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Datasheet for the decision of 3 May 2018

Case Number: T 0822/15 - 3.3.03

Application Number: 09001548.8

Publication Number: 2216350

IPC: C08F10/06, C08F10/00, C08K3/00

Language of the proceedings: EN

Title of invention:
Polypropylene composition with high stiffness and impact strength

Patent Proprietor:
Borealis AG

Opponents:
SABIC Petrochemicals BV / Sabic Innovative Plastics US LLC / Saudi Basic Industries Corporation

Relevant legal provisions:
EPC Art. 54(2), 56
RPBA Art. 12(4)

Keyword:
Novelty - state of the art (D20 and D21: yes)
Inventive step - (all requests: no)
Main request and all auxiliary requests - no reason to be held inadmissible

Decisions cited:
T 0035/85, T 0197/86

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Case Number: T 0822/15 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 3 May 2018

Appellants: (Opponents)	SABIC Petrochemicals BV / Sabic Innovative Plastics US LLC / Saudi Basic Industries Corporation Europaboulevard 1/ 1Plastic Ave Pittsfiled/ 6135 LD Sittard/ MA 01201/ 11422 Riyadh (NL)
Representative:	Algemeen Octrooi- en Merkenbureau B.V. P.O. Box 645 5600 AP Eindhoven (NL)
Respondent: (Patent Proprietor)	Borealis AG IZD Tower Wagramerstraße 17-19 1220 Vienna (AT)
Representative:	Kador & Partner PartG mbB Corneliusstraße 15 80469 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 23 February 2015 concerning maintenance of the European Patent No. 2216350 in amended form.**

Composition of the Board:

Chairman	D. Semino
Members:	O. Dury
	R. Cramer

Summary of Facts and Submissions

I. The appeal by the opponents lies against the interlocutory decision of the opposition division concerning maintenance of European Patent No. 2 216 350 in amended form according to the main request filed during the oral proceedings of 29 January 2015 and an amended description.

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

III. Claim 1 of the **main request** which forms the basis of the decision read as follows:

"1. A polypropylene composition comprising

- a propylene homo- or copolymer (A); and
- an inorganic filler (B);

whereby the following relation is fulfilled

$$(80F + 1700)\ \text{MPa} \leq T$$

wherein

F are the parts per weight of component (B) based on 100 parts per weight of the total amount of (A) + (B).

T is the tensile modulus in MPa, determined according to ISO 527-2, of the polypropylene composition measured on a test specimen prepared by injection molding according to ISO 1873-2,

wherein (A) has a polydispersity index (PI), determined according ISO 6721-1, of at least 5.8 Pa^{-1} and not higher than 15 Pa^{-1}."

IV. In the contested decision the following documents were *inter alia* cited:

D3: EP-A-1 632 529
D6: WO 2006/122 702
D7: WO 2006/114 358
D20: Influence of Nucleating System and Molecular Weight Distribution on Polypropylene Mechanical, Rheological and Crystallization Behavior, Anita Vaxman, Presentation given at the AMI Conference Polyolefin Additives 2008, 14-16 April 2008, Cologne, Germany
D21: Selected slides from RPK Course 1998 "Polymer Chemistry & Reaction Engineering, Module A+F, Polymer Modification", Mr. van Os, Montel Technology
D32: WO 2007/071446

According to that decision, the opposition division saw no reason to hold either the main request filed on 30 October 2013 nor the new main request filed during the oral proceedings of 29 January 2015 inadmissible. Also, documents D20, D21 were, among others, admitted into the proceedings, but were held not to constitute valid prior art documents. Said main request was further considered to satisfy the requirements of sufficiency of disclosure and to be novel over the cited prior art. An inventive step starting from reference example 2 of D6 as closest prior art was further acknowledged.

V. The opponents (appellants) appealed the above decision. With the statement setting out the grounds of appeal the appellants requested that the decision be set aside and that the patent be revoked. Also, the following documents were filed:

D20a: Slides of the presentation D20
D20b: E-mail from Mr. Terpsma (Sabic Innovative Plastics) to the attention of Anita Vaxman dated 26 January 2015 and its reply e-mail by Anita Vaxman dated 2 February 2015
D20c: E-mail of Mr Terpsma (Sabic Innovative Plastics) and its reply-email by Mr. M. Wherlock, both dated 18 February 2015
D21a: Declaration of Mr. L. Nelissen, dated 5 June 2015
D21b: Programme of the RPK Course 1998 (D21)
D21c: Declaration of PhD student M. Wouters dated 23 June 2015
D21d: Slides 1-58 of D21

The appellants further requested *inter alia* that:

- the decision of the opposition division to admit late-filed requests (in particular the main request on which the contested decision was based) should be overturned;

- D20 and D21 be considered as valid prior art documents.

VI. In their reply to the statement of grounds of appeal the patent proprietor (respondent) requested that the appeal be dismissed or, in the alternative, that the patent be maintained in amended form according to any of the 1st to the 4th auxiliary requests filed

therewith.

It was further requested, *inter alia*, that the decision of the opposition division according to which D20 and D21 were no valid prior art be confirmed.

Claim 1 of the **1st auxiliary request** differed from claim 1 of the main request by the addition of the following feature at the end of the claim:

"component (B) is talc".

Claim 1 of the **2nd auxiliary request** differed from claim 1 of the above 1st auxiliary request by the addition of the following feature at the end of the claim:

"and (B) is present in an amount from 2.0 to 20 parts per weight based on 100 parts per weight of (A) + (B)".

Claim 1 of the **3rd auxiliary request** differed from claim 1 of the above indicated 2nd auxiliary request request in that the wording "a propylene homo- or copolymer (A)" was replaced by "a propylene homopolymer (A)".

Claim 1 of the **4th auxiliary request** differed from claim 1 of the above indicated main request by the addition of the following feature at the end of the claim:

"the polypropylene composition having a tensile modulus determined according to ISO 527-2 of at least 2200 MPa measured on a test specimen prepared by injection molding according to ISO 1873-2".

VII. Issues to be discussed at the oral proceedings were specified by the Board in a communication sent on 28 November 2017, in which it was in particular indicated that:

- It appeared that in view of the evidence on file it could be held that D20 and D21 constituted valid prior art pursuant to Article 54(2) EPC (sections 4.4.1 and 4.4.2);

- It appeared that there was no room for the Board not to admit into the proceedings the operative main request (section 5);

- Regarding inventive step, it might have to be discussed if the expression "improved balance" may be used for formulating the problem (to be) solved because it did not appear to be clear when a composition was to be held to solve that problem or not (section 10.4.3);

- The question of the admittance into the proceedings of the 1st to the 4th auxiliary requests could have to be discussed (section 11.1).

VIII. With letter of 2 March 2018, the appellants submitted further arguments.

IX. With letter of 16 March 2018, the respondent submitted further arguments.

X. With letter of of 26 April 2018, the respondent filed additional auxiliary requests A and 1' to 4'.

XI. During the oral proceedings, which were held on 3 May 2018 in the presence of all parties, the

respondent withdrew auxiliary request A as well as each of auxiliary requests 1' to 4'.

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

Main request - Admittance

(a) The decision of the opposition division to admit the main request should be dismissed because said request was filed too late during the first instance proceedings.

Validity of D20 and D21 as prior art documents

(b) D20a to D20c were submitted in order to overcome the objections retained by the opposition division regarding the questions if a talk according to D20 actually took place at the conference Polyolefine Additives 2008 and if the slides of D20 corresponded to the the slides effectively presented at said conference.

(c) D21a to D21d were submitted in order to overcome the objections retained by the opposition division regarding the availability to the public of the course material D21 and the fact that the selected slides of D21 belonged to a single document.

(d) In view of these additional pieces of evidence, D20 and D21 were prior art documents pursuant to Article 54(2) EPC.

Main request - Inventive step

(e) D6 was the closest prior art document. Besides, in view of the problem addressed and solved in the patent in suit, reference example 2 of D6 was an appropriate starting point for the assessment of the inventive step.

The subject-matter of operative claim 1 differed from the composition of reference example 2 of D6 only in the requirement that the polydispersity index should be in the range of 5.8 to 15 Pa^{-1} (instead of 5.7 Pa^{-1}).

No fair comparison could be made between the examples illustrative of the invention and the comparative examples of the patent in suit. Therefore, the technical problem effectively solved over the closest prior art resided in the provision of filled polypropylene compositions having improved tensile modulus while having satisfactory heat deflection temperature and Charpy notched impact strength.

Considering the teaching of D20 (in particular slide 14) and D21 (in particular slide 19), it was obvious to solve that problem by increasing the polydispersity index of the polypropylene component of the composition of the closest prior art.

1st to 4th auxiliary requests - Admittance

(f) No substantiation was provided by the respondent at the moment of filing of the 1st to the 4th auxiliary requests. The first time that a substantiation was given was in their letter of 16 March 2018, i.e.

following the Board's communication and shortly before the oral proceedings took place. Further arguments were submitted during the oral proceedings before the Board. However, considering that according to the EPO case law, requests were held to be filed at the moment they were substantiated, the 1st to the 4th auxiliary requests were filed very late in the proceedings, which was unfair to the appellants. In particular, in view of the numerous objections raised in the present case, the appellants did not know which of those objections was intended to be overcome by the amendments made. Under those circumstances, the appellants could not adequately prepare their defense. For those reasons, none of the 1st to the 4th auxiliary requests should be admitted into the proceedings.

1st to 4th auxiliary requests - Inventive step

(g) Since the composition of the closest prior art document already contained talc as component (B), the same conclusion as for claim 1 of the main request should be reached for claim 1 of the 1st auxiliary request.

(h) It was disclosed in D6 that talc could be used as nucleating agent in the range defined in claim 1 of the 2nd auxiliary request. Therefore, the amendment made did not overcome the objection of lack of inventive step put forward against the higher ranking requests.

(i) The composition of the closest prior art (reference example 2 of D6) comprised an heterophasic polypropylene, which was a composition comprising a

polypropylene homopolymer matrix as defined in claim 1 of the 3rd auxiliary request. Therefore, the amendments made did not overcome the objection of lack of inventive step put forward against the higher ranking requests.

(j) The lower limit of tensile modulus inserted in claim 1 of the 4th auxiliary request was arbitrary. Besides, it was agreed by the respondent that it was known in the art that adding talc to a polypropylene composition led to increasing the tensile modulus. Therefore, the subject-matter of claim 1 of the 4th auxiliary request was not inventive over D6 as closest prior art for the same reasons as for the main request.

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

Main request - Admittance

(a) There was no legal basis for rejecting the operative main request. Besides, it was allowable to submit new requests at the oral proceedings before the opposition division, whereby the decision to admit or not such requests was a matter of discretion of the opposition division.

Validity of D20 and D21 as prior art documents

(b) According to the case law, the standard of proof to be applied to assess the validity of D20 and D21 as prior art document was "beyond any reasonable doubt", which was not satisfied in the present case. In particular, even if the additional documents submitted by the appellants on appeal

were considered, serious doubts remained regarding e.g.:

- the nature of the presentation referred to by Ms. A. Vaxman in D20b;
- whether or not the slides contained in D20, in particular slides 19 and 27, were effectively presented at the conference;
- the identity of Ms. Vaxman and Mr. Wherlock, who wrote the emails of D20b and D20c, and the reliability of the statements made by those persons. In particular, since D20b and D20c were mere emails and not proper declarations, the respondent was not in a position to assess the veracity of the facts reported therein;
- the public availability of the information contained in D20 and D21.

Main request - Inventive step

(c) D6 was the closest prior art document. However, it was not appropriate to start the analysis of the inventive step from a comparative example. Therefore, the closest prior art should be a composition according to any of examples 1-3 of D6, not the one of reference example 2 of D6.

Nevertheless, should reference example 2 of D6 be the closest prior art, the subject-matter of operative claim 1 differed from that composition in the requirement that the polydispersity index should be in the range of 5.8 to 15 Pa^{-1}.

In view of the data of the patent in suit, the problem effectively solved over the closest prior art resided in the provision of filled polypropylene compositions having improved tensile

modulus and improved heat deflection temperature, while maintaining satisfactory Charpy notched impact strength. In that respect, it was admitted during the oral proceedings before the Board that the argument made in writing according to which the problem effectively solved also resided in the provision of an increased tensile modulus at the same amount of filler (see e.g. sections 4.15 and 4.17 of the letter dated 16 March 2018) was not shown by the examples of the patent in suit and could, thus, not be considered in the formulation of the problem effectively solved. Also, the argument based on the provision of an "improved balance of properties" put forward in the reply to the statement of grounds of appeal (section 8.14), which had been questioned in the Board communication (see section VII above), was neither pursued any further in writing, nor during the oral proceedings before the Board.

Regarding slide 14 of D20, although the polydispersity disclosed therein and the polydispersity index according to operative claim 1 were correlated, there was no evidence in how far the range of polydispersity shown in slide 14 was comparable with the range of polydispersity index specified in operative claim 1. Similarly, regarding slide 19 of D21, since it was not clear how the polydispersity index was measured, no conclusion could be reached if the range of polydispersity index of that slide was comparable with the range of polydispersity index specified in operative claim 1.

Besides, both D20 and D21 were directed to polypropylene homopolymers, not to impact

polypropylene compositions according to reference example 2 of D6. Therefore, it was not sure in how far the conclusions drawn from those documents applied to the closest prior art.

The comparison of reference examples 1 and 2 of D6 showed that an increase in tensile modulus went along with a decrease in Charpy properties. Therefore, the skilled person would not be motivated to increase the tensile modulus (by increasing the polydispersity index) to solve the above indicated problem.

For those reasons, starting from reference example 2 of D6, it was not obvious to solve the problem defined above by increasing the polydispersity index of the polypropylene component, even when taking the teaching of D20 and D21 into account.

1st to 4th auxiliary requests - Admittance

(d) Although no complete substantiation in support of the 1st to the 4th auxiliary requests had been provided in the respondent's reply to the statement of grounds of appeal, it had to be taken into account that, in the present case, the amendments made were easy to understand. Also, it was obvious why they were made. Besides, claim 1 of each of the 1st to the 4th auxiliary requests was a further limitation of some dependent claims of the main request, i.e. all the auxiliary requests were convergent with the main request and were limitations of the subject-matter defined in the main request. Therefore, the appellants could not be taken by surprise and no fresh case was made. In

that respect, it was not required by the EPC that a patent proprietor explained why an auxiliary request overcame all the objections made.

1st to 4th auxiliary requests - Inventive step

(e) No further argument as compared to the main request was submitted regarding the 1st auxiliary request.

(f) Regarding the 2nd auxiliary request, it was to be taken into account that talc was used in D6, D20 and D21 as a nucleating agent and not as a filler. It was known in the art that nucleating agents were used in much lower amounts than fillers, usually below 1 wt.%. In that respect, D6 did not disclose amounts of talc in the range defined in claim 1 of the 2nd auxiliary request and the amounts of talc disclosed in D20 and D21 were outside that range. Therefore, the subject-matter of claim 1 of the 2nd auxiliary request was not obvious in view of the prior art cited.

(g) The skilled person reading the wording of claim 1 of the 3rd auxiliary request would understand that the polypropylene composition did not encompass heterophasic polypropylene compositions according to reference example 2 of D6. Therefore, D6 was not a suitable closest prior art and the objection raised against the main request was not valid for the 3rd auxiliary request.

(h) No further argument as compared to the higher ranking requests was put forward regarding the inventive step of the 4th auxiliary request.

XIV. The appellants requested that the decision under appeal be set aside and that European patent No. 2 216 350 be revoked.

The respondent requested that the appeal be dismissed or, in the alternative, that the patent be maintained in amended form according to any of the 1st to the 4th auxiliary requests filed with their reply to the statement of grounds of appeal.

Reasons for the Decision

Main request

1. Admittance

The operative main request is identical to the main request filed during the oral proceedings of 29 January 2015, which was decided upon in the contested decision and has further been defended as main request during the whole appeal proceedings, in particular in the respondent's reply to the statement of grounds of appeal. Under such circumstances, the operative request is part of the proceedings pursuant to Article 12(1)(b) and (4) RPBA and the Board has no power to hold it inadmissible deriving therefrom.

The Board is further not aware of any provision of the EPC under which a request which was admitted to the proceedings by the opposition division and dealt with in the contested decision could be excluded from the proceedings at the appeal stage.

Therefore, there is no room for the Board to overturn

the decision of the opposition division to admit the operative main request as requested by the appellants.

2. Validity of D20 and D21 as prior art documents

2.1 The appellants requested that the opposition division's decision according to which D20 and D21 were no valid prior art be overturned, which was contested by the respondent.

2.1.1 D20, which is a collection of 27 slides allegedly having been presented at the 2008 Polyolefin Additives conference, was not considered as a valid prior art by the opposition division because there was "too much doubt" if the presentation took place and what had been effectively disclosed at said conference (section 16.2 of the decision).

In order to overcome said deficiencies, the appellants submitted D20a to D20c as additional evidence. In particular, D20b is an email of the main author of D20, Ms. Anita Vaxman, in which it is specified that said person held that presentation at said conference. In D20c it is further indicated that the content of D20 was made available to the public shortly after the conference, which is well in advance of the filing date of the patent in suit and further corresponds to usual practice for that kind of conferences. The latter is further confirmed by the advertisement made for purchasing the conference proceedings and the order form submitted as pages 29 to 31 of D20.

The respondent argued that there were some doubts whether the presentation referred to in the email of Ms. Vaxman (D20b) was effectively the presentation D20. However, it is derivable from D20b that Ms. Vaxman's

email is a reply to a first email of Mr. Terpsma (of the appellants' company Sabic), asking for a confirmation that Ms. Vaxman indeed held the presentation attached to the email at the 2008 Polyolefin Additives conference. As indicated by the appellants during the oral proceedings before the Board, since D20b is a reply-email, it is not surprising that it does not contain any indication of the document attached to the original email (from Mr. Terpsma). Moreover, it is clear from the conference programme attached to D20 that Ms. Vaxman held only one presentation at that conference. Therefore, the Board has no reason to consider that the presentation referred to in Ms. Vaxman's email (D20b) is not D20.

During the oral proceedings before the Board, the respondent argued that D20b and D20c were no proper declarations but mere emails, so that he was not in position to contest the information contained therein. Similarly, doubts were raised concerning the identity of Ms. A. Vaxman (D20b) and Mr. Wherlock (D20c) and whether those persons were effectively in a situation to support the statements made in those emails. However, from the evidence on file, the Board has no reason to doubt that the person named "Anita Vaxman" who wrote the reply email of D20b is the same person as "Anita Vaxman" who gave the presentation D20 and that Mr. Wherlock, who was identified as an employee of AMI, the company that organised the conference Polyolefin Additives 2008 during which the presentation D20 was given (statement of grounds of appeal: top of page 19), were in a position to make the statements made in D20b and D20c. Under those circumstances it would have been the duty of the respondent to submit evidence in order to refute the arguments submitted by the appellants and the preliminary conclusions drawn by the Board (see

section VII) from D20, D20b and D20c, if he believed that the evidence was not reliable or not correct.

In view of the above, D20 constitutes a valid prior art pursuant to Article 54(2) EPC.

2.1.2 D21, which is part of lecture materials, was not considered as a valid prior art by the opposition division because it was not sure that said conference was public (and that there was no secrecy agreement) and that all pages belonged to one single document (section 16.3 of the decision).

In order to overcome said deficiencies, the appellants submitted D21a to D21d together with their statement of grounds of appeal. In particular, D21a is a declaration of the Managing Director of the institution that organised the lecture (and organiser of said lecture) in which it is stated that D21 is part of the document filed in complete form as D21d (paragraphs 7 and 8) and in which it is indicated that the participants were not bound by any confidentiality agreement (paragraph 9) and that D21 was available to the public as of 26 June 1998 (paragraph 10). Similar statements are found in D21c (paragraphs 5 to 8), which is a declaration of one participant to said course. In view of that information, there is no reason to doubt that D21 was effectively available to the public as of 26 June 1998.

It is further noted that no argument was submitted by the respondent, either in writing or during the oral proceedings before the Board, to refute the same conclusion which had been indicated in the communication of the Board, which was sent well in advance of the oral proceedings.

Under those circumstances, D21 and its complete version D21d both constitute prior art documents pursuant to Article 54(2) EPC.

2.1.3 In its reply to the statement of grounds of appeal, the respondent, making reference to the Case Law of the Boards of Appeal of the EPO (7th edition, III.G.4.3.1) argued that the question whether D20 - and D21 - was/were valid prior art document(s) should be very critically and strictly examined.

However, the analysis made in sections 2.1.1 and 2.1.2 above is based on the examination of the facts effectively put forward by the parties, whereby as indicated in the above passage of the Case Law, each of the parties should seek to prove the facts it alleged. In that respect, it should further be noted that the present situation is not identical with an objection based on an alleged public prior use originating from an opponent's own product, as argued by the respondent during the oral proceedings before the Board. Indeed, in the present case, and contrary to the above situation of alleged prior used in which all the evidence are in the hand of the opponent, nothing would have prevented the respondent e.g. to contact the company AMI and or Ms. Vaxman, as was done by the appellants, in order to refute the arguments submitted by the opposing party. For that reason, the mere allegations of the respondents putting in doubt the evidence submitted by the appellants are, in the absence of any evidence in support of those allegations, not sufficient to refute the conclusions drawn above by the Board on the basis of the evidence on file. Therefore, the above conclusions regarding the validity of D20 and D21 as prior art documents were

reached according to the usual standards of the EPO case law cited by the respondent.

3. Inventive step

3.1 Closest prior art

3.1.1 According to the EPO case law, the closest prior art for assessing inventive step is a prior art disclosing subject matter conceived for the same purpose or aiming at the same objective as the claimed invention and having the most relevant technical features in common, i.e. requiring the minimum of structural modifications (Case Law of the Boards of Appeal of the EPO, 8th edition, 2016, I.D.3.1).

3.1.2 Both parties considered, as the opposition division, that D6 represents a suitable closest prior art. The Board has no reason to depart from that view.

3.1.3 However, whereas reference example 2 of D6 was considered as closest prior art by the appellants, as was done by the opposition division, the respondent considered that the compositions according to any of examples 1-3 (D6: page 22, Table 3) should be selected as closest prior art.

3.1.4 According to paragraphs 1, 7, 10 and to the data shown in Tables 3A and 3B of the patent in suit, the aim of the patent was to provide polypropylene compositions having high stiffness (i.e. high tensile modulus), in combination with good impact strength (i.e. expressed in terms of the Charpy notch test indicated in paragraph 60). Furthermore, good temperature resistance is evaluated in terms of heat deflection temperature in the examples of the patent in suit (see: paragraph 184

and entry "HDT" in Tables 3A and 3B). It was agreed between the parties during the oral proceedings before the Board that the other properties mentioned in the patent specification such as good surface quality and scratch resistance (see e.g paragraphs 7 and 10) were not supported by any evidence and were not relevant for the assessment of the inventive step.

3.1.5 D6 (see page 1, lines 4-6; page 3, line 27 to page 4, line 2; page 6, lines 19-20; page 8, lines 7-8; page 23, line 4 to page 24, line 2; Tables 3 and 4) also aimed at providing polypropylene compositions exhibiting good mechanical properties such as good stiffness (tensile modulus) and good impact strength (Charpy notch index). However, D6 fails to disclose any information regarding heat deflection temperature, in particular for any of the compositions of examples 1-3 or reference example 2.

It is further apparent from Tables 3 and 4 of D6 that the composition of reference example 2 exhibits the highest tensile modulus within the compositions of the examples and reference examples of D6 (see the extract of Tables 3 and 4 of D6 copied hereinafter).

Regarding the impact strength, it is noted that Charpy notch index at -20°C of the composition of reference example 2 of D6 is lower than that of the compositions of any of examples 1-3 of D6. However, the Charpy impact strength of D6 was not determined as indicated in paragraph 60 of the patent in suit, in particular because it is measured at -20°C in D6, i.e. not at +23°C. In that respect, it is in particular shown in D7 (Table 1, three bottom lines) and in D3 (Tables 4 and 6) that Charpy impact strength is dependent on the temperature of measurement (in particular for

measurements performed at either -20°C or 0°C and, for D7, also at 23°C). Besides, according to paragraph 60 of the patent in suit, a composition is considered to have a satisfactory impact strength if it exhibits a Charpy notch test "according to ISO 179/1eA:2000 at +23°C of at least 3.8 kJ/m^2 measured on a V-notched teste specimen prepared by injection molding according to ISO 1873-2". However, in view of the evidence on file, it is not possible to conclude whether or not any of the compositions of examples 1-3 or of reference example 2 of D6 satisfies the requirements in terms of Charpy properties aimed at in the patent in suit, i.e. as defined in paragraph 60 of the patent in suit. In that respect, it was neither shown nor even argued by the respondent that the compositions of either examples 1-3 or of reference example 2 of D6 would not exhibit a satisfactory impact strength expressed according to the patent in suit. Further considering that it was an aim of D6 to provide polypropylene compositions exhibiting good impact strength and that the compositions of reference example 2 and of example 1 (illustrative of the teaching of D6) of D6 exhibit similar Charpy impact strength (see Tables 3 and 4 hereinafter: 4.2 kJ/m^2" and 4.5 kJ/m^2, respectively), there is no reason to consider that the compositions of reference example 2 would be a less suitable starting point for the assessment of the inventive step than the composition of any of examples 1-3 of D6.

Table 3: Properties of the inventive polymer compositions

	Ex. 1	Ex. 2	Ex. 3
$MFR_{2.16kg/230°C}$, g/10 min	0.31	0.43	0.75
Tensile modulus, MPa	1612	1530	1495
Charpy impact strength at -20°C, kJ/m^2	4.5	5.6	4.9
Storage modulus G'(G"=5 kPa), Pa	2500	2609	2001
Polydispersity index PI	4.3	4.4	3.3
Notched pipe test at 80°C and 4.2 MPa, h	227 374	236 223	154 R 528 R
	average 300	average 230	average 341
R_z, µm	17	13	5
C2 content in matrix, wt%	0.4	0.6	1.2

Table 4: Properties of the reference materials

	Ref. 1	Ref. 2
$MFR_{2.16kg/230°C}$, g/10 min	0.27	0.27
Tensile modulus, MPa	1429	1826
Charpy impact strength at -20°C, kJ/m^2	6.3	4.2
Storage modulus G'(G"=5kPa), Pa	2209	3007
Polydispersity index PI	3.6	5.7
Notched pipe test at 80°C and 4.2 MPa, h	85 85	110 121
	average 86	average 115
R_z, µm	17	>30(1)
C2 content in matrix, wt%	0	0

It is further noted that according to D6 (page 17, lines 12-15) the "Notched pipe test at 80°C and 4.2 MPa, h" indicated in Tables 3 and 4 of D6 is directed to the resistance to accelerated crack growth, which is not a problem addressed in the patent in suit. Therefore, although that property is not as good for reference example 2 as compared to examples 1-3 of D6,

it is irrelevant in view of the problems addressed in the patent in suit and it provides also no reason to disregard reference example 2 as a suitable starting point as compared to examples 1-3 of D6.

Therefore, in view of the problem addressed in the patent in suit and of their respective properties, there is no reason in the present case to disregard the composition of reference example 2 as a suitable starting point within the closest prior art document as compared to the composition of any of examples 1-3 of D6.

3.1.6 Examples 1-3 of D6 are directed to polymer compositions comprising i) a polypropylene matrix comprising a polypropylene random copolymer and ii) an elastomeric copolymer of polypropylene and at least one olefin comonomer (D6: claim 1; page 20, lines 2-14). The compositions of examples 1-3 of D6 further do not comprise any filler and/or nucleating agent (e.g. talc). Also, as may be seen from Table 3 of D6, the compositions of examples 1-3 of D6 neither satisfy the relation between the amount of filler F and tensile modulus T defined in operative claim 1 (since the compositions contain no filler, i.e. F = 0, and the tensile modulus is not higher than 1700 MPa), nor the requirement in terms of polydispersity index (since their polydispersity index is lower than 5.8 Pa^{-1}). In respect of the latter, it is noted that the parties agreed during the oral proceedings before the Board that the polydispersity index decreases with increasing temperature of measurement: therefore, although the polydispersity index is determined at 220°C in D6 (as defined at page 19, lines 16-23 of D6), the polydispersity index determined at 230 °C (as defined in paragraphs 180 and 181 of the patent in suit) would

be even lower than as reported in Table 3 of D6.

The composition prepared in reference example 2 of D6 comprises a polypropylene homopolymer matrix blended with an elastomeric ethylene-propylene copolymer and < 1 wt.% talc (D6: page 20, lines 15-21). It may be derived from the information of Table 4 of D6 (see above) that the composition of reference example 2 of D6 satisfies the relation between the amount of filler F and tensile modulus T defined in operative claim 1 (since the tensile modulus is 1826 MPa and (80F +1700) is at most 1780 MPa, when calculated with the highest possible amount of talc, namely F = 1 wt.%). Besides, the polydispersity index of the composition according to reference example 2 is higher than that of examples 1-3 of D6, i.e. it is closer to the lower end of the range defined in operative claim 1 (namely 5.8 Pa^{-1}, determined at 230 °C).

In view of the above, the composition of reference example 2 has more technical features in common with the subject-matter of operative claim 1 than any of the compositions according to examples 1-3 of D6.

3.1.7 For those reasons, it is agreed with the appellants (and with the opposition division) that, in the circumstances of the present case, considering both the technical problems addressed in the patent in suit and the amount of technical features in common with the subject-matter of operative claim 1, the composition of reference example 2 of D6, is the most promising starting point for the assessment of the inventive step.

3.2 Distinguishing feature(s)

The subject-matter of operative claim 1 differs from the composition of reference example 2 of D6 in requiring that component (A) exhibits a polydispersity index determined according to ISO 6721-1 of at least 5.8 Pa^{-1} and not higher than 15 Pa^{-1}, whereby the composition of reference example 2 has a polydispersity index of 5.7, as determined according to ISO 6421-10 at 220°C (D6: page 19, lines 16-23).

3.3 Problem effectively solved

3.3.1 The respondent argued that the problem to be solved resided in the provision of filled polypropylene compositions which exhibited improved tensile modulus and improved heat deflection temperature while maintaining satisfactory Charpy notch impact strength (as indicated in paragraph 60 of the patent in suit).

3.3.2 It was not contested by the appellants that the improvement in tensile modulus (i.e. improved stiffness) relied upon by the respondent was effectively achieved. The Board also has no reason to deviate from that view. In particular, it is credible in view of the teaching of D21 (in particular slide 19), that an improvement in tensile modulus is effectively achieved by increasing the polydispersity index of component (A). In that respect, as is explained in the third paragraph of section 3.4.2 below, the Board is satisfied that the effect shown in slide 19 for a polypropylene homopolymer is also credible for an impact polypropylene composition according to reference example 2 of D6.

3.3.3 It is shown in Table 3A of the patent in suit that compositions according to operative claim 1 (indicated therein as "Inventive compositions") exhibit

satisfactory Charpy notch impact strength (i.e. above 3.8 kJ/m^2 as indicated in paragraph 60 of the patent in suit), which was not contested by the appellants. As explained in section 3.1.5 above, the Board has no reason to consider that the composition of reference example 2 of D6 does not satisfy said property.

3.3.4 Regarding the temperature resistance, the respondent argued that the comparison of comparative example 7C with examples 2C, 3C and 3E and of comparative example 7D with examples 2D, 3D and 3F of the patent in suit (Tables 3A and 3B), showed that an improvement in heat deflection temperature was obtained by increasing the polydispersity index of component (A).

In that respect, it is shown in Table 3A of the patent in suit that compositions according to operative claim 1 (indicated therein as "Inventive compositions") exhibit satisfactory heat deflection temperature, which was not contested by the appellants.

However, regarding the claimed improvement in heat deflection temperature relied upon by the respondent, it is noted that comparative examples 7C and 7D of the patent in suit are not illustrative of the teaching of the closest prior art, in particular because they were both carried out using a polypropylene homopolymer (paragraph 206 of the patent in suit) and not a polypropylene homopolymer matrix blended with an elastomeric ethylene-propylene copolymer (D6: page 20, lines 15-21). Besides, it is derivable from the properties indicated in Table 1 of the patent in suit (paragraph 207), that the neat polypropylene compositions prepared either in examples 1C-3C and 1D-3D or in comparative examples 7C and 7D differed not only in terms of their polydispersity index, but also

at least in respect of their molecular weight and their melt flow rate. For those reasons, the comparisons relied upon by the respondent are not suited to show an effect attributable to the sole feature distinguishing the subject-matter of operative claim 1 from the composition of the closest prior art (reference example 2 of D6), namely the polydispersity index. Also, the comparative examples of the patent in suit may not be held to represent variants of the closest prior art lying closer to the subject-matter being claimed than reference example 2 of D6, i.e. those comparative examples may not demonstrate that an advantageous effect attributable to the feature distinguishing the claimed subject-matter from the closest prior art is in fact more clearly demonstrated (see T 35/85: section 4 of the reasons; T 197/86: section 6.1.3 of the reasons).

3.3.5 In view of the above, the problem effectively solved over the closest prior art resides in the provision of filled polypropylene compositions which exhibit improved tensile modulus while having satisfactory heat deflection temperature and Charpy notched impact strength.

3.4 Obviousness

3.4.1 The question remains to be answered if the skilled person desiring to solve the problem identified 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. In particular, it has to be assessed if there was any hint in the prior art cited to solve the above problem by increasing the polydispersity index of the polypropylene component (A) used in reference example 2

of D6 so as to be within the range defined in operative claim 1 (5.8 to 15 Pa^{-1} according to ISO 527-2).

3.4.2 In that respect, it is shown in Figure 6.5 of D21 (slide 19 of D21d; title: Stiffness vs. molecular weight distribution), that increasing the polydispersity index of a polypropylene homopolymer leads to increased stiffness (measured in terms of flexural modulus) over a range of polydispersity index between (around) 4 to (around) 24.

Although it is not clear from D21/D21d at which temperature the polydispersity index is determined in Figure 6.5 thereof, there is no reason to believe that the trend shown therein would be different depending on the temperature used for the determination of the polydispersity index.

Also, the appellants argued that it was known in the art that the polydispersity index of an impact copolymer such as that used in reference example 2 of D6 was primarily related to the homopolymer part thereof, which mostly determined the stiffness of the resulting impact copolymer (letter of 2 March 2018: page 7, end of the section "problem effectively solved" directed to D6). In the absence of any evidence and/or convincing arguments to the contrary, there is no reason for the Board to reject that submission. Therefore, it is credible that the conclusions drawn by the appellants from Figure 6.5 of D21, which is related to a polypropylene homopolymer, also apply to the impact copolymer used in reference example 2 of D6.

3.4.3 There is no evidence on file showing that increasing the polydispersity index of the polypropylene component (A) of the composition of reference example 2

of D6 so as to arrive in the range of polydispersity index defined in operative claim 1 would lead to compositions having unsatisfactory Charpy impact strength, i.e. a composition having a Charpy notch index of at least 3.8 kJ/m^2 as defined in paragraph 60 of the patent in suit.

In that respect, the respondent argued that the comparison of reference examples 1 and 2 of D6 showed that an increase in tensile modulus goes along with a decrease in Charpy properties. Therefore, the skilled person would not be motivated to increase the tensile modulus (by increasing the polydispersity index). However, for the reasons already indicated in section 3.1.5 above, there is no evidence on file that increasing the polydispersity index of the polypropylene component (A) of the composition of reference example 2 of D6 leads to compositions which would have unsatisfactory Charpy impact strength. For that reason, the respondent's argument did not convince.

Considering that reference example 2 of D6 was carried out using a polypropylene having a higher polydispersity index and containing additional inorganic filler (< 1 wt.% talc: page 20, line 21 of D6) as compared to examples 1-3 of D6 and showed an improvement in tensile modulus but a reduction in other mechanical properties such as Charpy impact strength at -20°C and Notched pipe test at 80°C, the opposition division held that the skilled person would not have been motivated to increase the polydispersity index and to add an inorganic filler to the compositions of the closest prior art in order to solve the problem posed (section 18.4.2.3: end of first paragraph). However, in the Board's view, the teaching of D6 in that respect is

rather related to differences in terms of the comonomer amount of the polypropylene and of the storage modulus than of polydispersity index (see D6: paragraph below Table 4 on page 23). Moreover, what the skilled person would do depends on the problem he is aiming at solving, which in the present case includes the improvement of the tensile modulus. Besides, the "addition of filler" needs not to be considered since the composition of reference example 2 already contains talc. For those reasons, the arguments retained by the opposition division are not adhered to.

3.4.4 It is shown in slide 14 of D20 that heat deflection temperature increases with addition of talc and with increasing the broadness of the molecular weight distribution curve of the polypropylene characterised in terms of its polydispersity value PD, i.e. the ratio Mw/Mn as determined by gel permeation chromatography (see slide 6 of D20).

In that respect, as explained in paragraphs 11 and 12 of the patent in suit, the polydispersity value PD mentioned in slide 6 of D20 and the polydispersity index referred to in operative claim 1 are both parameters used to characterise one and the same feature, namely the broadness of the molecular weight distribution of a polymer composition. However, since the use of gel permeation chromatography finds its limitation with ultra high molecular weight materials, that feature can, for those materials, be determined by melt rheological measurements using the polydispersity index rather than with the polydispersity value PD. Therefore, it makes no doubt that, as further indicated at the bottom of slide 7 of D20, both parameters polydispersity value PD and polydispersity index characterise one and the same property of a polymer

composition, namely the broadness of the molecular weight distribution, and are somehow correlated. Further considering that the data of slide 14 of D20 encompass polydispersity values PD in a broad range (3.3 to 12.6), it is agreed with the appellants that it would be understood from those data that increasing the broadness of the molecular weight distribution (independently whether that feature is assessed in terms of PD or of polydispersity index) leads to an improvement in terms of heat deflection temperature.

Similarly to the conclusion reached in section 3.4.2 (last paragraph) above in respect of the impact strength, in the absence of any evidence to the contrary, it is credible that the conclusions drawn from slide 14 of D20, which is related to a (polypropylene) homopolymer, also apply to the impact copolymer comprising a polypropylene homopolymer matrix used in reference example 2 of D6.

Under those circumstances, the data indicated in slide 14 of D20 would motivate the skilled person to increase the polydispersity index of the polypropylene component of the composition of reference example 2 of D6 so as to arrive in the range of polydispersity index defined in claim 1 of the main request in order to obtain a composition having at least satisfactory heat deflection temperature.

3.4.5 For those reasons, it is concluded that, starting from reference example 2 of D6, it was obvious to provide filled polypropylene compositions exhibiting improved tensile modulus while having satisfactory Charpy notched impact strength and heat deflection temperature by increasing the polydispersity index of the

polypropylene component (A).

3.5 In view of the above, the subject-matter of claim 1 of the main request is not inventive over D6 in view of the teaching of D20 and D21. Therefore, the main request is not allowable.

1st to 4th auxiliary requests

4. Admittance

4.1 The appellants requested that the 1st to the 4th auxiliary requests be not admitted into the proceedings because, when they were filed, no substantiation was provided in order to explain why the amendments made would remove the objections put forward by the appellants in respect of the main request.

4.2 Considering that the 1st to 4th auxiliary requests were submitted together with the appellants' statement of grounds of appeal, they were filed pursuant to Article 12(2) RPBA and underlie the stipulations of Article 12(4) RPBA according to which the Board has the power to hold inadmissible requests which could have been presented in the first instance proceedings.

4.3 In the Board's view, although no specific reason why the amendments carried out in each of the 1st to the 4th auxiliary requests would overcome any objection raised was explicitly given in the reply to the statement of grounds of appeal, the appellants should have been in a position to understand that:

- The amendment made in claim 1 of the 1st auxiliary request, in which it was defined that component (B) is talc, was made to overcome their objection of

lack of sufficient disclosure based on the argument that the patent in suit only illustrated talc as inorganic filler (B) and/or their objection of lack of novelty over D7, which was directed to compositions comprising calcium carbonate as filler;

- The amendments made in claim 1 of the 2nd auxiliary request, in which it was defined that component (B) is talc in a specific amount, was made to overcome their objection of lack of novelty based on D32, in which talc was only disclosed as an optional additive in the description, whereby no specific amount thereof was disclosed;

- The amendment made in claim 1 of the 3rd auxiliary request, in which it was defined that component (B) is talc in a specific amount and in which the reference to copolymers in component (A) was deleted, was made to overcome the objection of lack of sufficient disclosure based on the argument that the patent in suit only illustrated polypropylene homopolymers as component (A) and to try to distinguish further the subject-matter being claimed from the compositions of the closest prior art D6;

- The amendment made in claim 1 of the 4th auxiliary request, in which it was defined that the polypropylene composition has a tensile modulus of at least 2200 MPa, was made to overcome the objection of lack of novelty based on D32, which fails to disclose a composition satisfying that feature.

Besides, it is noted that each of the 1st to the 4th auxiliary requests is a limitation of claim 1 of the main request, so that none of those auxiliary requests is directed to completely new subject-matter as compared to the main request (no "fresh case").

Also, those requests were all submitted at the first opportunity, namely together with the respondent's reply to the statement of grounds of appeal, and early enough in the proceedings so that the appellants were not taken by surprise.

The Board further considers that there is no evidence of a deliberate abuse of procedure by the respondent and that in view of the outcome of the opposition proceedings there was no compelling reason to file these additional requests at that stage.

Under these circumstances, there is no reason justifying that the Board exercises its power pursuant to Article 12(4) RPBA to hold inadmissible any of the 1st to the 4th auxiliary requests.

5. 1st auxiliary request - Inventive step

No further argument was put forward by the respondent in respect of the 1st auxiliary request as compared to the main request. Besides, claim 1 of the 1st auxiliary request corresponds to claim 1 of the main request, whereby component (B) was defined as being talc. Therefore, considering that talc is already present in the composition constituting the starting point in the closest prior art document (reference example 2 of D6), the conclusion in respect of inventive step reached for claim 1 of the main request is also valid for claim 1 of the 1st auxiliary request. For that reason, the

subject-matter of claim 1 of the 1st auxiliary request is not inventive.

6. 2nd auxiliary request - Inventive step

6.1 The subject-matter of claim 1 of the 2nd auxiliary request differs from that of claim 1 of the main request in that it was specified that component (B) is talc and that it is used in an amount from 2.0 to 20 pbw based on 100 parts per weight of components (A) + (B).

6.2 The sole additional argument submitted by the respondent in respect of the inventive step of claim 1 of the 2nd auxiliary request as compared to claim 1 of the main request is that in D6, D20 and D21, talc was used as a nucleating agent and not as a filler and that it was known in the art that nucleating agents were generally used in amounts lower than 1 wt.%, i.e. outside the range specified in claim 1 of the 2nd auxiliary request.

However, it is explicitly stated at page 10, lines 10-12 of D6 that talc can act both as nucleating agent and as a filler and that, when it is used as a nucleating agent, it may be used in amounts of up to 3 wt.% based on the weight of the polymer composition, i.e. it may be used in an amount comprised in the range now specified in claim 1 of the 2nd auxiliary request.

In that respect, the appellants' argument according to which it was known in the art that the addition of talc led to improved stiffness was not disputed by the respondent (see in particular appellants' letter of 2 March 2018: page 7, section directed to D6, third sentence and section 4.17, first sentence, of the

respondent's letter dated 16 March 2018). Besides, there is no evidence on file showing that increasing the amount of talc up to 3 wt.% in the composition of reference example 2 of D6 may lead to compositions showing unsatisfactory Charpy impact strength and/or heat deflection temperature.

Therefore, the amendments made in claim 1 of the 2nd auxiliary request provide no reason to deviate both from the reasoning and from the conclusion in respect of inventive step for claim 1 of the main request.

7. 3rd auxiliary request - Inventive step

7.1 As compared to claim 1 of the 2nd auxiliary request, the composition according to claim 1 of the 3rd auxiliary request is further defined as "a polypropylene composition comprising a propylene homopolymer".

7.2 During the oral proceedings before the Board, the respondent argued that the skilled person reading claim 1 of the 3rd auxiliary request would understand that the polypropylene composition was limited to compositions containing a polypropylene homopolymer only, i.e. it did not encompass impact polypropylene composition comprising a mixture of a polypropylene homopolymer and an elastomeric ethylene-propylene copolymer as used in reference example 2 of D6 (see section 3.1.6 above and D6: page 20, lines 15-21).

However, the normal rule of claim construction is that the terms used in a claim should be given their broadest technically sensible meaning in the context of the claim in which they appear. This means, in the present case, that since claim 1 of the 3rd auxiliary

request is drafted using an open formulation "a polypropylene composition **comprising** ..." (emphasis by the Board), it does not exclude the presence of any other components different from those specified therein, in particular other polymers such as the elastomeric ethylene-propylene copolymer present in the composition of reference example 2 of D6. For that reason, the respondent's argument is rejected.

7.3 Consequently, the additional amendment does not provide an additional difference with respect to reference example 2 of D6 and therefore does not provide any reason to deviate from the conclusion reached in respect of inventive step for claim 1 of the higher ranking requests.

8. 4th auxiliary request - Inventive step

8.1 Claim 1 of the 4th auxiliary request differs from claim 1 of the main request only by the addition of a further requirement according to which the polypropylene compositions should have a tensile modulus of at least 2200 MPa.

8.2 No additional argument was put forward by the respondent in respect of the 4th auxiliary request as compared to the higher ranking requests. Further considering that:

- a tensile modulus of 2200 MPa (as defined in the amendment made in claim 1 as compared to claim 1 of the main request) is not much higher than a tensile modulus of 1826 MPa of the composition of the closest prior art (see reference example 2 in Table 4 of D6);

- as explained for the main request, an increase in tensile modulus would result from an increase of the polydispersity index of component (A) of the composition according to the closest prior art;

- it was undisputed that an improvement in tensile modulus (stiffness) may also be obtained by the mere addition of talc to the composition according to the closest prior art;

it is concluded that it was not shown and that it is not credible that the amendment made as compared to the main request contributes in any manner to an inventive step. Therefore, it is agreed with the appellants that the amendment made is only indicating an arbitrary minimal value of the tensile modulus achievable by the measures discussed fro the previous requests. As a consequence, the Board has no reason to arrive at a different conclusion regarding the inventive step of the 4th auxiliary request than for the main request.

9. None of the respondent's requests being allowable, the patent is to be revoked and there is no need for the Board to address any other issues in dispute between the parties.

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:

L. Stridde D. Semino

Decision electronically authenticated