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**Datasheet for the decision of 20 October 2021**

**Case Number:** T 1307/18 - 3.3.03

**Application Number:** 12797888.0

**Publication Number:** 2794676

**IPC:** C08F4/649, C08F110/06, C08F4/651

**Language of the proceedings:** EN

**Title of invention:**
CATALYST SYSTEM FOR THE POLYMERIZATION OF OLEFINS

**Patent Proprietor:**
Basell Poliolefine Italia S.r.l.

**Opponent:**
W.R. Grace & Co.-Conn.

**Relevant legal provisions:**
EPC Art. 56

**Keyword:**
Inventive step - (no)

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**Case Number: T 1307/18 - 3.3.03**

# D E C I S I O N
# of Technical Board of Appeal 3.3.03
# of 20 October 2021

| | |
|---|---|
| **Appellant:** (Opponent) | W.R. Grace & Co.-Conn.<br>7500 Grace Drive<br>Columbia, MD 21044 (US) |
| **Representative:** | J A Kemp LLP<br>80 Turnmill Street<br>London EC1M 5QU (GB) |
| **Respondent:** (Patent Proprietor) | Basell Poliolefine Italia S.r.l.<br>Via Pontaccio 10<br>20121 Milano (IT) |
| **Representative:** | LyondellBasell<br>c/o Basell Poliolefine Italia<br>Intellectual Property<br>P.le Donegani 12<br>44122 Ferrara (IT) |
| **Decision under appeal:** | **Decision of the Opposition Division of the European Patent Office posted on 28 March 2018 rejecting the opposition filed against European patent No. 2794676 pursuant to Article 101(2) EPC.** |

**Composition of the Board:**

| | |
|---|---|
| **Chairman** | D. Semino |
| **Members:** | D. Marquis |
| | W. Ungler |

## Summary of Facts and Submissions

I. The appeal of the opponent lies from the decision of the opposition division posted on 28 March 2018 rejecting the opposition against European patent No. 2794676.

II. Claim 1 as granted read as follows:

"1. A catalyst system for olefin polymerization comprising the product obtained by contacting

(a) a solid catalyst component containing Mg, Ti, halogen and at least an electron donor compound selected from phenylene aromatic diesters;
(b) an alkylaluminum cocatalyst and
(c) an ester formula R'OOC-$(CR"_2)_m$-COOR' in which m is an integer from 2 to 7, the R' groups, equal to or different from each other, are $C_1$-$C_{10}$ alkyl groups and the R" groups, independently, are hydrogen or $C_1$-$C_{15}$ hydrocarbon groups".

III. The decision of the opposition division was based *inter alia* on document D1 (US 2009/0203863 A1).

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

- D1 was the closest prior art. Claim 1 of the main request differed from D1 in that the external electron donor used was a diester defined by the formula R'OOC-$(CR"_2)_m$-COOR' (where m was an integer from 2 to 7, the R' groups, equal to or different

from each other, were $C_1$-$C_{10}$ alkyl groups and the R" groups, independently, were hydrogen or $C_1$-$C_{15}$ hydrocarbon groups), whereas a monoester was used in D1. The patent in suit did not show the presence of an effect resulting from that difference. The problem was to provide an alternative catalyst system suitable for propylene polymerization, that would show a hydrogen response at least as good as the catalyst system in D1 or even better. D1 did not render the claimed subject-matter obvious, so that the subject-matter of granted claim 1 involved an inventive step.

V. The appellant (opponent) lodged an appeal against that decision.

VI. With the reply to the statement of grounds of appeal the respondent (patent proprietor) submitted auxiliary requests I to III.

Claim 1 of auxiliary request I differed from claim 1 of the main request in that in the definition of the ester (c) the range of integers m was amended to 3-6 and the group R" was "hydrogen or $C_1$-$C_{10}$ linear or branched alkyl groups".

Claim 1 of auxiliary request II corresponded to claim 1 of the main request.

Auxiliary request III corresponded to page 4 of the patent as granted in which in paragraph 24 the reference to WO98/44009 was amended to WO98/44001.

VII. Oral proceedings were held on 20 October 2021 in the presence of both parties by videoconference.

VIII. The arguments of the appellant, insofar as relevant to the present decision, may be summarised as follows:

- D1 represented the closest prior art. Claim 1 of the main request differed from the catalyst system used in run O-0972 in Table 7 in that the external electron donor was a diester defined by the formula R'OOC-(CR"$_2$)$_m$COOR' instead of the monoester isopropyl myristate. In the absence of an effect over D1, the problem solved was the provision of an alternative catalyst system suitable to produce polyolefins having reasonably high melt flow rate.

- It would have however been obvious to the skilled person to replace isopropyl myristate in run O-0972 of D1 with any ester (c) according to claim 1 of the main request. Paragraph 62 of D1 described compounds identified as alternative activity limiting agents (ALAs) such as $C_{1-4}$ alkyl diesters of aliphatic $C_{4-20}$ dicarboxylic acids which overlapped with the definition of ester (c) as recited in claim 1 of the main request. These esters would have led to an alternative catalyst composition for the preparation of polyolefins having a high melt flow rate. The choice of an ester falling within formula (c) was therefore an arbitrary choice from the broad disclosure of D1, as no technical advantage was associated with this selection. Claim 1 of the main request lacked therefore an inventive step.

- Claim 1 of auxiliary requests I and II or the combination of auxiliary request III with any of the previous requests also lacked an inventive step for the same reasons as the main request.

IX. The arguments of the respondent, insofar as relevant to the present decision, may be summarised as follows:

- D1 and in particular the catalyst system used in run O-0972 disclosed in Table 7 represented the closest prior art. Claim 1 of the main request differed from that starting point in the presence of a diester component of the formula defined in operative claim 1. The definition of the technical problem provided by the appellant could be accepted.

- There was, however, no incentive in D1 to use a diester component according to operative claim 1 in place of isopropyl myristate, the monoester used in the catalyst system of run O-0972. In particular, D1 did not teach that a diester would provide a good hydrogen response in the catalyst system free of TEOS or diether. On the contrary, D1 pointed at specific selectivity control agents of component SCA2 for obtaining high melt flow rates, so that the skilled person would be prompted to address this component when aiming at solving the posed problem. Furthermore, D1 did not specifically point at diesters according to operative claim 1 and isopropyl myristate was disclosed as a preferred activity limiting agent in paragraph 62 of D1 together with an alternative ester not falling under the formula in the claim. Claim 1 of the main request involved therefore an inventive step over D1.

- Claim 1 of auxiliary requests I, II and III was also inventive starting from D1 for the same reasons as the main request. There was no

additional argument of inventive step for these requests.

X. The appellant requested that the decision under appeal be set aside and the patent be revoked.

XI. The respondent requested that the appeal be dismissed (main request), or that the patent be maintained in amended form on the basis of any of auxiliary requests I to III filed with the reply to the statement of grounds of appeal. In that respect the modified description page filed as auxiliary request III was intended to be combined with the previous requests.

## Reasons for the Decision

Main request (claims as granted)

1. Inventive step

1.1 Inventive step of the main request was addressed in view of D1 as the closest prior art in the contested decision. Within that document, the catalyst system of run O-0972 disclosed in Table 7 was seen as the most relevant starting point and it was acknowledged that operative claim 1 differed from that starting point in the presence of a diester component (c) defined by the formula R'OOC-(CR"$_2$)m-COOR' (where m was an integer from 2 to 7, the R' groups, equal to or different from each other, were $C_1$-$C_{10}$ alkyl groups and the R" groups, independently, were hydrogen or $C_1$-$C_{15}$ hydrocarbon groups), while by contrast a monoester (isopropyl myristate, IPM) was used in D1. That was not in dispute between the parties.

1.2 It was also established in the contested decision that the distinguishing feature of operative claim 1 over D1 had not been shown to have an effect over D1. In view of that the parties agreed at the oral proceedings before the Board that the problem was to provide an alternative catalyst system suitable to produce polyolefins having reasonably high melt flow rate. In the presence of an agreement between the parties the Board has no reason to take a different view up to this point of the reasoning.

1.3 The appellant contested the decision of the opposition division as to obviousness. It was argued that it would have been obvious for the skilled person starting from D1 to replace isopropyl myristate in run O-0972 with an ester (c) according to operative claim 1.

1.4 The question of inventive step in the present case is whether the skilled person would have considered the use of a diester according to the definition provided for component (c) in claim 1 of the main request instead of the monoester used in the catalyst system of run O-0972 in the expectation of obtaining a catalyst system suitable to produce polyolefins having reasonably high melt flow rate.

1.5 The catalyst system disclosed in D1 is based on a composition including a procatalyst composition, a cocatalyst, and a mixed external electron donor (M-EED), wherein the M-EED includes a first selectivity control agent (SCA1), a second selectivity control agent (SCA2) and an activity limiting agent (ALA) (paragraph 20). According to D1, the SCA1 (e.g. dicyclohexyldimethoxysilane used in run O-0972) acts as a stiffness promoting agent (paragraphs 47 and 48), the SCA2 (e.g. tetraethoxysilane (TEOS) used in run O-0972)

acts as a melt-flow promoting agent (paragraph 54), and the activity limiting agent ALA (e.g. isopropyl myristate in run O-0972) limits the catalyst activity at high temperatures (paragraphs 56 and 62 of D1). The teaching of D1 in that respect is that the three components SCA1, SCA2 and ALA of the mixed external electron donor M-EED in the catalyst system have distinct effects on the polymerization and the polymer produced. In particular, the choice of the activity limiting agent (ALA) is not limited by the presence of any of the other specific components of the mixed external electron donor M-EED and the list of activity limiting agents provided in paragraphs 61-67 is, according to the information contained in D1, largely independent from the choice of the other components SCA1 and SCA2.

1.6 Paragraph 62 discloses as possible activity limiting agents (ALAs) $C_{1-4}$ alkyl diesters of aliphatic $C_{4-20}$ dicarboxylic acids, which overlap with the definition provided for the ester compounds (c) defined in claim 1 of the main request. It is also apparent from paragraph 62 that any $C_{1-4}$ alkyl diester of aliphatic $C_{4-20}$ dicarboxylic acids is an alternative activity limiting agent to the isopropyl myristate disclosed in the catalyst system of run O-0972. In this respect isopropyl myristate and di-n-butyl sebacate listed at the end of paragraph 62 are disclosed as possible options of activity limiting agents, but also the diesters are disclosed in the preceding list as an equivalent option. The skilled reader of D1 would have thus understood from paragraph 62 that any $C_{1-4}$ alkyl diester of aliphatic $C_{4-20}$ dicarboxylic acids could have been used in place of isopropyl myristate in the catalyst system of run O-0972 when looking for an alternative catalyst system suitable to produce

polyolefins having reasonably high melt flow rate. In this respect, it is clear from the disclosure of D1 that the activity limiting agent (ALA) should not affect the melt flow rate of the polymer obtained which mainly depends on the SCA2 component.

1.7 The respondent argued that one would not have replaced isopropyl myristate by a diester according to operative claim 1 in the catalyst system of run O-0972 because that component was not suggested as one leading to a good hydrogen response and therefore to a high melt flow rate in a catalyst system free of TEOS (tetraalkoxysilane). In this respect it is firstly noted that, in order to arrive at a catalyst system according to claim 1, the skilled person has only to replace isopropyl myristate with a specific diester and does not need to get rid of TEOS, which is not excluded by the wording of claim 1. Moreover, what the skilled person would do, depends mainly on the problem as formulated. In the present case, when aiming simply at the provision of an alternative catalyst system suitable to produce polyolefins having reasonably high melt flow rate, the skilled person would take into consideration without any inventive skill all possible alternatives foreseen in D1 which do not clearly negatively affect the melt flow rate. In particular, the skilled person would consider any of the possible activity limiting agents disclosed in paragraph 62 of D1 as alternative obvious solutions to the posed problem, as these components are not meant to address (and influence) the melt flow rate.

1.8 The problem formulated above being the provision of an alternative catalyst system, no further hint towards the $C_{1-4}$ alkyl diester of aliphatic $C_{4-20}$ dicarboxylic acids appears to be needed in D1 than the disclosure in

paragraph 62. In view of this, the subject-matter of claim 1 of the main request lacks an inventive step over D1 alone.

Auxiliary requests

2. Inventive step

2.1 Claim 1 of auxiliary request I differs from claim 1 as granted in that the definition of component (c) was limited by amending "m" from 2-7 to 3-6 and the hydrocarbon group of R" from $C_1$-$C_{15}$ to $C_1$-$C_{10}$ linear or branched alkyl groups.

2.2 With regard to that request, both the appellant and the respondent relied on the argumentation they had put forward for the main request.

2.3 The limitation of the definition provided for component (c) in operative claim 1 does not modify the distinguishing feature identified in view of D1 nor does it alter the problem solved. Moreover, it does not significantly modify the overlap between the definition of the activity limiting agent disclosed in paragraph 62 of D1, the $C_{1-4}$ alkyl diesters of aliphatic $C_{4-20}$ dicarboxylic acids, and the definition of component (c) according to operative claim 1. In particular, the three diesters exemplified in the examples of the patent in suit, diethyl adipate, diethyl pimelate and diethyl suberate, which are according to claim 1 of auxiliary request I, are also $C_{1-4}$ alkyl diester of aliphatic $C_{4-20}$ dicarboxylic acids according to the definition of paragraph 62 of D1. In view of that, claim 1 of auxiliary request I lacks an inventive step for the same reasons as claim 1 of the main request.

2.4 Claim 1 of auxiliary request II corresponds to claim 1 of the main request. The parties relied on their arguments of inventive step submitted for the main request. In view of that claim 1 of auxiliary request II lacks an inventive step for the same reasons as the main request.

2.5 Auxiliary request III is an amended page 4 of the description in which paragraph 24 was modified with respect to a citation (WO98/44001). There was no further arguments of the parties with regard to auxiliary request III. The amendment of the citation in paragraph 24 does not change the assessment of inventive step in view of D1. In view of that the conclusion of lack of inventive step also applies to that request when combined with any of the main request or auxiliary requests I and II.

3. As the subject-matter of claim 1 according to all requests on file does not involve an inventive step, the patent is to be revoked and there is no need for the Board to decide on any other issue.

**Order**

**For these reasons it is decided that:**

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

B. ter Heijden D. Semino

Decision electronically authenticated