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**Datasheet for the decision  
of 8 February 2022**

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**Application Number:** 13714630.4

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**IPC:** C08L23/10, C08L23/12, C08L23/08

**Language of the proceedings:** EN

**Title of invention:**

HIGH FLOW THERMOPLASTIC POLYOLEFIN WITH BALANCED MECHANICAL  
PERFORMANCE AND LOW SHRINKAGE AND CLTE

**Patent Proprietor:**

Borealis AG

**Opponent:**

Basell Poliolefine Italia S.r.l.

**Relevant legal provisions:**

EPC Art. 56, 123(2)

**Keyword:**

Inventive step - Main request (no) - Seventh to twelfth  
auxiliary requests (no)  
Amendments - First to sixth auxiliary requests - allowable (no)



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Case Number: T 2087/19 - 3.3.03

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.03**  
**of 8 February 2022**

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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 4 June 2019  
rejecting the opposition filed against European  
patent No. 2834300 pursuant to Article 101(2)  
EPC.**

**Composition of the Board:**

**Chairman** D. Semino  
**Members:** D. Marquis  
R. Cramer

## Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division posted on 4 June 2019 to reject the opposition against European patent No. 2 834 300.

II. Claim 1 of the granted patent read as follows:

"1. Thermoplastic polyolefin (TPO) composition having a melt flow rate  $MFR_2$  (230°C) between 30 and 100 g/10 min measured according to ISO 1133, comprising

a) a matrix phase (M) comprising a propylene homopolymer (H-PP) and/or a propylene copolymer (R-PP), and

b) a dispersed phase (D) comprising an ethylene-C<sub>3</sub>-C<sub>8</sub>- $\alpha$ -olefin rubber copolymer (EOP),

wherein

(i) the composition comprises 20 wt.-% to 45 wt.-%, based on the total weight of the composition, of a xylene cold soluble (XCS) fraction having

(i-a) an ethylene content in the range of 40 wt.-% to 65 wt.-%, and

(i-b) an intrinsic viscosity (IV) of below 1.5 dL/g measured according to ISO 1628, and

(ii) the ratio of the intrinsic viscosity (IV) of xylene cold insoluble (XCI) fraction to the intrinsic viscosity (IV) of the xylene cold soluble (XCS) fraction ( $[XCS]/[XCI]$ ) of the thermoplastic polyolefin (TPO) composition is in the range of 0.75 to 1.35".

III. The documents submitted during the opposition proceedings included:

D1 WO 2004/003073 A1

- D3 EP 1477525 A1
- D4 EP 2154194 A1
- D5 Declaration of Mr. Grestenberger dated 6 March 2018
- D6 Declaration of Mr. Grestenberger dated 18 December 2018

- IV. In the decision under appeal, the opposition division decided that the granted claims involved an inventive step over D3 as the closest prior art.
- V. The opponent (appellant) lodged an appeal against that decision.
- VI. With the reply to the statement setting out the grounds of appeal the patent proprietor (respondent) filed twelve sets of claims as first to twelfth auxiliary requests.

Claim 1 of the seventh auxiliary request corresponded to claim 1 of the patent as granted (main request) in which the dispersed phase (D) was defined as "comprising an ethylene-propylene rubber copolymer or an ethylene-1-octene rubber copolymer".

Claim 1 of the eighth auxiliary request corresponded to claim 1 of the seventh auxiliary request with the specification that the matrix phase (M) had "a melt flow rate  $MFR_2$  (230°C) between 80 and 200 g/10 min, measured according to ISO 1133".

Claim 1 of the ninth auxiliary request corresponded to claim 1 of the eighth auxiliary request with the specification that the range defining the ethylene content of the xylene cold soluble (XCS) fraction was limited to "40 wt.-% to 50 wt.-%".

Claim 1 of the tenth auxiliary request corresponded to claim 1 of the ninth auxiliary request with the specification that the amount of xylene cold soluble (XCS) fraction was limited to "28 wt.-% to 45 wt.-%".

Claim 1 of the eleventh auxiliary request corresponded to claim 1 of the tenth auxiliary request in which the melt flow rate  $MFR_2$  (230°C) of the composition was limited to the range of "between 40 and 100 g/10 min".

Claim 1 of the twelfth auxiliary request corresponded to claim 1 of the eleventh auxiliary request in which the range defining the ratio of the intrinsic viscosity (IV) of xylene cold insoluble (XCI) fraction to the intrinsic viscosity (IV) of the xylene cold soluble (XCS) fraction ( $[XCS]/[XCI]$ ) of the thermoplastic polyolefin (TPO) composition was limited to "0.80 to 1.20".

Claim 1 of the first to sixth auxiliary requests corresponded to claim 1 of the seventh to twelfth auxiliary requests respectively in which the ratio in point (ii) was amended to read "the ratio of the intrinsic viscosity (IV) of xylene cold ~~insoluble~~ (~~XCS~~) fraction to the intrinsic viscosity (IV) of the xylene cold **insoluble** (**XCS****I**) fraction ( $[XCS]/[XCI]$ )" (additions in bold, deletions in strike-through).

VII. In preparation of the oral proceedings the Board issued a communication dated 5 October 2021 in which the Board gave their preliminary opinion about the case.

VIII. Oral proceedings before the Board were held by videoconference on 8 February 2022.

IX. The appellant's submissions relevant to the present decision, are essentially as follows:

- Claim 1 of the main request differed from the composition of Polymer 5 of D3 in the melt flow rate, the intrinsic viscosity of the xylene cold soluble fraction and the ratio of the intrinsic viscosity (IV) of xylene cold insoluble (XCI) fraction to the intrinsic viscosity (IV) of the xylene cold soluble (XCS) fraction ( $[XCS]/[XCI]$ ) of the thermoplastic polyolefin (TPO) composition.
- None of the distinguishing features was associated with an effect. The problem was to provide alternative thermoplastic polyolefins.
- D3 disclosed that the melt flow rate of the composition could vary in the range of 2-120 g/10 min. D4 taught that the melt flow rate of an heterophasic polymer composition could be raised by decreasing the intrinsic viscosity of the rubber (XCS fraction) through the use of a molecular weight regulator such as hydrogen. Raising the melt flow rate of the composition of Polymer 5 in D3 to a value in the upper part of the range disclosed in D3 resulted in a thermoplastic polyolefin composition according to operative claim 1. In particular, decreasing the intrinsic viscosity of the ethylene rubber increased the melt flow rate of the composition without affecting the other parameters of the composition. The range defining the ratio  $[XCS]/[XCI]$  in operative claim 1 only meant that the propylene homopolymer of the matrix

phase and the ethylene rubber had similar molecular weights. Claim 1 of the main request therefore lacked an inventive step over D3.

- The application as originally filed did not provide a basis for the amendment of the ratio of the intrinsic viscosity (IV) of xylene cold insoluble (XCI) fraction to the intrinsic viscosity (IV) of the xylene cold soluble (XCS) fraction as defined in claim 1 of the first to sixth auxiliary requests.
- Claims 1 in the seventh to twelfth auxiliary requests lacked inventive step for the same reason as the main request. In particular, it was not shown that the limitation of the features of these claims resulted in any effect over D3. D3 and D4 provided the teaching that rendered claim 1 according to the seventh to twelfth auxiliary requests obvious starting from D3.

X. The respondent's submission relevant to the present decision, are essentially as follows:

- Claim 1 of the main request differed from the composition of Polymer 5 of D3 in the melt flow rate, the intrinsic viscosity of the xylene cold soluble fraction and the ratio of the intrinsic viscosity (IV) of xylene cold insoluble (XCI) fraction to the intrinsic viscosity (IV) of the xylene cold soluble (XCS) fraction ( $[XCS]/[XCI]$ ) of the thermoplastic polyolefin (TPO) composition.
- Examples IE1 and IE2 of the patent in suit and the additional comparative examples CE4 to CE11 in D5 and D6 showed that the compositions according to

claim 1 of the main request displayed an improved reduction of shrinkage and coefficient of linear thermal expansion (CLTE). The composition of comparative example CE6 in particular was a fair representation of the composition of Polymer 5 in D3 even though the two compositions had different melt flow rates. The problem was to provide a thermoplastic polyolefin composition with a superior profile in terms of shrinkage, CLTE and mechanical properties.

- There was no motivation in the prior art to increase the melt flow rate of the composition of Polymer 5 of D3 in the expectation to improve shrinkage. The teaching of D3 was limited to the improvement of shrinkage through the addition of inorganic filler to the composition. Moreover, the range disclosed for the melt flow rate in D3 was broad and there was no pointer in D3 or in its examples towards the range of operative claim 1.
  
- Starting from the composition of Polymer 5 of D3 an increase of the melt flow rate did not necessarily lead to a decrease of the intrinsic viscosity of the xylene cold soluble fraction. The teaching of D4 was not relevant to D3 since it concerned shrinkage in one direction only and it did not concern the CLTE as in the patent in suit. The examples of D4 also pointed to a melt flow rate of the composition that was outside the range defined in operative claim 1 and there was no teaching in D4 about the specific range defining the ratio of the intrinsic viscosity (IV) of the xylene cold soluble (XCS) fraction to the intrinsic viscosity (IV) of the xylene cold insoluble (XCI) fraction.



Claim 1 of the main request was inventive over D3.

- In the first to sixth auxiliary requests, the ratio of the intrinsic viscosity (IV) of the xylene cold soluble (XCS) fraction to the intrinsic viscosity (IV) of the xylene cold insoluble (XCI) fraction ( $[XCS]/[XCI]$ ) of the thermoplastic polyolefin (TPO) composition being in the range of 0.75 to 1.35 has been defined in contrast to claim 1 as granted.
  
- The same arguments of inventive step provided for the main request applied to the seventh auxiliary request. There was no pointer in D3 and D4 towards the range defining the melt flow rate of the matrix characterising the composition of claim 1 of the eighth auxiliary request, which was further away from the disclosure of these documents. The arguments of inventive step provided for the eighth auxiliary request equally applied to the ninth and tenth auxiliary requests. The limitation of the ranges defining claim 1 of the eleventh auxiliary request rendered the claimed subject-matter inventive over D3. In particular there was no teaching in the prior art towards the range of melt flow rate defining the composition. The arguments of inventive step provided for the eleventh auxiliary request equally applied to the twelfth auxiliary request. Claim 1 according to the seventh to twelfth auxiliary requests therefore involved an inventive step.

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

XII. The respondent requested that the appeal be dismissed, or alternatively that the decision under appeal be set

aside and the patent be maintained in amended form on the basis of the claims of one of the first to twelfth auxiliary requests filed with the reply to the statement of grounds of appeal.

## **Reasons for the Decision**

Main request (patent as granted)

1. Inventive step
  - 1.1 Document D3 was considered as the closest prior art in the decision under appeal and was used as such by both parties in appeal. The Board sees no reason to take a different approach.
  - 1.2 D3 concerns polyolefin compositions based on an heterophasic propylene copolymer and a small amount of inorganic filler with an improved balance of thermal dimensional stability and impact strength at temperatures both above and below room temperature (paragraph 1). Within D3, the composition reported as Polymer 5 in Table 1 on page 4 was found to be the most relevant starting point for the assessment of inventive step of the composition of claim 1 of the main request.
  - 1.3 The composition of Polymer 5 contains a propylene homopolymer (matrix phase) and a propylene/ethylene rubber (disperse phase) (paragraph 35). According to Table 1 the melt flow rate with a load of 2.16 kg at 230°C (paragraph 29) is 16 g/10 min (MFR<sub>2</sub> in Table 1), the xylene cold soluble fraction (XCS2) is 32 wt.-% of the composition, the ethylene content of the xylene cold soluble fraction (C2/XCS2) is 47.5 wt.-% and the intrinsic viscosity of the xylene cold soluble fraction

(IV/XCS2) is 1.6.

- 1.4 The contested decision established that the composition according to operative claim 1 differed from the composition of Polymer 5 of D3 in an MFR<sub>2</sub> (230°C) of 30 to 100 g/10min, an intrinsic viscosity of the xylene cold soluble fraction below 1.5 dl/g and a ratio of intrinsic viscosities of the xylene cold soluble fraction to xylene cold insoluble fraction in the range of 0.75 to 1.35 (passage bridging pages 4 and 5 of the contested decision). These three distinguishing features were acknowledged by the parties in appeal.
- 1.5 The object of the patent in suit was to provide a polyolefin composition of low coefficient of linear thermal expansion (CLTE), low shrinkage and rather low weight, without compromising the mechanical properties of said composition (paragraph 5). The patent in suit discloses two exemplary compositions (IE1 and IE2) as well as two comparative compositions (CE1 and CE2) corresponding to commercial products (EG001AE and EE041AE) from Borealis AG (paragraphs 139 to 145 and Table 1). Table 2 of the patent in suit shows that the compositions of examples IE1 and IE2 have improved shrinkage resistance, CLTE and mechanical properties over the compositions of comparative examples CE1 and CE2.
- 1.6 Beneficial effects or advantageous properties can in certain circumstances properly form a basis for the definition of the problem that the claimed invention sets out to solve and can, in principle, be regarded as an indication of inventive step if they are appropriately demonstrated by means of truly comparable results. The only comparative tests suitable for this are, however, those which are concerned with the

structurally closest state of the art to the invention, because it is only here that the factor of unexpectedness is to be sought (Case Law of the Boards of Appeal, 9th Edition, July 2019, I.D.4.2).

- 1.7 The dispersed phases of the compositions CE1 and CE2, however, do not correspond to that of Polymer 5 of D3. In particular, the ethylene contents of the xylene cold soluble fractions (32.8 wt.-% for composition CE1 and 37 wt.-% for composition CE2) and their intrinsic viscosities (3.1 dl/g for composition CE1 and 2.2 dl/g for composition CE2) differ substantially from those of Polymer 5 of D3 (ethylene content of the xylene cold soluble fraction of 47.5 wt.-% and intrinsic viscosity of 1.6 dl/g). As a result, the compositions CE1 and CE2 cannot be seen as fair representations of the closest prior art. While the patent in suit shows that compositions according to claim 1 of the main request (IE1 and IE2) have resistance to shrinkage and low CLTEs, it does not show that these compositions have improved properties over the closest prior art.
- 1.8 The respondent contended that the additional compositions CE4 to CE11 in D5 and D6 showed that the thermoplastic polyolefin compositions of the patent in suit had unexpectedly low shrinkage as well as reduced CLTE while preserving the mechanical properties of the compositions (third full paragraph on page 6 of the reply to the statement setting out the grounds of appeal).
- 1.9 The question with regard to CE4 to CE11 is also whether these compositions can be seen as a fair representation of Polymer 5 of D3. CE4 to CE11 concern thermoplastic polyolefin compositions based on a propylene homopolymer as a matrix and an ethylene propylene

rubber as dispersed phase (Sections 7 and 8 of D6). The preparations of the compositions CE4 to CE11 in D5/D6 were carried out with the same process and with the same catalyst as for the examples IE1 and IE2 of the patent in suit. The respondent specifically referred to CE6, CE7, CE8 and CE10 in D5 as compositions that would establish the presence of an effect over the composition of Polymer 5 of D3 (letter 3 December 2021, page 2).

1.10 However, while compositions CE6 and CE7 have a melt flow rate of 12 g/10 min which is relatively close to that of Polymer 5 (16 g/10 min), the intrinsic viscosities of the xylene cold soluble fractions of these compositions (2.38 dl/g and 2.68 dl/g respectively) are significantly higher than that of Polymer 5 (1.6 dl/g). The difference in intrinsic viscosities between the comparative examples CE6 and CE7 of D5 and Polymer 5 of D3 is significant because the compositions according to D3 should have an intrinsic viscosity of the xylene cold soluble fraction of at most 2.0 dl/g (paragraphs 8/9 of D3), a factor that is relevant for the mechanical properties and the coefficient of linear thermal expansion (CLTE) of the produced compositions (paragraph 12 of D3).

1.11 The compositions CE6 and CE7 therefore cannot represent the teaching of D3 and cannot show an effect of the intrinsic viscosities according to claim 1 over the one of Polymer 5 of D3. The same conclusion applies to compositions CE8 and CE10 of D5 which in addition to high values of intrinsic viscosities of the xylene cold soluble fraction (2.71 dl/g and 2.03 dl/g respectively) have melt flow rates (25 g/10 min and 22 g/10 min respectively) that are significantly higher than for

Polymer 5 of D3 (16 g/10 min).

- 1.12 The Board concludes that none of the comparative examples cited by the respondent allows to make a fair comparison between the compositions IE1 and IE2 according to operative claim 1 and Polymer 5 of D3. According to the case law of the boards of appeal, alleged advantages to which the patent proprietor merely refers, without offering sufficient evidence to support the comparison with the closest prior art, cannot be taken into consideration in determining the problem underlying the invention and therefore in assessing inventive step (Case Law of the Boards of Appeal, 9th Edition, July 2019, I.D.4.2).
- 1.13 In the absence of a demonstration of an effect over the closest prior art, the problem is to be formulated as the provision of further thermoplastic polyolefin compositions.
- 1.14 It remains to be established whether the solution provided in operative claim 1 is inventive over the closest prior art.
- 1.14.1 Paragraph 20 of D3 teaches that the polyolefin compositions may have any desired melt flow rate, usually values in the range of 2-120 g/10 min. The control of the melt flow rate in multistage polymerization such as in the process of preparation of Polymer 5 of D3 is well known to the skilled person. It can be carried out by using molecular weight regulators, typically hydrogen, during the polymerization reaction (page 1, last paragraph of the letter of the appellant dated 16 December 2021 also referring back to D1, page 3, lines 23/24). The use of molecular weight regulators in any or both stages of

the polymerization process provides a control of the melt flow rate of either the matrix phase, the dispersed phase or both without affecting the compositional features of the composition (page 2, first paragraph of the letter of the appellant dated 16 December 2021). The Board has no doubt that this regulation is part of the common general knowledge which has not been disputed by the respondent.

- 1.14.2 Starting from Polymer 5 of D3, which has a melt flow rate of 16 g/10 min, the skilled person therefore had the necessary knowledge for the adjustment of the melt flow rate anywhere in the broad range of 2-120 g/10 min suggested in D3, therefore also anywhere in the range defined in operative claim 1 (30-100 g/10 min), and would have done so when aiming at providing further thermoplastic polyolefin compositions.
- 1.14.3 It is known in the art and not disputed that the melt flow rate of a polymer is inversely related to its molecular weight or intrinsic viscosity. Decreasing the intrinsic viscosity of the ethylene propylene rubber of the dispersed phase in the composition of Polymer 5 of D3 from 1.6 dl/g to any lower value is one of the options the skilled person has at his disposal that would result in an increase of the melt flow rate of the overall composition.
- 1.14.4 In that regard, raising the melt flow rate of the composition of Polymer 5 and decreasing the intrinsic viscosity of the ethylene propylene rubber are measures that together lead the skilled person towards compositions according to operative claim 1 that ultimately display a melt flow rate between 30 and 100 g/10 min and an intrinsic viscosity of the xylene cold soluble fraction (IV XCS) of below 1.5 dl/g while

remaining within the teaching of document D3.

- 1.14.5 Operative claim 1 additionally defines the thermoplastic polyolefin composition by its ratio of the intrinsic viscosity (IV) of the xylene cold insoluble (XCI) fraction to the intrinsic viscosity (IV) of the xylene cold soluble (XCS) fraction being in the range of 0.75 to 1.35. The intrinsic viscosity of the xylene cold insoluble fraction (IV XCI) of the composition is defined in paragraph 9 of the patent in suit as representing the intrinsic viscosity of the matrix phase of the composition. D3 does not disclose the value of the intrinsic viscosity of the xylene cold insoluble fraction (IV XCI) nor the above mentioned ratio for the composition of Polymer 5. Information in this regard can, however, be found by the skilled person in document D4.
- 1.14.6 D4 concerns polypropylene compositions based on a propylene homopolymer and an ethylene propylene rubber analogous to that of Polymer 5 of D3 (claim 1 of D4). The object of D4 concerns the general shrinkage of injection molded parts obtained from polypropylene compositions (paragraph 6) and it is therefore relevant to D3 (see paragraph 1.2, above). Paragraphs 29-34 of D4 concern the relative amounts of the two phases of the compositions as well as their intrinsic viscosities.
- 1.14.7 The amount of xylene cold soluble fraction defined in paragraph 29 of D4 (22-33 wt.-%) corresponds to that of Polymer 5 of D3 (32 wt.-% in Table 1). The ethylene content of that fraction as taught in paragraph 30 of D4 (45-65 wt.-%) also corresponds to that of Polymer 5 of D3 (47.5 wt.-%). The intrinsic viscosity of the xylene cold soluble fraction is said to be in the range



of 1.0-1.6 dl/g (paragraph 22), also in accordance with the value of Polymer 5 of D3 (1.6 dl/g).

1.14.8 The skilled reader of D4 would therefore consider the teaching of D4 with regard to the phases of the compositions as being relevant to D3. D4 teaches in paragraph 34 that the viscosities of the propylene homopolymer (forming the matrix phase) and that of the ethylene propylene rubber (forming the dispersed phase) are advantageously similar. That as such is a teaching that a composition analogous to that of Polymer 5 of D3 in which the above mentioned ratio of the intrinsic viscosities is in a broad sense around 1, would at least constitute compositions from which it could be expected that they have reasonable shrinkage properties.

1.15 The Board thus concludes that starting from the composition of Polymer 5 of D3 and considering the teaching of that document as well as the teaching of D4 which pertains to similar compositions, the skilled person would have found the compositions according to operative claim 1 as an obvious solution of the problem of providing further thermoplastic polyolefin compositions.

1.16 Claim 1 of the main request therefore lacks an inventive step starting from the composition of Polymer 5 of D3.

First to sixth auxiliary requests

2. Amendments

2.1 Claim 1 according to the first to sixth auxiliary requests include among others the amendment that the

feature "the ratio of the intrinsic viscosity (IV) of xylene cold insoluble (XCI) fraction to the intrinsic viscosity (IV) of the xylene cold soluble (XCS) fraction ( $[XCS]/[XCI]$ )" (for which a range of values is specified) is replaced by "the ratio of the intrinsic viscosity (IV) of xylene cold soluble (XCS) fraction to the intrinsic viscosity (IV) of the xylene cold insoluble (XCI) fraction ( $[XCS]/[XCI]$ )" (with the same range being given).

- 2.2 Independently of the apparent contradiction in granted claim 1 between the ratio in text form and the abbreviation given in brackets, the application as original filed contained in claim 1 and throughout the description only the formulation provided in granted claim 1 and not the one resulting from the proposed amendment (which refers to the inverse ratio). While the Board clearly indicated the absence of a basis for the amendment in the original application in its communication sent in preparation of the oral proceedings (see paragraphs 9.1 and 9.2), the respondent did not take position on that issue and did not provide any basis in the original application. In view of that the Board can only conclude that the first to sixth auxiliary requests do not meet the requirements of Article 123(2) EPC.

Seventh auxiliary request

3. Inventive step

- 3.1 Claim 1 of the seventh auxiliary request differs from claim 1 as granted in that the ethylene rubber copolymer of the dispersed phase (D) is limited to an ethylene propylene rubber copolymer or to an

ethylene-1-octene rubber copolymer.

- 3.2 That limitation, which is based on claim 8 as originally filed, however does not constitute a further distinguishing feature over the composition of Polymer 5 of D3 which is based on an ethylene propylene rubber copolymer (paragraph 35).
- 3.3 The parties in appeal relied in view of inventive step of the seventh auxiliary request on their argumentation provided for the main request and did not provide further arguments specific to the present request. The assessment of inventive step with regard to the main request and its conclusion therefore apply equally to the seventh auxiliary request. Claim 1 of the seventh auxiliary request therefore lacks an inventive step starting from the composition of Polymer 5 in D3.

#### Eighth auxiliary request

4. Inventive step
- 4.1 Claim 1 of the eighth auxiliary request differs from claim 1 of the seventh auxiliary request in that the thermoplastic polyolefin composition is further defined by the melt flow rate  $MFR_2$  (230°C) of the matrix phase being "between 80 and 200 g/10 min, measured according to ISO 1133". Support for that amendment can be found in claim 4 as originally filed.
- 4.2 The range of melt flow rate of the matrix defined in operative claim 1 constitutes a further distinguishing feature over the composition of Polymer 5 of D3 for which the matrix has a melt flow rate at 230°C of 29 g/10 min ( $MFR_1$  in Table 1 together with paragraph 29). Operative claim 1 differs from Polymer 5 of D3 in the

melt flow rate of the composition, the intrinsic viscosity of the xylene cold soluble fraction and the ratio of the intrinsic viscosities, as claim 1 of the main request, and additionally in the melt flow rate of the matrix phase.

- 4.3 The argumentation of the respondent with regard to inventive step of the eighth auxiliary request was that the combination of features defining the thermoplastic polyolefin compositions according to claim 1 was further away from the compositions disclosed in prior art documents D3 and D4 and that neither of these documents rendered this combination of features obvious since they taught away from operative claim 1. The respondent additionally submitted that the compositions IE1 and IE2 reported in Table 1 of the patent in suit, for which the melt flow rate  $MFR_2$  (230°C) of the matrix was 112 g/10 min, showed that the melt flow rate of the matrix was an important factor for not compromising the mechanical properties (stiffness and impact strength).
- 4.4 The Board observes that, independently of the argumentation of the respondent, the fact remains that the examples of the patent in suit and those of D5/D6 do not contain a comparison that would show the presence of any effect of a composition according to operative claim 1, with a melt flow rate  $MFR_2$  (230°C) in the range of 80-200 g/10 min, alone or in combination with the other features distinguishing operative claim 1 from the composition of Polymer 5 of D3. The problem over the closest prior art therefore is, as for the main request, the provision of further thermoplastic polyolefin compositions.
- 4.5 The adjustment of the melt flow rate of the matrix is one of the measures known and available to the skilled

person, alongside the adjustment of the melt flow rate of the dispersed phase to adjust the melt flow rate of the whole composition. Raising the melt flow rate of the composition of Polymer 5 of D3 from 16 g/10 min to any value in the range of 2-120 g/10 min is taught in paragraph 20 of that document. To do so the skilled person can raise the melt flow rate of the matrix and, as already established in the discussion of the main request, can reduce the intrinsic viscosity of the xylene cold soluble fraction.

- 4.6 The range of 80-200 g/10 min of the melt flow rate of the matrix as defined in operative claim 1 is not purposive. D3 teaches a range of 2-120 g/10 min in paragraph 20 for the overall composition. Therefore, raising the melt flow rate of the matrix from 29 g/10 min (Polymer 5 of D3) to anywhere in the higher part of that range, thereby falling in the range in operative claim 1, is one of the measures that the skilled person can take, especially since it can be achieved by using known molecular weight regulators in the preparation of the polypropylene homopolymer matrix (see paragraph 1.14.1, above).
- 4.7 The teaching of D4 does not teach away from the melt flow rate of the matrix as defined in operative claim 1 (80-200 g/10 min), if read in the light of the disclosure of the closest prior art D3. Paragraph 25 of D4 discloses that the melt flow rate of the matrix is 8-60 g/10 min ( $MFR_A$ ) (paragraph 25). That range is however disclosed in the context of heterophasic compositions having a melt flow rate of 10-50 g/10 min (paragraph 26). Since the melt flow rate of the compositions of the closest prior art D3 can be as high as 120 g/10 min, the skilled person would understand

that the the melt flow rate of the matrix can also be chosen in a range significantly above 60 g/10 min.

- 4.8 Since raising the melt flow rate of the matrix, reducing the intrinsic viscosity of the xylene cold soluble fraction and raising the melt flow rate of the whole composition, while keeping the two intrinsic viscosities close to each other, are convergent measures that can be adopted in order to provide a further thermoplastic polyolefin composition, the Board concludes that operative claim 1 lacks an inventive step over D3.

#### Ninth and tenth auxiliary requests

##### 5. Inventive step

- 5.1 Claim 1 of the ninth auxiliary request corresponds to claim 1 of the eighth auxiliary request in which the range defining the ethylene content of the xylene cold soluble fraction was amended from 40-65 wt.-% to 40 to 50 wt.-% based on the range disclosed on page 7, lines 9-14 of the application as originally filed.
- 5.2 That limitation of claim 1 of the ninth auxiliary request however does not constitute a distinguishing feature of operative claim 1 over the composition of Polymer 5 of D3 since the ethylene content of the xylene cold soluble fraction for that composition is 47.5 wt.-% (C2/XCS2 in Table 1). The reasoning on inventive step of the eighth auxiliary request therefore applies equally to the ninth auxiliary request. Claim 1 of the ninth auxiliary request therefore lacks an inventive step over D3.

5.3 Claim 1 of the tenth auxiliary request corresponds to claim 1 of the ninth auxiliary request in which the range defining the amount of xylene cold soluble fraction was amended from 20-45 wt.-% to 28-45 wt.-% based on the range disclosed on page 7, line 6 of the application as originally filed.

5.4 That limitation of claim 1 of the tenth auxiliary request however does not constitute a distinguishing feature of operative claim 1 over the composition of Polymer 5 of D3 since the xylene cold soluble fraction for that composition is 32 wt.-% (XCS2 in Table 1). That limitation can therefore not establish the presence of an inventive step over D3. Claim 1 of the tenth auxiliary request lacks an inventive step over D3.

#### Eleventh and twelfth auxiliary request

#### 6. Inventive step

6.1 Claim 1 of the eleventh auxiliary request corresponds to claim 1 of the tenth auxiliary request in which the range defining the melt flow rate of the thermoplastic polyolefin composition was amended from 30-100 g/10 min to 40-100 g/10 min based on the range disclosed in claim 11 of the application as originally filed.

6.2 That limitation of claim 1 of the eleventh auxiliary request however only slightly changes the range of an already present distinguishing feature of operative claim 1 over the composition of Polymer 5 of D3 and it is also not associated with any improvement with respect to claim 1 of the main request. It was in particular established that D3 already taught a melt flow rate of the composition in the range of 2-120 g/10

min (see paragraph 1.14.1, above), a range that also encompasses the range of 40-100 g/10 min defined in claim 1 of the eleventh auxiliary request. The selection of the subrange from that known in D3 was not shown to result in an effect nor justify an inventive step. Claim 1 of the eleventh auxiliary request lacks therefore an inventive step over D3.

6.3 Claim 1 of the twelfth auxiliary request corresponds to claim 1 of the eleventh auxiliary request in which the range defining the ratio of the intrinsic viscosities of the xylene cold soluble fraction to the xylene cold insoluble fraction of the thermoplastic polyolefin composition was amended from 0.75-1.35 to 0.80-1.20 based on the range disclosed in claim 12 of the application as originally filed.

6.4 That limitation of claim 1 of the twelfth auxiliary request however only slightly changes the range of an already present distinguishing feature of operative claim 1 over the composition of Polymer 5 of D3 and it is also not associated with any improvement alone or in combination with any of the amendments present in operative claim 1. It was already established that D4 teaches a ratio of intrinsic viscosities around 1 (see paragraph 1.14.8, above). In that regard, the limitation in claim 1 of the twelfth auxiliary request does not justify an inventive step. Claim 1 of the twelfth auxiliary request lacks therefore an inventive step over D3.

7. Final remarks

As for all requests on file a lack of inventive step or lack of compliance with the requirements of Article 123(2) EPC is found, the patent is to be revoked and



there is no need for the Board to decide on any other issue. In this respect, while the Board decided at the oral proceedings not to make use of its power under Article 12(4) RPBA 2007 to hold inadmissible a number of documents filed by the parties in appeal, there is no need to provide detailed reasons for this decision, as the documents were irrelevant for the conclusions reached and therefore for the revocation of the patent.

## 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