the technical problem defined above.

Therefore, the subject-matter of claim 1 of

auxiliary request 1 was inventive.

- (d) The same arguments as outlined for auxiliary request 1 were valid for claim 1 of each of auxiliary requests 2 to 4.

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

Main request - Inventive step

- (a) The closest prior art was example 7 of D1.

Both embodiments referred to as "case 1" and "case 2" by the opposition division (see section VI above) were covered by granted claim 1.

Regarding the embodiment referred to as "case 1", the subject-matter of granted claim 1 differed from example 7 of D1 in that the scavenger should be used in a specific amount.

Regarding the improved technical effects relied upon by the appellant, it was shown in Annex 1 that, when using the scavenger of example 7 of D1, the catalyst activity was constant throughout the whole range of amounts used (5 to 200 ppm). Therefore, no improvement in catalyst activity could be derived from Annex 1. Regarding the reduced fouling, no direct comparison between a process according to granted claim 1 and the one of the closest prior art was on file. In that respect, it was not even sure that fouling occurred at all in the process of example 7 of D1. Under such circumstances, the technical problem effectively solved could only reside in the provision of an

alternative process as compared to the one of the closest prior art.

Considering that no technical effect was associated with the range of scavenger defined by the embodiment "case 1" encompassed by granted claim 1, the subject-matter of that embodiment could be arrived at, starting from example 7 of D1, by mere routine experimentation. The same was valid in case the skilled person would encounter fouling problems. Besides, it was explicitly taught in D4 that the amount of alkylaluminium such as the one used in the process of example 7 of D1 should be kept as low as possible in order to optimise the polymerisation process, in particular in order to reduce fouling problems. Finally, as already indicated in the contested decision, it was derivable from D5, in particular its example 7, that amounts of scavengers according to granted claim 1 were usual in the art, also for slurry loop reactors.

Therefore, the subject-matter of granted claim 1 was not inventive.

Auxiliary requests 1 to 4 - Admittance

- (b) It was derivable from the minutes of the oral proceedings before the opposition division that the interpretation of granted claim 1 on the basis of "case 1" and "case 2" (see section VI above) was made clear and even agreed upon by the appellant, at least at the beginning of the oral proceedings (see sections 16 and 17; see also section 21). In that respect, the issue of the interpretation of granted claim 1 was already identified in the

notice of opposition and should not have taken the appellant by surprise. Besides, the opposition division had made clear that the main request, interpreted according to the so-called "case 2" lacked an inventive step and gave the appellant the opportunity to submit additional auxiliary requests. However, the appellant decided not to file any auxiliary request which distinguished the claims by limiting that 5-40 ppm scavenger was actually introduced into the first reactor, which was a feature now introduced in each of operative auxiliary requests 1 to 4. In view of the above, the appellant had failed to submit during the opposition proceedings any requests which would have overcome the objection of lack of an inventive step in respect of the process of granted claim 1, in particular in respect of "case 2", which he should have done. Under those circumstances, auxiliary requests 1 to 4 should be held inadmissible.

Auxiliary requests 1 to 4 - Inventive step

- (c) The subject-matter of claim 1 of auxiliary request 1 differed from the one of claim 1 of the main request in that an additional, non defined scavenger had to be introduced into the second reactor. However, no effect related to that feature was demonstrated, in particular because no proper comparison between a process with and without addition of scavenger in the second reactor was on file. Besides, in a process conducted in two loop reactors connected in series, part of the scavenger introduced in the first reactor was bound to be present in the second reactor, which was not contested by the appellant and was further

derivable from the wording of claim 1 of D1. Therefore, if one started with e.g. an amount of scavenger of 40 ppm in the first reactor, some of that scavenger, in an amount higher than 5 ppm would mandatorily be present in the second reactor. Since the appellant argued that 5 ppm scavenger was sufficient for solving the problem of fouling in the reactor, no effect was credibly obtained by the additional feature.

Finally, since it was derivable from claim 1 of D1 that some scavenger was already present in the second reactor of the process according to example 7 of D1, the addition of 5 to 40 ppm scavenger into the second reactor was within the routine modifications of the process of that example and was, thus, obvious in the light of D1, optionally in combination with D4 and/or D5 for the same reasons as for the main request.

- (d) The same arguments as for the main request were valid for claim 1 of each of auxiliary requests 2 to 4. In that respect, it was in particular to be noted that the process of example 7 of D1 was carried out using tributylaluminium as scavenger, which was the scavenger defined for the first reactor of claim 1 of auxiliary request 2 and for both reactors of claim 1 of auxiliary request 4 and which was a compound AlR_x corresponding to the scavenger to be used in both reactors of claim 1 of auxiliary request 3.

XIII. The appellant requested that the decision under appeal be set aside and the opposition be rejected (main request), or, alternatively, that the patent be maintained in amended form according to any of

auxiliary requests 1 to 4 submitted with the statement of grounds of appeal.

The respondent requested that the appeal be dismissed and that auxiliary requests 1 to 4 not be admitted into the proceedings.

Reasons for the Decision

Main request (patent as granted)

1. Both parties disagreed upon the reading of granted claim 1, in particular regarding whether or not said claim encompassed the embodiment "case 2" identified in the contested decision (see section VI above). It was not disputed that granted claim 1 encompasses the embodiment "case 1" as identified in the decision. However, in view of the conclusion regarding that embodiment there is no need for the Board to decide whether granted claim 1 encompassed the embodiment "case 2". Therefore, the following analysis of the main request is limited to the embodiment "case 1", i.e. to a process according to granted claim 1, in which the scavenger AlR_x defined therein is introduced into the first reactor in an amount of 5 to 40 ppm based on the total amount of the diluent and reactants introduced to a first reactor.
2. Inventive step
 - 2.1 Closest prior art

Both parties considered, as the opposition division, that example 7 of D1 represents the closest prior art.

The Board has no reason to deviate from that view.

2.2 Distinguishing feature(s) over example 7 of D1

2.2.1 Example 7 of D1 (see in particular paragraphs 109-110) is directed to a process for the polymerisation of ethylene in suspension (i.e. a "slurry process" as defined in granted claim 1) in two loop reactors connected in series and in the presence of a supported metallocene catalyst (prepared according to section A of example 7 of D1), a polymerisation diluent (isobutane) and triisobutyl aluminium (TIBAL), which is a scavenger AlRx as defined in granted claim 1. In that respect, the fact that TIBAL is formally used in D1 as "cocatalyst" (see paragraph 64 of D1) rather than as "scavenger" as indicated in granted claim 1 cannot be held to distinguish the process according to granted claim 1 from that of example 7 of D1, which was agreed upon by the appellant during the oral proceedings before the Board.

2.2.2 Both parties agreed with the opposition division (see contested decision: section 5.1, second paragraph) that the subject-matter of granted claim 1 differs from the process according to example 7 of D1 only in that the amount of scavenger introduced is in the range of 5-40 ppm by weight based on the total amount of the diluent and reactants introduced to the first reactor, which is not specifically disclosed in said example 7 (in which use is made of TIBAL but for which no information in respect of the amount is given).

2.3 Problem effectively solved over the closest prior art

2.3.1 The appellant argued that the problem to be solved resided in the provision of a process that allows

reducing the amount of "sheeting" (also referred to as "fouling" by the parties) which occurs in the reactor during the slurry polymerisation of ethylene using supported metallocene catalyst, while keeping a good and stable activity of the catalyst all along the polymerisation process in the two loop reactors. In that respect, sheeting/fouling denotes, according to paragraph 3 of the patent in suit, the tendency of the polymer to deposit on the walls of the polymerisation reactor, which leads to a decrease in the efficiency of heat exchange between the reactor bulk and the coolant around the reactor, which may lead in its turn to overheating of the reactor. Therefore, the expressions "reduced sheeting" or "reduced fouling" mean, in the context of the present decision, that such build-up of polymer on the walls of the polymerisation reactor should be reduced or even avoided.

2.3.2 Regarding the reduction of sheeting/fouling

It was disputed by the parties that it could be concluded from the examples of the patent in suit that the specific amount of scavenger defined in granted claim 1 was related to a reduction of fouling as compared to the process according to example 7 of D1. However, since in the present case the Board arrives at the conclusion that the subject-matter of granted claim 1 is not inventive even if the improvement in terms of fouling relied upon by the appellant is acknowledged, there is no need for the Board to address that issue in details. Therefore, it is hereinafter considered, to the appellant's benefit, that the improvement in terms of fouling as compared to the closest prior art relied upon by the appellant is indeed present.

2.3.3 Regarding the maintenance of a stable activity of the catalyst

The evidence relied upon by the appellant regarding the maintenance of a stable activity of the catalyst was the second figure of Annex 1, in which it is shown that in a polymerisation process according to granted claim 1 carried out using as scavenger TIBAL in amounts varying between 5 and 200 ppm, the catalyst activity remained almost constant, which is not the case when using triethylaluminium (TEAL) as scavenger.

However, considering that the process according to example 7 of D1 is already carried out with TIBAL, the nature of the scavenger (TIBAL vs. TEAL) is not a distinguishing feature between the subject-matter of granted claim 1 and the one of the closest prior art. Therefore, all what the data of the second figure of Annex 1 may show in relation to the distinguishing feature identified above is that varying the amount of TIBAL between 5 and 200 ppm has no effect on the catalyst activity. Under such circumstances, the process claimed provides no improvement over the closest prior art in terms of catalyst activity (but it also maintains a constant catalyst activity).

2.3.4 In view of the above, the technical problem effectively solved is seen as residing in the provision of a slurry process for producing polyethylene in two loop reactors connected in series, which maintains a stable activity of the catalyst and leads to less fouling than the one according to example 7 of D1.

2.4 Obviousness

- 2.4.1 The question remains to be answered if the skilled person, desiring to solve the problem identified in section 2.3.4 above, would, in view of the prior art, have modified the disclosure of the closest prior art in such a way as to arrive at the subject matter of operative claim 1.
- 2.4.2 In that respect, the Board agrees with the respondent that determining a suitable amount of the scavenger TIBAL, which is already introduced into the first reactor in the process according to example 7 of D1, but for which no information is provided in D1, may be determined by mere routine experimentation taking into account the general teaching in the art.
- 2.4.3 In particular, it is known from D4 (column 11, lines 39-48) that alkyl aluminium scavengers such as TIBAL may cause some problems, including fouling, during the polymerisation process, so that they should be "minimised or avoided altogether if conditions permit". Although it is true that D4 does not specifically deal with double loop reactors connected in series as in example 7 of D1, its teaching is related to slurry polymerisation process of ethylene using supported metallocene catalysts (column 3, lines 14-28; column 11, lines 25-34). Therefore, the general teaching at column 11, lines 39-38 of D4 is valid for the process according to example 7 of D1.
- 2.4.4 Also, D6, although it is not specifically directed to supported metallocene catalysts, teaches that high amounts of alkyl aluminium compounds such as TIBAL (page 9, line 22; example 1.4, Table 1, page 20) may lead to decreased productivity of (unsupported)

metallocene catalysts (page 8, line 21 to page 9, line 18). Therefore, the amount of such scavengers should preferably be kept low (page 10, line 27 to page 11, line 2).

- 2.4.5 As already explained by the opposition division (section 5.2.4 of the contested decision), it may further be derived from D5 that amounts of 21.64 to 41.08 ppm TIBAL, i.e. also within the range of 5 to 40 ppm specified in granted claim 1, are usual in the art.

In that respect, it is correct that D5 teaches that in the process according to example 7 of D5, which is carried out in a slurry single loop reactor (see paragraph 431), use is made of an antistatic agent to prevent static build-up in the reactor (paragraph 432 of D5), i.e. to reduce fouling/sheeting. However, considering that neither granted claim 1 nor D1 forbid the use of such antistatic agents, that teaching of D5 would not prevent the skilled person aiming at solving the technical problem defined above from using amounts of TIBAL in the range specified in granted claim 1.

- 2.4.6 Finally, since the process of example 7 of D1 is carried out using a metallocene catalyst and a scavenger (TIBAL) according to the teaching of the patent in suit (D1: paragraphs 104-108; paragraphs 26-32, 46 and 49 of the patent in suit), there is no reason to doubt that in that process, the catalyst activity is maintained throughout the process (see the second figure of Annex 1), which was not contested by the appellant.

- 2.4.7 In view of the above, it is concluded that controlling the amount of TIBAL belonged to a usual optimisation of

the polymerisation process according to example 7 of D1 by using quantities that were in line with the general teaching in the art. Therefore, the subject-matter of granted claim 1, in particular the specific range of 5 to 40 ppm scavenger, would be arrived at in an obvious manner starting from the teaching of example 7 of D1 and in view of the available prior art. Under such circumstances, the main request is not inventive.

Auxiliary requests 1 to 4

3. Admittance

3.1 Auxiliary requests 1 to 4 were all filed with the patent proprietor's statement of grounds of appeal pursuant to Article 12(1)(2) RPBA. The question arises if those requests should be held inadmissible pursuant to Article 12(4) RPBA, as requested by the respondent.

3.2 Each of auxiliary requests 1 to 4 was *inter alia* modified in order to indicate unambiguously that an amount of scavenger of 5 to 40 ppm based on the total amount of the diluent and reactants introduced to a first reactor is introduced into the first reactor, i.e. to limit the processes being claimed to the embodiment according to "case 1" as defined in the contested decision (see section VI above).

3.3 In that respect, it appears from the minutes of the oral proceedings before the opposition division that the interpretation of granted claim 1 on the basis of "case 1" and "case 2" was made clear to the appellant (and even agreed upon by him), at least at the beginning of the oral proceedings (see sections 16, 17 and 21 of the minutes). Besides, according to the respondent, the opposition division made clear that the

then pending main request (patent in suit), interpreted according to the so-called "case 2" was held to lack an inventive step (see reply to the statement of grounds of appeal: section 3.2, first paragraph). Therefore, it makes no doubt that it would have been possible for the appellant to submit the now pending auxiliary requests 1 to 4 already during the oral proceedings before the opposition division.

3.4 However, the amendments made to granted claim 1 in claim 1 of each of auxiliary requests 1 to 4 effectively limit the subject-matter being claimed to subject-matter which was dealt with in the contested decision ("case 1" of the main request) and further defended in the main request in appeal. Besides, it was not shown that the amendments made constitute a fresh case as compared to said main request. It is further noted that the interpretation of granted claim 1 into "case 1" and "case 2" was first made at the oral proceedings before the opposition division and was in particular not identified by the opposition division in the summons to oral proceedings (see section 2), which may have surprised the appellant. Also, auxiliary requests 1 to 4 were filed at the onset of the appeal proceedings and may be seen as a direct reaction to the contested decision.

3.5 Under those circumstances, it is not justified to hold auxiliary requests 1 to 4 inadmissible pursuant to Article 12(4) RPBA.

4. Auxiliary request 1

4.1 Inventive step

4.1.1 As compared to granted claim 1, auxiliary request 1 was amended in order to indicate that:

(a) an amount of scavenger AlR_x of 5 to 40 ppm based on the total amount of the diluent and reactants introduced to a first reactor is introduced into the first reactor (emphasis by the Board);

(b) additional ethylene, additional polymerisation diluent and additional scavenger (defined in general terms) are introduced in the second reactor, whereby the amount of additional scavenger is in the range of 5 to 40 ppm based on the additional diluent and additional reactants introduced into the second reactor.

4.1.2 The first amendment renders explicit a feature which has already been considered as encompassed by claim 1 as granted in the analysis of the embodiment "case 1" and therefore does not have any impact in the analysis of inventive step.

4.1.3 Regarding amendment (b), it is already indicated in example 7 of D1 (paragraph 110, page 8, lines 5-8) that additional reactant (ethylene) and polymerisation diluent (isobutane) is added into the second reactor. Therefore, the subject-matter of claim 1 of auxiliary request 1 is further distinguished, as compared to granted claim 1, from the process according to example 7 of D1 only in that additional scavenger is added into the second reactor in an amount according to the range defined therein.

In that respect, it was undisputed between the parties during the oral proceedings before the Board that in a process carried out in two loop reactors connected in series such as the one according to example 7 of D1, some of the scavenger introduced into the first reactor is mandatorily transferred into the second reactor, which is, although not explicitly indicated in example 7 of D1, indeed reflected by claim 1 of D1 (see end of feature (b) thereof). Therefore, amendment (b) effectively amounts to defining that the concentration of scavenger which is already present in the second reactor remains in the same range as in the first reactor when further diluent and reactants are added into the second reactor.

It was not shown by the appellant that any additional (as compared to the main request) technical effect is achieved by the feature of amendment (b). In particular, no comparison between a process satisfying or not said feature was made.

Under such circumstances, the formulation of the problem effectively solved for claim 1 of auxiliary request 1 remains the same as for the main request.

However, it is, for the same reasons as for the main request, obvious to control and determine a suitable amount of scavenger to be used in the second reactor by mere routine experimentation, in particular to ensure that the same concentration of scavenger is present at any time in both reactors, i.e. also upon addition of diluent and reactants into the second reactor. In that respect, it was undisputed between the parties that diluent and reactants usually contain undesirable impurities, which are usually removed by such

scavengers (see paragraph 2 of the patent in suit, which is directed to general knowledge from the prior art). It makes further no doubt that the skilled person would use the same scavenger in the first and in the second reactor (i.e. TIBAL in the case of example 7 of D1) and that, for the same reasons as for the main request, the amount of scavenger should be controlled so as to avoid the drawbacks known to be related with the use of those compounds, including sheeting/fouling (see in particular D4).

For those reasons, the subject-matter of claim 1 of auxiliary request 1 is not inventive.

5. Auxiliary request 2

5.1 Claim 1 of auxiliary request 2 corresponds to claim 1 of auxiliary request 1, whereby the scavenger introduced into the first reactor is TIBAL.

5.2 Considering that the process of example 7 of D1 is already carried out using TIBAL in the first reactor, the amendment made in claim 1 of auxiliary request 2 does not introduce any further difference with respect to example 7 of D1 and therefore does not contribute to an inventive step. On that basis, the same conclusion regarding inventive step is bound to be reached for auxiliary request 2 as for auxiliary request 1.

6. Auxiliary requests 3 and 4

No additional arguments were put forward by the appellant regarding inventive step in respect of each of auxiliary requests 3 and 4. Further considering that the scavenger TIBAL used in the first reactor of example 7 of D1 is a scavenger as defined for the

second reactor in each of auxiliary requests 3 and 4, the same conclusion regarding inventive step is bound to be reached for each of those requests as for the operative higher ranking requests.

7. Since neither the main request, nor any of auxiliary requests 1 to 4 is inventive, there is no need for the Board to deal with any other issues and 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