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**Datasheet for the decision
of 19 October 2015**

Case Number: T 1256/12 - 3.3.03

Application Number: 01967318.5

Publication Number: 1315763

IPC: C08F8/50

Language of the proceedings: EN

Title of invention:

CONTROLLED RHEOLOGY POLYPROPYLENE HETEROPHASIC COPOLYMERS

Patent Proprietor:

TOTAL RESEARCH & TECHNOLOGY FELUY

Opponent:

Akzo Nobel N.V.

Relevant legal provisions:

EPC Art. 123(2), 123(3), 84

RPBA Art. 13(1)

Keyword:

Main request - Article 123(2) (no)
Auxiliary request 1 - Article 123(3) (no)
Auxiliary request 2 - Article 123(2) (no)
Auxiliary request 3 - Withdrawn
Auxiliary request 4 - Article 13(1) RPBA (no)

Decisions cited:

T 0988/02



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Case Number: T 1256/12 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 19 October 2015

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Decision under appeal: **Interlocutory decision of the Opposition**
Division of the European Patent Office posted on
10 April 2012 concerning maintenance of the
European Patent No. 1315763 in amended form.

Composition of the Board:

Chairman F. Rousseau
Members: D. Marquis
R. Cramer

Summary of Facts and Submissions

I. The appeal lodged by the opponent lies from the decision of the opposition division posted on 10 April 2012 maintaining European patent N° 1 315 763 (based on application number 01 967 318.5) in amended form.

II. The application as filed had 18 claims whereby claims 1, 10 and 12 read as follows:

"1. Polypropylene (co)polymer degraded with a cyclic ketone peroxide characterised in that it exhibits an Izod notched impact strength for melt flow indices larger than 15 g/10 min that is at least 50% higher than that obtained for a polypropylene (co)polymer degraded with a linear peroxide under similar conditions."

"10. Use of a cyclic ketone peroxide to degrade a polypropylene (co)polymer, for producing a controlled rheology material of melt index larger than 15 g/10 min, having simultaneously an impact resistance that is at least 50% higher and a flexural modulus that is 30 Mpa higher than those of polypropylene (co)polymers degraded with linear peroxides under similar conditions."

"12. Use according to claim 10 or claim 11 wherein the extrusion temperature is of from 160 to less than 200°C"

III. The patent was granted with a set of 15 claims of which independent claim 1 read as follows:

"1. A method for degrading an heterophasic copolymer of propylene by extruding said copolymer with a cyclic ketone peroxide at a temperature of from 160°C to less

than 200°C."

- IV. A notice of opposition against the patent was filed in which the revocation of the patent was requested on the grounds according to Article 100(a) EPC (lack of novelty and lack of inventive step) and Article 100(c) EPC.
- V. By a decision posted on 10 April 2012, the opposition division maintained the patent in amended form on the basis of the first auxiliary request filed during oral proceedings. The claims of that request differed from the claims as granted in that claims 2, 9 and 10 were deleted and the remaining claims renumbered accordingly.

In the decision it was held that claim 1 of the first auxiliary request found a basis in claims 10 and 12 together with the general teaching of the description as originally filed. The opposition division found that the method disclosed in claim 1 automatically lead to degraded propylene copolymers characterized by the product features disclosed in claim 10 as originally filed (melt index, impact resistance and flexural modulus). Although claim 1 as granted did not explicitly disclose these product features, its scope was implicitly restricted to them. The claims of the first auxiliary request were also found to be novel and inventive.

- VI. On 28 November 2012, the patent proprietor (respondent) filed a reply to the statement of the grounds of appeal and submitted two auxiliary requests. Claim 1 of those requests read as follows:

Auxiliary request 1

"1. Method for producing a controlled rheology

polypropylene heterophasic copolymer by extruding a polypropylene heterophasic copolymer with a cyclic ketone peroxide, at an extrusion temperature ranging from the temperature at which all components are in the molten state up to a temperature of less than 200°C."

Auxiliary request 2

"1. Method for producing a controlled rheology polypropylene heterophasic copolymer by extruding a polypropylene heterophasic copolymer with a cyclic ketone peroxide, at an extrusion temperature ranging from the temperature at which all components are in the molten state up to a temperature of less than 200 °C, wherein the cyclic ketone peroxide has at least two peroxide groups, wherein the cyclic ketone peroxide is 3,6,9-triethyl-3,6,9-trimethyl-1,4,7-triperoxonane, wherein the extrusion temperature is of from 160 °C to less than 200 °C, wherein the polypropylene heterophasic copolymer is prepared by copolymerising propylene with ethylene in the proportions of from 5 to 20 wt% of ethylene and 95 to 80 wt% of propylene."

VII. On 30 July 2015, the parties were summoned to oral proceedings. On 14 September 2015, the Board issued a communication setting out its preliminary opinion.

VIII. Oral proceedings were held on 19 October 2015. During the oral proceedings, the respondent filed a third and a fourth auxiliary requests. The third auxiliary request was subsequently withdrawn during oral proceedings.

Claim 1 of auxiliary request 4 read as follows:

"1. A method for degrading an heterophasic copolymer of propylene consisting of ethylene propylene bipolymer

spherical domains dispersed in a semi-crystalline polypropylene matrix by extruding said copolymer with a cyclic ketone peroxide at a temperature of from 160°C to less than 200 °C, wherein the copolymer is obtained by reactor polymerization, wherein the cyclic ketone peroxide is 3,6,9-triethyl-3,6,9-trimethyl-1,4,7-triperoxonane, wherein the extrusion is carried out at a temperature sufficient to maintain the copolymer in the molten state, and wherein the degraded copolymer exhibits an Izod notched impact strength for melt flow indices larger than 15 g/10 min that is at least 50% higher than that obtained for the copolymer degraded with a linear peroxide under similar conditions."

IX. The appellant's arguments may be summarised as follows:
Main request

Claim 1 found no basis in the application as originally filed. The application as filed disclosed a method for the preparation of a degraded polymer characterised by its melt flow index and Izod impact strength. Those requirements were not mentioned in claim 1 of the main request and they were not implied by its preparation method either. As a result, claim 1 of the main request did not meet the requirements of Article 123(2) EPC.

First auxiliary request

The scope of claim 1 of the first auxiliary request was broader than the scope of the corresponding claim 1 as granted. In particular, the temperature range had been extended as compared to the range of claim 1 as granted. Claim 1 did therefore not meet the requirements of Article 123(3) EPC.

Second auxiliary request

Claim 1 of the second auxiliary request did not find a basis in the application as filed. The passage bridging pages 7 and 8 only disclosed the preparation of a specific polymer. It was not allowable to consider the method steps disclosed therein in isolation from that specific polymer. Claim 1 of that request did not meet the requirements of Article 123(2) EPC.

Fourth auxiliary request

Claim 1 of that request was restricted to specific ranges of melt flow index and the Izod impact strength. These two parameters lacked clarity because claim 1 did not mention the temperature at which they had to be measured as well as the type of linear peroxide employed for the comparison. The examples of the patent showed that the Izod impact strength depended on the temperature at which it was measured. Claim 1 therefore lacked clarity. As the fourth auxiliary request was filed late, it should not be admitted into the appeal proceedings.

X. The respondent's arguments may be summarised as follows:

Main request

The passage bridging pages 7 and 8 formed the basis for claim 1 of the main request. The temperature range introduced in claim 1 was disclosed on page 8, line 20. The claimed method was not limited by specific values of the melt flow index and the Izod impact strength as these were not the gist of the invention. The method of claim 1 did not automatically lead to a degraded polymer having a melt flow index of more than 15 g/10min. That could also be derived from the examples of the patent in

suit. The formulation of claim 1 of the main request relied on the method steps disclosed on page 8. Claim 1 fulfilled the requirements of Article 123(2) EPC.

First auxiliary request

No comments were provided concerning the objection against the temperature range defined in claim 1. Claim 1 of the first auxiliary request fulfilled the requirements of Article 123(3) EPC.

Second auxiliary request

The formulation "controlled rheology polypropylene heterophasic copolymer" added to claim 1 did not imply a specific melt flow index or Izod impact strength, it merely referred to the polymer obtained from the degradation method. Claim 1 was based on a combination of the preferred embodiment of the application disclosed in step (b) on page 6 together with the preferred peroxide type and preferred polymer of page 7 and the preferred temperature range of page 8. Claim 1 fulfilled the requirements of Article 123(2) EPC.

Fourth auxiliary request

The introduction of the melt flow index and the Izod impact strength in claim 1 allowed a relative comparison to other degraded polymer compositions obtained under similar conditions. Claim 1 was clear and the fourth auxiliary request should be admitted into the proceedings.

- XI. The appellant requested that the decision under appeal be set aside and that the European patent No. 1 315 763 be revoked.

XII. The respondent requested that the appeal be dismissed or that the patent be maintained on the basis of the first or second auxiliary requests filed on 28 November 2012 or on the basis of the fourth auxiliary request filed during the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Article 123(2) EPC

2.1 According to Article 123(2) EPC the European patent application or the European patent may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed. The wording of claim 1 of the main request cannot be found *expressis verbis* in the application as filed. The question that must be answered with respect to claim 1 of the main request is therefore whether the claimed subject matter contains new technical information that the skilled person could not derive directly and unambiguously, using common general knowledge from the application as filed.

2.2 The application as filed relates to polypropylene heterophasic copolymers modified with cyclic ketone peroxides in order to better control their impact strength (page 1, lines 4 to 6). From page 1, line 7 to page 4, line 3, methods for increasing the impact strength of polypropylene (co)polymers that are known in the art are discussed. According to page 4, lines 5 to

7, these methods do not lead to polypropylene heterophasic (co)polymers having simultaneously a melt flow index MI_2 larger than 15g/10min and increased impact strength, while keeping adequate rigidity. The application discloses on page 4, starting at line 21, that the "invention discloses a polypropylene (co)polymer degraded with a cyclic ketone peroxide characterised in that it retains an Izod notched impact strength for melt flow indices larger than 15 g/10 min that is at least 50% higher than that of a polypropylene (co)polymer degraded with a linear peroxide under similar conditions", which polypropylene (co)polymer is made the subject matter of claim 1.

- 2.3 The methods proposed for preparing these polypropylene (co)polymers comprise the steps of degrading a polypropylene heterophasic copolymer or a polypropylene (co)polymer with a cyclic ketone peroxide in an extruder, at a temperature sufficient to maintain the copolymer in the molten state (page 5, line 29 to page 6, line 13). The skilled person derives from the application as filed that these method steps are necessary to obtain the claimed polymers having specific melt index and impact resistance properties. In particular, the application as filed teaches that the degradation method is carried out in such a way that products having a melt flow index larger than 15 g/10 min are produced (page 7, lines 18 to 20). Also, the nature of the cyclic peroxide (page 6, line 18 to page 7 line 3), its amount in the polymer during extrusion (page 7, lines 15 to 18), the amount of ethylene present in the polypropylene heterophasic copolymer and the extrusion temperature can be adapted to control the Izod impact strength characterizing the degraded polymers (page 8, line 31 to page 9, line 3 and page 9, lines 17 to 24).

- 2.4 The application as filed therefore teaches that beyond the mere extrusion of the starting polymer with a cyclic ketone peroxide, other characteristics of the process are necessary to produce the polymers of claim 1 of the application as filed having the specific melt index and impact resistance properties mentioned above.
- 2.5 Claim 1 of the main request defines a method for degrading an heterophasic copolymer of propylene by extruding said copolymer with a cyclic ketone peroxide at a temperature of from 160°C to less than 200°C. The application as filed does not provide a basis for that general method which as such does not necessarily lead to polymers having a melt index MI_2 larger than 15 g/10 min and having an impact resistance that is at least 50% higher than those of the polypropylene (co)polymers degraded with linear peroxides under similar conditions. For instance, the application as filed reveals that the melt flow index of the polymer produced may vary from 2 to 70 g/10 min but that the efforts of the application were focused on products having a melt flow index larger than 15 g/10min, meaning that that more restricted range of melt flow index can only be achieved when specific conditions are applied during the degradation method. That is confirmed by the results reported in Table III of example 2 wherein the polymer obtained from the degradation of an heterophasic copolymer of propylene by extruding said copolymer with a cyclic ketone peroxide (3,6,9-triethyl-3,6,9-trimethyl-1,4,7-triperoxonane) at a temperature of 160°C or 180°C may have a melt flow index of as low as 12 g/10 min, which is not according to claim 1 as originally filed.
- 2.6 The method of claim 1 of the main request therefore lacks method steps that are necessary to obtain a

material retaining an Izod notched impact strength for melt flow indices larger than 15 g/10 min that is at least 50% higher than that of a polypropylene (co)polymer degraded with a linear peroxide under similar conditions as disclosed in claim 1 as originally filed.

2.7 The Appellant indicated that the passage on page 7, line 24 to page 8, line 29 was the basis for claim 1 of the main request. That passage relates to a preferred embodiment of the invention. There is no doubt for the skilled person that it refers to an embodiment within the ambit of claim 1 as filed. This follows from the whole description before (see above points 2.2 to 2.3) and the reference to excellent impact performance of the resin obtained after degradation (page 8, lines 23 to 29). Therefore, that passage implicitly discloses the preparation of a polypropylene (co)polymer meeting the parametric definition of claim 1 as filed. However, as shown above, the method of present claim 1 does not contain features from which it would result that these parametric values are necessarily obtained. Moreover, that passage discloses a degradation method of a polypropylene heterophasic copolymer obtained by reaction polymerisation of propylene with ethylene in proportions of from 5 to 20 wt% of ethylene and 95 to 80 wt% of propylene. The copolymerization is effected in two reactors under specific conditions to produce an ethylene-propylene rubber having a typical heterophasic morphology consisting of ethylene-propylene bipolymer spherical domains dispersed in a semi-crystalline polypropylene matrix.

2.8 The degradation method disclosed in the passage bridging pages 7 and 8 corresponds to a preferred embodiment of the application for which the polypropylene heterophasic

copolymer is prepared by copolymerising propylene with ethylene in specific proportions. Those proportions are however not part of claim 1 of the main request. The proportions of the monomers and more specifically the content in ethylene constituting the polypropylene heterophasic copolymer cannot be dissociated from the conditions of the degradation method since they together influence the physical properties of the resulting material, in particular the behaviour of the Izod notched impact strength as a function of melt flow index (page 8 lines 10 to 13 and page 9, lines 17 to 24).

2.9 Therefore, the subject-matter of claim 1 of the main request represents an undue generalisation of the method disclosed in the passage bridging pages 7 and 8 of the application as filed, contrary to the requirements of Article 123(2) EPC.

2.10 The main request is therefore not allowable.

First auxiliary request

3. Article 123(3) EPC

3.1 The temperature range of the method of claim 1 of the first auxiliary request is defined as a "temperature ranging from the temperature at which all components are in the molten state up to a temperature of less than 200°C". Claim 1 as granted requires a temperature range that is "from 160 to less than 200°C.", as consistently defined in the specification.

3.2 Claim 1 of the first auxiliary request therefore allows extrusion temperatures below 160°C, i.e. the method now claimed in the first auxiliary request does not necessarily fall within the ambit of claim 1 as granted.

In this respect it was not disputed that extrusion of a polypropylene heterophasic copolymer in the molten state would not necessarily imply a temperature of at least 160°C. Hence, claim 1 of the first auxiliary request extends beyond the scope of protection of the patent as granted.

- 3.3 The first auxiliary request does therefore not meet the requirements of Article 123(3) EPC.

Second auxiliary request

4. Article 123(2) EPC

4.1 Claim 1 of the second auxiliary request defines a method for producing a "*controlled rheology*" polypropylene heterophasic copolymer which method also comprises the same steps as defined in claim 1 of the main request. Additionally, claim 1 specifies *inter alia* that the polypropylene heterophasic copolymer to be extruded is prepared by copolymerising propylene with ethylene in the proportions of from 5 to 20 wt% of ethylene and 95 to 80 wt% of propylene.

4.2 The application as filed does not provide a definition of the wording "*controlled rheology*" and the patent proprietor itself acknowledged that it merely refers to the polymer resulting from the claimed degradation method. That wording however does not imply that the polymers obtained by the method of the application retain an Izod notched impact strength for melt flow indices larger than 15 g/10 min that is at least 50% higher than that of a polypropylene (co)polymer degraded with a linear peroxide under similar conditions. The same holds true for the definition wherein the polypropylene heterophasic copolymer is prepared by

copolymerising propylene with ethylene in the proportions of from 5 to 20 wt% of ethylene and 95 to 80 wt% of propylene. Therefore, the conclusion reached for claim 1 of the main request applies also to claim 1 of the second auxiliary request. Claim 1 of the second auxiliary request does not meet the requirements of Article 123(2) EPC.

- 4.3 The third auxiliary request having been withdrawn in the course of the oral proceedings, there is no need to consider that request.

Fourth auxiliary request

5. Article 13(1) RPBA

- 5.1 The fourth auxiliary request was only submitted at the oral proceedings, in reaction to the Board's opinion that the second auxiliary request was in breach of Article 123(2) EPC. Article 13(1) RPBA leaves it to the Board's discretion to admit any amendment to a party's case after it has filed its grounds of appeal or reply. The discretion shall be exercised in view of inter alia the complexity of the new subject matter submitted, the current state of the proceedings and the need for procedural economy.
- 5.2 Claim 1 of the fourth auxiliary request was amended such that the degraded copolymer resulting from the claimed method "exhibits an Izod notched impact strength for melt flow indices larger than 15 g/10 min that is at least 50% higher than those of the polypropylene (co)polymers degraded with linear peroxides under similar conditions." That amendment is based on page 4, lines 22 to 26 of the description of the application as originally filed. It includes specific ranges of the

melt index and Izod notched impact strength properties of the degraded polymer.

- 5.3 According to Article 84 EPC, the claims shall define the matter for which protection is sought (first sentence) and for this purpose they shall, *inter alia*, be clear. This implies that the claims must be clear in themselves when being read with the normal skills, but not including any knowledge derived from the description of the patent application (cf. decision T988/02 of 30 October 2003, Reasons point 3.3.1).
- 5.4 In the Board's view, the unambiguous characterization in a claim of a product by parameters (here the melt flow index and the Izod notched impact strength) necessarily requires that these parameters can be clearly and reliably determined. It thus follows that an indication of the method and conditions of determination of the parameter, which is absent in present claim 1, is necessary for the unambiguous definition of these parameters.
- 5.5 The Izod notched impact strength is a property of the polypropylene heterophasic copolymer resulting from the degradation method that can be measured over a broad range of temperatures according to the examples of the application (23°C, 10°C and -20°C in Table III). The values reported in Table III for a same polymer show that the Izod notched impact strength varies significantly as a function of the temperature under which it was measured. Also the values reported show that the limitation imposed on claim 1 that the degraded polymer exhibits an Izod notched impact strength for melt flow indices larger than 15 g/10 min that is at least 50% higher than those of the polypropylene (co)polymers degraded with linear peroxides under

similar conditions is fulfilled when that property is measured at 23°C but not when it is measured at 10°C and -20°C. In addition, claim 1 does not specify which linear peroxide should be used for that comparison and it is not credible that any linear peroxide would lead to the same result. It is also conventional in the art that the measurement of the melt index depends in particular on the load used.

5.6 Consequently, the Board can only come to the conclusion that there is a lack of information regarding the exact conditions at which the Izod impact strength in claim 1 is to be determined. This lack of information results in uncertainty as to the definition of the Izod impact strength, and therefore the Izod impact strength of the propylene polymer cannot limit the subject-matter of Claim 1 in any clear way.

5.7 Therefore, the subject-matter of claim 1 of the fourth auxiliary request is not prima facie allowable, which would be necessary for fulfilling the need for procedural economy and consequently admitting the request into the proceedings at such a late stage. Accordingly, the Board exercises its discretion under Article 13(1) RPBA not to admit this request. The further objections made against this request do not require further consideration as the request was not admitted into the proceedings.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The European patent No. 1 315 763 is revoked.

The Registrar:

The Chairman:



B. ter Heijden

F. Rousseau

Decision electronically authenticated