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# Datasheet for the decision of 12 April 2024

**Case Number:** T 1888/21 - 3.3.03

**Application Number:** 16768940.5

**Publication Number:** 3275932

**IPC:** C08L23/06, B29C45/00, C08J5/00, C08F2/00, C08L23/08

**Language of the proceedings:** EN

**Title of invention:**
POLYETHYLENE FOR INJECTION MOLDING AND MOLDED ARTICLE USING SAME

**Patent Proprietor:**
Japan Polyethylene Corporation

**Opponent:**
The Dow Chemical Company

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

**Keyword:**

Inventive step (no) - obvious modification (main request and auxiliary requests 2, 4 to 7, 9, 11, 12, 14, 16, 17, 19, 21 to 24, 26, 28, 29, 31, 33, 34, 36 and 38)
Exception to the principle of prohibition of reformatio in peius (no) - admittance of auxiliary requests 1, 3, 8, 10, 13, 15, 18, 20, 25, 27, 30, 32, 35 and 37 to the proceedings (no)

**Decisions cited:**

G 0009/92, G 0004/93, G 0001/99, T 0254/86, T 0315/97, T 0405/14, T 0648/15, T 1845/16

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**Case Number: T 1888/21 - 3.3.03**

# D E C I S I O N
# of Technical Board of Appeal 3.3.03
# of 12 April 2024

| | |
|---|---|
| **Appellant:** (Opponent) | The Dow Chemical Company<br>2030 Dow Center<br>Midland, MI 48674 (US) |
| **Representative:** | Boult Wade Tennant LLP<br>Salisbury Square House<br>8 Salisbury Square<br>London EC4Y 8AP (GB) |
| **Respondent:** (Patent Proprietor) | Japan Polyethylene Corporation<br>1-1, Marunouchi 1-chome<br>Chiyoda-ku<br>Tokyo 100-8251 (JP) |
| **Representative:** | Hoffmann Eitle<br>Patent- und Rechtsanwälte PartmbB<br>Arabellastraße 30<br>81925 München (DE) |
| **Decision under appeal:** | **Interlocutory decision of the Opposition Division of the European Patent Office posted on 21 September 2021 concerning maintenance of the European Patent No. 3275932 in amended form.** |

**Composition of the Board:**

| | |
|---|---|
| **Chairman** | D. Semino |
| **Members:** | F. Rousseau |
| | A. Bacchin |

## Summary of Facts and Submissions

I. The appeal lies from the interlocutory decision of the opposition division according to which European patent No. 3 275 932 as amended on the basis of claims 1 to 5 of the main request submitted with letter of 16 December 2019 and an adapted description met the requirements of the EPC.

II. The following items of evidence were submitted among others during the opposition proceedings:

D1: WO 2015/101668 A1
D2: WO 2007/130515 A2
D3: WO 2008/136849 A1
D4: JP-A-2008/114819 and certified English translation thereof (D4b)
D5: WO 2014/180989 A1
D11: Experimental report - Inventive Example 9 filed by the patent proprietor with letter of 16 December 2019
D15: Injection Molding Technical Tip, tech.topic, Using Spiral Flow to Achieve Optimum Processability and Properties, Lyondell, 9704/0403
D16: Böhm et al, The Industrial Synthesis of Bimodal Polyethylene Grades with Improved Properties, Studies in Surface Science and Catalysis, Volume 89, 1994, Elsevier, 351-363
D18: US 2005/0170112 A1.

III. According to the reasons for the contested decision relative to the main request which are pertinent for the appeal proceedings:

(a) Novelty was given, in particular with respect to example 2 of D1, example 4 of D2 and example 3 of D3.

(b) Taking into account test report D11, an inventive step was acknowledged over the polyethylene of example 1 of D4, which represented the closest prior art.

IV. An appeal against that decision was lodged by the opponent (appellant) and a statement setting out the grounds of appeal was submitted.

V. With the reply to the statement of grounds of appeal the patent proprietor (respondent) based their submissions on auxiliary requests 1 to 16 filed before the opposition division and auxiliary requests 17 to 33 submitted with said reply.

VI. Both parties made further substantive submissions, namely the appellant with letters of 27 June 2023 and 30 January 2024 and the respondent with letter of 26 October 2023. With the letter of 26 October 2023, the respondent filed additional auxiliary requests 34 to 38 and reordered previous auxiliary requests 1 to 6 and 18 to 23. Auxiliary requests 1 to 38 according to their new numbering were summarized in a table annexed to said letter of 26 October 2023.

VII. In preparation of the oral proceedings, a communication pursuant to Article 15(1) RPBA conveying the Board's provisional opinion was issued.

VIII. Oral proceedings before the Board were held on 12 April 2024 in mixed mode (see minutes of the oral proceedings, first paragraph).

IX. The final requests of the parties were as follows:

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

The respondent requested that the appeal be dismissed, or alternatively that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of one of the following auxiliary requests, in this order:

- auxiliary requests 1 to 6 filed with letter of 26 October 2023,

- auxiliary requests 7 to 11 filed with letter of 20 May 2021,

- auxiliary requests 12 to 16 filed with letter of 20 July 2021,

- auxiliary request 17 filed with the rejoinder,

- auxiliary requests 18 to 23 filed with letter of 26 October 2023,

- auxiliary requests 24 to 33 filed with the rejoinder,

or

- auxiliary requests 34 to 38 filed with letter of 26 October 2023.

X. The claims which are relevant to the present decision are as follows:

*Main request (filed with letter of 16 December 2019)*

Claim 1 which reads:

"1. A polyethylene for injection molding, which comprises at least the following component (a) and component (b) and satisfies the following characteristics (1) to (4):

Component (a): a polyethylene having a density of 0.910 to 0.940 g/cm$^3$ and a high load melt flow rate (HLMFR) (test conditions: 190°C, a load of 21.6 kg) of 0.1 to 5.0 g/10 minutes,
Component (b): a polyethylene having a density of 0.960 to 0.980 g/cm$^3$ and a melt flow rate (MFR) (test conditions: 190°C, a load of 2.16 kg) of 1 to 500 g/10 minutes,
Characteristic (1): a density is 0.935 to 0.970 g/cm$^3$,
Characteristic (2): HLMFR is 50 to 200 g/10 minutes,
Characteristic (3): a relation of a weight ratio Wa (%) of the component (a) to the total weight of the component (a) and the component (b) and the density Da (g/cm$^3$) of the component (a) satisfies the following formula (1):
$Wa \geq 832 \times Da - 730$ Formula (1),
Characteristic (4): a ratio of weight-average molecular weight (Mw) to number average molecular weight (Mn) (Mw/Mn) measured by gel permeation chromatography (GPC) is 10 or more."

Claims 2 and 3 are dependent on claim 1, whereas claims 4 and 5 concern a moulded article obtained by injection moulding using the polyethylene for injection moulding according to any one of claims 1 to 3.

*Auxiliary request 1*

Claim 1 which corresponds to claim 1 of the main request in which the characteristic defining the ratio of weight-average molecular weight (Mw) to number average molecular weight (Mn) (Mw/Mn) (hereafter MWD) for the polyethylene for injection moulding has been deleted and the HLMFR of component (a) is amended from of 0.1 to 5.0 g/10 minutes to 0.3 to 4.0 g/10 minutes.

*Auxiliary request 2 and 3*

Claim 1 of auxiliary request 2 and 3 which corresponds to claim 1 of the main request and auxiliary request 1, respectively, in which the density of component (b) is amended from 0.960 to 0.980 g/cm$^3$ to 0.965 to 0.975 g/cm$^3$.

*Auxiliary request 4*

Claim 1 which corresponds to claim 1 of the main request in which the HLMFR of component (a) is amended from of 0.1 to 5.0 g/10 minutes to 0.3 to 4.0 g/10 minutes and the density of component (b) is amended from 0.960 to 0.980 g/cm$^3$ to 0.965 to 0.975 g/cm$^3$.

Auxiliary requests 5 and 6

Claim 1 of auxiliary requests 5 and 6 which corresponds to claim 1 of the main request in which the MWD of the polyethylene for injection moulding is defined to be 15 or more and to exceed 17, respectively.

Auxiliary requests 7 to 11

Claim 1 of auxiliary requests 7 to 11 which corresponds to claim 1 of the main request and auxiliary requests 1 to 4, respectively, in which the polyethylene for injection moulding is defined "to form a fuel tank".

Auxiliary requests 12 to 16

Claim 1 of auxiliary requests 12 to 16 which corresponds to claim 1 of the main request and auxiliary requests 1 to 4, respectively, in which the claim does not any more concern a polyethylene for injection moulding, but "a molded article obtained by injection molding using polyethylene for injection molding, wherein the molded article is a fuel tank".

*Auxiliary requests 17 to 33*

Claim 1 of auxiliary requests 17 to 33 which corresponds to claim 1 of the main request and auxiliary requests 1 to 16, respectively.

*Auxiliary requests 34 to 38*

Claim 1 of auxiliary requests 34 to 38 which corresponds to claim 1 of auxiliary requests 24 to 28, i.e. claim 1 of auxiliary requests 7 to 11, respectively.

XI. The parties' submissions, in so far as they are pertinent to the present decision, may be derived from the reasons for the decision below. The contentious points essentially concerned the questions whether the claimed subject-matter involved an inventive step in view of the disclosure of D4 as the closest prior art

and whether some of the auxiliary requests could be admitted as an exception to the principle of the prohibition of *reformatio in peius*.

## Reasons for the Decision

*Main Request*

*Inventive step*

*Closest prior art*

1. In order to assess in an objective manner whether the invention for which protection is sought can be seen, from the perspective of the skilled person, as a contribution to the art which could justify the extent of the monopoly conferred by the patent, the problem solution approach is applied. For these reasons, the assessment process should start from a situation as close as possible in reality to that encountered by that notional skilled person. It is established case law that ideally the closest prior art should be a document that mentions the purpose or objective indicated in the patent in suit as a goal worth achieving 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, 10th edition 2022, in the following "Case Law", I.D.3.1).

1.1 According to paragraph [0012] of the specification, an object of the present invention is to provide a material for a moulded article, which material exhibits excellent durability and impact resistance of the

resulting moulded article, particularly a polyethylene-based resin material for a fuel tank while maintaining good injection mouldability, and a moulded article.

Document D4 is patent document 2 cited in the patent in suit as background art. It is indicated in paragraph [0006] of the specification to concern a polyethylene-based resin for an injection-moulded plastic fuel tank which exhibits an excellent balance of injection mouldability, durability, and impact resistance.

While the parties agree that a suitable starting point for the present invention is to be found in D4, the appellant, in line with the contested decision, submits that the composition described with example 1 of D4 constitutes the closest prior art, whereas according to the respondent, the closest prior art should be selected from the general teaching of D4, as specified in the claims of that document. In their opinion, selecting a particular example may rely on impermissible use of hindsight (rejoinder, page 14, section 4.2, first paragraph). The respondent argues in addition that the skilled person, if starting from an example of D4, would rather start from example 2 which concerns a composition having better injection mouldability and higher orientation ratio, the latter properties being also sought to be achieved in D4, as shown in its paragraph [0028]. In view of example 2, example 1 would not be seen as the most promising springboard. In what follows the passages of D4 referred to are those of its certified translation D4b.

1.2 The Board does not agree that in order to avoid hindsight an inventive step analysis should necessarily start from the general teaching of a document as e.g. specified in the claims. This is case dependent. A

preferred embodiment such as a specific example of a patent document which unambiguously describes a combination of concrete and promising measures toward the achievement of the goals set out in the patent under examination constitutes a realistic approach of the skilled person. This is the case for example 1 of D4, as shown in paragraphs [0034] to [0036] and [0048] which unambiguously describes a material having good injection mouldability, impact resistance, Charpy impact strength, and durability and whose use as a material for a fuel tank is in addition evaluated in example 4 and reference example 1 of that document (paragraphs [0045] and [0047]).

Starting from the general disclosure of D4, i.e. its claims 1 and 2, as proposed by the respondent, which claims comprise functional features and/or a more general definition for both the High Molecular Weight (HMW) component (a) and Low Molecular Weight (LMW) component (b) might therefore necessitate more experimentation to put into practice the teaching of D4 on which the skilled person needs to build on for a further development toward the achievement of the goals set out in the patent in suit.

Accordingly, it cannot be held that starting from the teaching of claims 1 and 2 of D4 would be considered by the skilled person to be more appropriate.

1.3 The concept of "the most promising springboard towards the invention" relied upon by the respondent is to be found in the case law as early as with decision T 254/86 (Case Law, supra, I.D.3.4.2). It expresses the necessity to assess inventive step from such point, as any non-obviousness finding vis-à-vis a prior art, "*if not closest to the invention, would be irrelevant and*

*inconclusive to validity without the assessment of the inventive step in respect of the objectively closest state, i.e. the most promising springboard towards the invention which was, available to the skilled person (cf. T 164/83, "Antihistamines" OJ EPO 1987, 149)*" (T 254/86 point 15 of the Reasons).

It does not mean, however, that a non-obviousness finding vis-à-vis that most promising springboard necessarily means that another route starting from a more remote starting point is non-obvious as well. This depends on the circumstances of the case under consideration. It is nevertheless required for an objective assessment of inventive step that a more remote starting point for the skilled person is also realistic.

In this respect, it can also be referred to T 405/14 cited in section I.D.3.1 of the Case Law in which it was held in essence that there is no requirement that the "closest prior art" should be unique and that it should be selected based on a metric defining the distance between items of prior art and the invention (T 405/14, point 18 of the Reasons). As pointed out in point 18 of the Reasons of T 405/14 "*the jurisprudence does not define any such metric beyond indicating what criteria might be considered relevant to it (common features, similar purpose, ...), there are frequent situations in which the identification of a unique closest or best starting point is not straightforward or even possible*."

The Board adheres with the view of the Board in decision T 405/14, at least insofar the selection of a single starting point as a matter of principle would

not correspond to the real situation encountered by the notional skilled person.

1.4 On the contrary, an inventor seeking to achieve a given goal would rather find natural to maximize their chances of success by trying more than one promising and realistic starting point. This is the case here for any of examples 1 to 3 which are all representative of the teaching of D4 and address the problems set out in paragraph [0012] of the patent in suit. In this respect the Board is not convinced that the skilled person would necessarily start from example 2, as contented by the respondent, because the material obtained in that example would have a superior orientation ratio or from example 3, because it would exhibit the highest Charpy impact strength at -40°C. First of all, the patent in suit does not put the focus on the orientation ratio, let alone address that parameter. As regards the Charpy impact strength at -40°C, the difference in value between examples 1 to 3 of D4 is marginal and cannot be realistically considered by those skilled in the art as a criterion of exclusion of one of these examples as starting point for the present invention.

Moreover, whereas D4 provides for example 1 a description of each of components (a) and (b) and their mixture, D4 does not specify details of the components (a) and (b) and their amounts for the additional examples, as stressed in the contested decision (section 7.3.1 of the Reasons).

The respondent considers that the absence of information is due to the fact that example 1 is the first example mentioned, the other examples being defined in paragraphs [0038] and [0039] with respect to it. Each of paragraphs [0038] and [0039] defines that a

polyethylene was produced in the same manner as example 1 except that the amount of hydrogen supplied was adjusted. These paragraphs, however, do not define in which stage of the reaction the hydrogen supply was modified, i.e. for preparing component (a), component (b) or both, and to which extent. Hence, the sole reference to example 1 in these examples is in the Board's opinion insufficient to provide an information content which is equivalent to that given with example 1.

1.5 In view of the above considerations, the Board does not see any reason to deviate from the opposition division's view that example 1 of D4 represents a suitable starting point for assessing inventive step of the subject-matter of operative claim 1.

*Distinguishing features over example 1 of D4*

2. Example 1 of D4 describes the preparation in a first stage of a HMW copolymer (a) of ethylene and 1-hexene in a loop reactor (paragraph [0035]). Said copolymer (a) has a HLMFR of 0.16 g/10 minutes and a density of 0.929 g/cm$^3$. In a second stage, ethylene is polymerized in the presence of copolymer (a) in a second reactor without adding catalyst or 1-hexene to produce a LMW polyethylene component (b) step (paragraph [0036]). The mixture of the HMW component (a) and LMW component (b) obtained has a HLMFR of 15 g/10 minutes and a density of 0.948 g/cm$^3$. The amount of the HMW component (a) based on the amounts of the HMW component (a) and LMW component (b) is 45% by weight. The MFR and density of the LMW component (b) produced in the second step are obtained by separate polymerization under the second-stage polymerization conditions. These parametric values are 80 g/10 minutes and 0.964 g/cm$^3$,

respectively. The appellant's submissions that the erroneous indication in example 1 of 0.946 g/cm$^3$ for the density of the LMW component (b) should read 0.964 g/cm$^3$ (statement of grounds of appeal, page 15, section inventive step over D4, 4th paragraph) is undisputed. A density of 0.964 g/cm$^3$ for the LMW component (b) is also confirmed in D11 in which comparative example 8 has been indicated by the respondent to correspond to example 1 of D4. It is also undisputed that the condition defined in operative claim 1 by formula (1) is met for that example.

As noted in the contested decision, the respondent's data in D11 in which example 1 of D4 was repeated also demonstrate that the polyethylene composition of example 1 of D4 has a Mw/Mn ratio of 18, i.e. within the range defined in operative claim 1.

Under these circumstances, the subject-matter of operative claim 1 differs from the closest prior art in the sole use of a higher HLMFR for the overall composition, namely in the range from 50 to 200 g/10 minutes.

*Problem successfully solved*

3. The objective technical problem was formulated by the respondent as the provision of a polyethylene suitable for heavy-duty uses with improved spiral flow and injection mouldability, improved durability, which at the same time achieves good impact resistance (rejoinder, paragraph bridging pages 16 and 17). It is, however, noted that this problem was not formulated vis-à-vis the closest prior art, but vis-à-vis a polyethylene which is more remote from the polyethylene of operative claim 1, i.e. one which has not only a

HLMFR below the values defined in operative claim 1, but in addition does not satisfy the conditions set out in said claim with respect to formula (1) and the condition on the MWD (rejoinder, page 15, first full paragraph), contrary to the polyethylene obtained in example 1 of D4 which meets the latter requirements.

The question to be answered, however, concerns the technical effect resulting from the sole use of a different HLMFR for the polyethylene which comprises components (a) and (b), i.e. a HLMFR which is in the range from 50 to 200 g/10 minutes.

3.1 Concerning the part of the problem concerning the alleged "improved spiral flow and injection mouldability", these terms are in the patent in suit considered as synonyms, injection mouldability being assessed in the patent in suit using a spiral flow test described in paragraphs [0069] and [0070] (statement of grounds of appeal, page 16, second paragraph). This type of test to evaluate the processability of a resin by injection moulding is also common general knowledge, as illustrated in D15 (page 1, left-hand column, last paragraph and right-hand column, first paragraph and figure 1) and D5 (tables 2 and 3 on page 26 show that spiral flow increases as melt index increases; statement of grounds of appeal, page 16, second full paragraph, in particular 6th sentence). Under the test conditions used in the patent in suit (paragraph [0070]) materials having a spiral flow length of 20 cm or more are rated good in injection mouldability, while those having a spiral flow length of less than 20 cm are rated as bad.

In other words, the respondent's contention of an "improved spiral flow and injection mouldability" merely means an improved injection mouldability.

3.1.1 With respect to this technical effect, the respondent relies on a comparison of examples 1 to 8 and comparative example 1 of the patent in suit and on the experimental data in D11. Concerning comparative example 1 of the specification, it is submitted by the respondent that comparative example 1 is representative of D4 in that the HLMFR of the polyethylene (with a value of 31 g/10 minutes) is significantly lower than the claimed range.

The appellant submits that no proper comparison can be made between the comparative examples and inventive examples of the patent and D11, so that there would be no proven difference in increasing the HLMFR (statement setting out the grounds of appeal, page 16, first paragraph). Furthermore, other differences between the polyethylene in comparative example 1 and those of the inventive examples would exist.

3.1.2 It is undisputed that several of the parameters of operative claim 1 are interrelated, making it difficult to prepare two examples which differ only in one parameter, in particular the HLMFR of component (a) that influences the HLMFR of the final polyethylene (rejoinder, page 15, penultimate full paragraph). It is also referred to the density which is held to increase with an increase of the HLMFR (see submission of the respondent in point 4.5 below, second paragraph)). The Board also notes that the Mw/Mn value is interrelated with the other feature of operative claim 1, which is illustrated with the experimental data in D11.

3.1.3 Having regard to the absence of any information concerning the preparation of the polyethylene tested in comparative examples 1 to 7, e.g. whether the same catalyst and comonomers as used for inventive examples 1 to 8 were employed, the sole comparison between the comparative examples and examples of the patent in suit does not allow any conclusion as to whether the distinguishing feature identified above is causative for a technical effect.

3.1.4 It belongs nevertheless to common general knowledge for thermoplastic polymers that a higher molecular weight results in an increase in melt viscosity and greater resistance to flow making injection moulding more difficult. In over words, it is common general knowledge that processability increases with decreasing molecular weight, i.e. increasing melt flow rate, as illustrated in D15 (page 1, first paragraph 1) and D16 (page 352, first paragraph), the passage of D16 mentioned referring to the international standard 1133-1981 and an encyclopaedia. It is in this respect irrelevant that D15 and D16 do not relate to polyethylene for the heavy duty uses, as was argued by the respondent, this teaching being for the skilled person generally applicable and not restricted to any specific use of the polyolefin.

3.1.5 Accordingly, already on that basis, it is credible that the sole use of a significant higher HLMFR for the polyethylene of operative claim 1 in the range from 50 to 200 g/10 minutes results in an improved injection moulding processability.

3.1.6 This is also confirmed by experimental report D11 in which for the preparation of inventive example 9 component (a) of comparative example 8 (corresponding

to example 1 of D4) remained the same, but component (b) of comparative example 8 was modified, but still within the definition of operative claim 1, so that the resulting HLMFR of the mixture of component (a) and (b) was increased to reach the lower limit of 50 g/10 minutes set out for the HLMFR of the claimed polyethylene.

3.2 However, an improvement of the durability alleged by the respondent to result from the condition expressed by formula (1) to be met cannot be taken into account for the formulation of the problem, as the latter does not constitute a distinguishing feature over the closest prior art. Moreover, an improvement of the durability when increasing the HLMFR of the mixture of component (a) and (b) due to an increase of the MFR of compoment (b) is also not shown in D11, in which the compositions according to inventive example 9 and comparative example 8 (corresponding to example 1 of D4) lead to the same evaluation of the durability.

Considering (i) that the durability test used in the patent in suit (paragraph [0104]) and in D4 (point (9) of paragraph [0033]) are the same and furthermore (ii) that some of the conditions which are indicated in paragraph [0024] of D4 to be necessary to obtain an adequate durability are met by the polyethylene compositions of operative claim 1 (i.e. density of the HMW component (a) of not greater than 0.940 g/cm$^3$, a HLMFR of the HMW component (a) of not greater than 10 g/10 minutes and a density of the LMW component (b) not greater than 0.970 g/cm$^3$) it is nevertheless accepted to the benefit of the respondent that the compositions of operative claim 1 have also an acceptable durability.

3.3 The respondent did not contend that the impact resistance is improved by increasing the HLMFR of the overall component. It is indicated in paragraph [0045] of the specification that it tends to decrease when the HLMFR is above the maximum value defined in operative claim 1. Furthermore, as submitted by the appellant at the oral proceedings, dependent claim 3 of the main request merely requires that the Charpy impact strength at -40°C has a minimum value of 4.0 $kJ/m^2$ or more, which demonstrate that the compositions in accordance with operative claim 1 can exhibit in comparison with that of the prior art with a Charpy impact strength at -40°C of 7.0 $kJ/m^2$ a lower impact resistance, the same test method being used both in D4 (point (8) of paragraph [0033]) and in the patent in suit (paragraphs [0101] to [0103]).

Moreover, the conditions taught in paragraph [0024] of D4 to obtain an adequate impact resistance are respected in operative claim 1, namely a HLMFR of the HMW component (a) of not greater than 10 g/10 minutes and a density of the LMW component (b) not greater than 0.970 $g/cm^3$. On that basis, it is also accepted that the compositions of operative claim 1 have an acceptable impact strength within the meaning of D4.

3.4 In view of the foregoing, it is concluded that the objective technical problem solved over the closest prior art resides in the provision of a polyethylene suitable for fuel tanks or other heavy-duty uses with improved injection mouldability, while exhibiting at the same time acceptable impact resistance and durability.

*Obviousness of the solution*

4. It remains to be decided whether the skilled person desiring to solve the problem so defined would have found it obvious to modify the polyethylene of example 1 of D4 in such a way as to arrive at the polyethylene of operative claim 1. The appellant referred in this respect to the general teaching of D4, in particular its paragraph [0013] and the common general knowledge.

4.1 As already pointed out in point 3.1.4 above, it is common general knowledge that processability of a polymer is improved when its melt flow rate increases. This is taught in paragraph [0013] of D4, according to which the HLMFR value is described to be relevant for injection mouldability. When the HLMFR is less than 6 g/10 minutes, fluidity is insufficient and injection moulding impractical.

According to paragraph [0013] of D4, there are no particular restrictions on the upper limit value of the HLMFR, which is usually 50 g/10 min, implying that it can be even higher, as was pointed out by the appellant. The same paragraph also indicates that the HLMFR can be adjusted by increasing the amount of hydrogen present during ethylene polymerisation, which is also common general knowledge.

Accordingly, confronted with the problem identified in point 3.4 above, the skilled person would have found in D4 the suggestion to increase the HLMFR of the polyethylene constituting the closest prior art to values of 50 g/10 min or even higher by increasing the amount of hydrogen present during ethylene polymerisation.

4.2 Moreover, the Board agrees with the appellant's argument that it was obvious for one skilled in the art that the HLMFR of the polyethylene composition could be increased by increasing the melt flow rate of at least one of its components (a) and (b), i.e. also for both components, and possibly their relative amounts, depending on the melt flow rate of each of these components (statement setting out the grounds of appeal, page 17, third full paragraph, first sentence and minutes of the oral proceedings, page 4, first paragraph). This obviously means increasing the proportion of the component having the higher melt flow rate, i.e. the LMW component (b), and consequently decreasing the proportion of the HMW component (a).

In this regard, a general teaching concerning the melt flow rates of components (a) and (b) and their relative amounts is to be found in claim 2 of D4, the same teaching being provided in paragraph [0024]. Component (a) is taught to be a HMW polyethylene having a density of 0.915 to 0.940 g/cm$^3$ and a HLMFR of 0.05 to 10 g/10 minutes, while component (b) is described to be a LMW polyethylene with a density of 0.940 to 0.970 g/cm$^3$ and a MFR of 1 to 300 g/10 minutes. The respective amounts of said components (a) and (b) are comprised from 23 to 84% by weight and from 77 to 16% by weight, respectively.

More importantly, the skilled person would have every reasons to explore further the teaching of this paragraph [0024] concerning the limits for the melt flow rate and density of components (a) and (b), as well as their respective amounts, since these limits are taught in said paragraph to be necessary for the achievement of an acceptable durability, impact

resistance and injection moldability of the ethylene composition. Starting from the composition of example 1 of D4, this would be done by the skilled person using routine experimental work and systemically incrementing within the teaching of D4 the melt flow rates of components (a) and (b) and/or the amount of the component having the higher melt flow rate, i.e. component (b).

4.3 As convincingly argued by the appellant (statement setting out the grounds of appeal, page 17, third full paragraph, third sentence) the teaching of D4 concerning the melt flow rates of components (a) and (b) in claim 2 of D4 provides adequate headroom to increase the overall HLMFR of 50 g/10 minutes or more.

This is confirmed by examples 2, 4, 5, 7 and 8 of the patent in suit, whose HMW component (a) and LMW component (b) are within the teaching of claim 2 of D4, the proportion of components (a) and (b) in examples 7 and 8 in which a HLMFR of 110 and 97 is obtained, respectively, being in particular the same as for example 1 of D4. This shows that there is in fact no need to change the proportion of the HMW and LMW components in the resin of example 1 of D4 to arrive at a resin falling within the ambit of operative claim 1. It is sufficient based on a limited amount of experimentation to increase the melt flow rate of each of components (a) and (b) by usual means, i.e. an adjustment of the hydrogen feed, possibly in combination with an obvious increase of the amount of α-olefin comonomer (see point 4.5 below).

In any event, an additional modification of the proportion of components (a) and (b) within the concentration ranges recommanded in paragraph [0024] of

D4 in order to increase the HLMFR of the polyethylene for injection moulding and therefore its processability is also an obvious measure for the skilled person, as indicated in point 4.2 above. This in the case for examples 2, 4 and 5 of the specification.

Thus, experimental evidence D11 submitted by the appellant which could lead one to believe that it is necessary in order to achieve a HLMFR of the overall composition of 50 g/10 minutes to increase the melt flow rate of the sole component (b) to a MFR of 500 g/10 minutes, i.e. beyond the limit of 300 g/10 minutes taught in D4, does not demonstrate that it is necessary to deviate from the teaching of D4 to obtain polyethylenes conforming to operative claim 1.

On the contrary, the examples of the patent in suit demonstrate that broad variations of the melt flow rate for each of components (a) and (b) and their amount within the teaching of D4 lead to polyethylenes for injection moulding falling within the definition of operative claim 1.

4.4 The respondent submitted in addition that D18 would teach in paragraph [0011], claim 7 and table 3 a lower HLMFR, providing a strong indication that it would not have been obvious to the skilled person to use a HLMFR according to operative claim 1. D18 which like D4 concerns the fabrication of injection-moulded fuel tanks merely teaches in said paragraph [0011] and claim 7 that the HLMFR of the polyethylene is preferably between 1 and 30. It does not teach that a HLMFR above 30 should not be used. In any event, the skilled person starting from example 1 of D4 would be prompted to preferably follow the teaching of the same document, as it is not apparent that the systems used in D4 and D18

are identical, as stressed by the appellant (letter of 27 June 2023, page 14, last paragraph of the section concerning the main request).

4.5 It is also correct, as stressed by the respondent during the oral proceedings, that arriving at the invention of claim 1 requires that the modification operated to the closest prior art also results in the condition defined with formula (1) to be met. Formula (1) defines an inequation involving the proportion of component (a) Wa in the mixture of components (a) and (b) and the density of component (a), namely $Wa \geq 832 \times Da - 730$.

The respondent pointed out it that an increase of HLMFR of the HMW component (a) in order to increase the flowability of the overall composition would correspond to the production of a component having shorter polymeric chains which fold in an easier manner, implying a concomitant increased of the density of component (a). It is therefore the respondent's submission that a large increase of the HLMFR of the HMW component (a) in order to increase the HLMFR of the mixture of components (a) and (b) would result in the inequation defined with formula (1) not to be met. In other words, the suggestion in D4 to increase the HLMFR of component (a) to provide a polyethylene with improved injection mouldability would not necessarily guide the skilled person towards a composition in accordance with operative claim 1.

This does not convince. As indicated by the appellant during the oral proceedings, the aim of providing at the same time a composition having an acceptable durability would, for the following reasons, lead the skilled person towards compositions additionally

meeting the parametric condition set out with formula (1).

4.5.1 As agreed by both parties at the oral proceedings, the durability of the polyethylene of operative claim 1 is partly assessed by measuring the breaking time in a full notch creep test (measured at 80°C and 6 MPa), which can be inferred from paragraph [0016] of D4, although a more realistic test was also indicated by the respondent to be described in paragraph [0114] of the patent in suit.

4.5.2 Taking into account that the breaking time in a full notch creep test, which is an element of the assessment of the durability, is indicated in the last sentence of paragraph [0016] of D4 to be increased by lowering the density of the ethylene polymer, i.e. conversely decreased by increasing the density of the ethylene polymer, the skilled person, who is aware that a substantial increase of the HLMFR of component (a) will tend to result in an increased density of the overall composition, would be expecting that additional measures might be necessary to keep the density within certain limits for an acceptable durability.

4.5.3 This, in the Board's judgement, would guide the skilled person to counteract the increase of density resulting from higher HLMFR values for component (a) by the obvious measure to (i) introduce larger amount of the α-olefin copolymerized with the ethylene, as suggested in paragraph [0012] of D4, according to which the density of the resin can be decreased by increasing the amount of α-olefin and/or (ii) increase the proportion of the component having the lowest density, i.e. component (a), in order to keep the density of the

overall composition within the limits required to obtain acceptable durability.

These obvious alternatives are expressed in operative claim 1 by the inequation of formula (1), according to which the proportion of component (a) and the density of that component have to be kept within a given relationship, the proportion of component (a) increasing with the density of said component.

Accordingly, the definition of formula (1) in operative claim 1 merely expresses the result of an obvious measure suggested to the skilled person by the teaching of D4.

4.6 The respondent also submitted that comparative example 5 of D4 concerning a resin whose HLMFR is 80 g/10 min would teach away from increasing the HLMFR of the polyethylene to a value in the range defined in operative claim 1, as this resin does not exhibit a favourable impact resistance and durability, reference being made to the results shown in Table 1 in paragraph [0048]. This would be in line with the disclosure in paragraph [0024] which would highlight that higher values of HLMFR and MFR in components (a) and (b), respectively, lead to a deterioration in durability, impact resistance and weld strength (rejoinder, paragraph bridging pages 17 and 18 and page 18, second full paragraph).

Furthermore, considering that the examples of D4 would only concern compositions having a HLMFR of up to 20 g/ 10 minutes, the skilled person would have no real expectation of success to triple the HLMFR value of the polyethylene resin of the closest prior art while obtaining at the same time satisfactory mechanical

properties, in particular in respect of impact strength which would rapidly decrease with increasing HLMFR of the polyethylene resin. The disclosure of D4 would in fact be understood by the skilled person to be limited to polyethylenes having a HLMFR value in the lower range used in the examples of D4.

This is not convincing. The absence of sufficient information about the way the polyethylene of comparative example 5 of D4 is prepared does not allow the skilled person to draw the firm conclusion that the unsatisfactory impact resistance and durability achieved for this comparative example are due to its too high HLMFR value. According to paragraph [0044] of D4, the polyethylene of comparative example 5 was produced in the same manner as example 1 except that the amount of hydrogen supplied was adjusted. How that amount of hydrogen was adjusted, i.e. for component (a) and/or (b), is, however, not specified. In view of the explicit teaching given in paragraph [0024], one cause for the lack of durability and impact resistance of the ethylene composition of comparative example 5 of D4 would rather be identified by the skilled person to reside in the melt flow rate of its individual components (a) and (b), i.e. values for the HLMFR of the HMW component (a) greater than 10 g/10 minutes and values for the MFR of the LMW component (b) greater than 300 g/10 minutes.

Having regard to the explicit teaching in paragraph [0013] that there is no particular restrictions on the upper limit value of the HLMFR of the polyethylene composition, but it is usually 50 g/10 min, without any indication of any consequence of higher values on the performance of the composition, the skilled person would have in the first place no motivation to

attribute the inadequate performance of the composition of comparative example 5 to the melt flow rate of the composition. The mere fact that the compositions exemplified in D4 do not cover the whole range of HLMFR up to 50 g/ 10 minutes for the composition does not allow the conclusion that the values explicitly taught in paragraph [0013] are technically unrealistic.

4.7 The respondent also submitted during the oral proceedings that the skilled person would have refrained from following the teaching given in paragraph [0013] of D4 to increase the HLMFR of the composition to values of 50 g/10 min or more, as it could be inferred from a comparison between the resin compositions of example 1 (HLMFR of 15 g/10 min), comparative example 2 (HLMFR of 22 g/10 min) and comparative example 3 (HLMFR of 35 g/10 min) of D4 that an increase of the HLMFR of the composition would be detrimental to durability. This would be demonstrated by the appearance of cracks in comparative example 2.

This in the Board's judgement is also not persuasive. Apart from an indication that a polyethylene was produced in the same manner as example 1 except that the amounts of 1-hexene and hydrogen supplied were adjusted, D4 does not specify how exactly those conditions were modified and how components (a) and (b) were varied for comparative examples 2 and 3. In other words, it is not possible to draw any conclusion as to the exact cause for the lowered durability in these comparative examples. Similarly to what has been stated in point 4.5 above, having regard to the explicit teaching in paragraph [0024] of D4, the skilled person would rather search the cause for a decreased durability in the melt flow rate of the individual components (a) and (b), i.e. values for component (a)

of a HLMFR greater than 10 g/10 minutes and values for component (b) of a MFR greater than 300 g/10 minutes.

4.8 Summing up, starting from the polyethylene of example 1 of D4 and faced with the problem of providing a polyethylene suitable for fuel tanks or other heavy-duty uses with improved injection mouldability, while exhibiting at the same time acceptable impact resistance and durability, the skilled person would be guided by the teaching of D4 to prepare with a limited amount of routine experimental work polyethylene for injection molding falling within the ambit of claim 1 of the main request.

4.9 Accordingly, the subject-matter of present claim 1 which encompasses obvious embodiments does not meet the requirements of Article 56 EPC, prejudicing maintenance of the patent in the form defined in the present main request.

*Admittance of auxiliary request 1*

5. The admittance of auxiliary request 1 filed before the opposition division and maintained in the appeal proceedings was objected by the appellant in view of the prohibition of *reformatio in peius*, reference being made to decision G 9/92, since the restriction concerning the MWD distribution of the claimed polyethylene had been removed. It is in this respect undisputed that all claims of the main request found to be allowable by the opposition division comprised said MWD restriction.

The respondent disagreed arguing that two established practices of the EPO would need to be balanced, namely on the one hand the prohibition of *reformatio in peius*,

and on the other hand the admission of multiple auxiliary requests to deal with multiple objections. The respondent submitted that the latter should outweigh the former in the present case, as the opponent had raised a large number of different objections. It would be only fair that the respondent similarly be permitted to respond with a range of amendments.

5.1 The approach advocated by the respondent does not find any basis in the case law of the Boards of appeal.

According to the principle of prohibition of *reformatio in peius*, as clarified by the Enlarged Board of Appeal in decisions G 9/92 and G 4/93 (Headnote II), if the opponent is the sole appellant against an interlocutory decision maintaining a patent in amended form, the patent proprietor is primarily restricted during the appeal proceedings to defending the patent in the form in which it was maintained by the Opposition Division in its interlocutory decision. Amendments proposed by the patent proprietor as a party to the proceedings as of right under Article 107, second sentence, EPC, may be rejected as inadmissible by the Board of Appeal if they are neither appropriate nor necessary.

Exceptions to the principle of the prohibition of *reformatio in peius* may be made in accordance with decision G 1/99 in which the criteria for allowing said exception were clarified in view of the non uniform application or interpretation of decisions G 9/92 and G 4/93.

The Enlarged Board concluded in decision G 1/99 "*In principle, an amended claim, which would put the opponent and sole appellant in a worse situation than*

*if it had not appealed, must be rejected. However, an exception to this principle may be made in order to meet an objection put forward by the opponent/appellant or the Board during the appeal proceedings, in circumstances where the patent as maintained in amended form would otherwise have to be revoked as a direct consequence of an inadmissible amendment held allowable by the Opposition Division in its interlocutory decision*" (Headnote, first two sentences).

In such circumstances, in order to avoid that the patent would otherwise have to be revoked, i.e. if the patent proprietor/respondent does not have any other possibility of amendment, which would allow rescue of even part of the patent, the patent proprietor/ respondent may be allowed to file requests in the manner set out in the order of decision G 1/99. According to G 1/99 (Reasons, points 12 to 14), the justification for the exceptions to the binding principle of the prohibition of *reformatio in peius* are reasons of equity to avoid procedural discrimination between the appellant and the respondent in situations in which the objection to said inadmissible amendment was not raised at the first instance and the prohibition of *reformatio in peius* would thus impair the legitimate defence of the patent. This procedural situation was present in the referral decision T 315/97 (Reasons, points 2.1 to 2.3), in which the Board drew attention of the parties to a deficiency of the independent claim under Article 123(2) EPC during the oral proceedings.

5.2 Furthermore, according to existing case law, that error of judgment concerns the allowability of an added feature for formal reasons with regard to the requirement that the European patent may not be amended

in such a way that it contains subject-matter which extends beyond the content of the application as filed in accordance with Article 123(2) EPC, as in the referral case underlying G 1/99. It is also established case law that the equity approach may also cover other changes of the factual and/or legal basis on which limitations have been made by the proprietor prior to the appeal, provided the proprietor would be prevented by the prohibition on *reformatio in peius* from adequately defending its patent against new facts and objections introduced into the proceedings at the appeal stage. This is the case for instance with regard to the requirement that the matter for which protection is sought should be clear in accordance with Article 84 EPC, as was considered in decisions T 1845/16 (Reasons 2.3.4) and T 648/15 (Reasons 3.9) applying by analogy the principles developed in G 1/99.

5.3 Turning to the case under consideration, claim 1 of auxiliary request 1 differs from claim 1 of the main request found to be allowable in the interlocutory decision (present main request) in that the HLMFR of component (a) has been amended from of 0.1 to 5.0 g/10 minutes to 0.3 to 4.0 g/10 minutes and the restriction concerning the MWD distribution has been removed. This means that the subject-matter of present auxiliary request 1 extends to subject-matter which was not covered by the claims maintained before the opposition division, which if allowed would put the opponent and sole appellant in a worse situation than if it had not appealed.

It is undisputed that the removal of the feature defining the MWD is not in response to any new objection raised only at the appeal stage, let alone that such objection would concern a formal requirement

that would not be met by the MWD as defined in claim 1 of the main request underlying the contested decision. Accordingly, the preconditions defined in G 1/99 for justifying an exception to the principle of prohibition of *reformatio in peius* are not met when removing in operative claim 1 the feature defining the MWD.

In view of the above, auxiliary request 1 is not admitted into the proceedings.

*Admittance of auxiliary requests 3, 8, 10, 13, 15, 18, 20, 25, 27, 30, 32, 35 and 37*

6. Like for auxiliary request 1, the polyethylene for injection molding defined in any of auxiliary requests 3, 8, 10, 13, 15, 18, 20, 25, 27, 30, 32, 35 and 37 is not characterized by its MWD. This limitation contained in the main request allowed by the opposition division was as for auxiliary request 1 removed in said auxiliary requests. For the same reasons given in relation to auxiliary request 1, the circumstances of the present case do not justify an exception to the principle of prohibition of *reformatio in peius* in accordance with decision G 1/99. On that basis, auxiliary requests 3, 8, 10, 13, 15, 18, 20, 25, 27, 30, 32, 35 and 37 are also not admitted into the proceedings.

*Auxiliary request 2*

7. Claim 1 of auxiliary request 2 corresponds to claim 1 of the main request in which the density of the LMW component (b) is amended from 0.960 to 0.980 g/cm$^3$ to 0.965 to 0.975 g/cm$^3$.

*Distinguishing features*

7.1 It is useful to note at this juncture that for all examples of the patent in suit the polymerisation is carried out through multistage polymerization with two reactors, in line with the teaching in paragraph [0078] of the specification. On that basis, it is undisputed that the density values for component (b) indicated in table 1 of the specification are estimated, but not measured. A reasonable technical reading of operative claim 1 is therefore that the density of component (b) is an estimate when said component is prepared in the presence of component (a). Such calculation is common general knowledge, as illustrated in D1 (page 9, lines 24-28). In contrast, the density of the LMW polyethylene component of the closest prior art of 0.964 g/cm$^3$ is experimentally determined in a separate polymerization under the second-stage polymerization conditions (point 2 above).

Accordingly, even though the minimum value of 0.965 g/cm$^3$, defined now in operative claim 1 is determined in a manner different from the one used in the closest prior art and only marginally higher, it is accepted to the benefit of the respondent that that definition of a density of the LMW component (b) from 0.965 to 0.975 g/cm$^3$ constitutes a further distinguishing feature over the closest prior art.

*Problem successfully solved*

7.2 Based on the teaching in paragraph [0033] of the patent in suit, the respondent submitted that a higher density for the LMW component would result in an improved rigidity of the injection moulded article. Accordingly, the problem successfully solved over the closest prior

art by the polyethylene for injection moulding of operative claim 1 should be that set out in relation to the main request supplemented by the definition of an improved rigidity.

The appellant submitted that the difference in density for the LMW component (b) between auxiliary request 2 and the closest prior art was so small that it could not be meaningful, and in any event that no evidence had been provided supporting the alleged improvement in rigidity resulting from such additional difference.

Paragraph [0024] of D4 teaches that when the density of the LMW component (b) is less than 0.940 $g/cm^3$, sufficient rigidity cannot be ensured.

Accordingly, despite the absence of experimental evidence in the specification for an improvement of rigidity caused by an increase of the density of the LMW component (b), the Board, based additionally on the teaching of of paragraph [0024] of D4, accepts still to the benefit of the respondent that the problem defined by that party is successfully solved by the subject-matter of operative claim 1.

*Obviousness of the solution*

7.3 As already shown in points 4.1 to 4.8 above, it was obvious for the skilled person to arrive at the polyethylene for injection moulding defined in claim 1 of the present main request based on the sole teaching of D4, for example by increasing the melt flow rate of both the HMW component (a) and the LMW component (b). In the Board's judgment, the skilled person who wanted in addition to improve at the same time the rigidity of the polyethylene for injection moulding would have been

guided by the teaching of said mentioned paragraph [0024] of D4 to prepare a LMW component (b) whose density is increased, which increase of density is in any event a known consequence of increasing the MFR of the LMW component (b), the latter being considered to be obvious in relation to the main request (see above, points 4.2, 4.3 and 4.5, second paragraph).

7.4 Accordingly, the additional distinguishing feature over the closest prior art defined in claim 1 of auxiliary request 2 does not result in a assessment of inventive step which is different from that given in relation to the main request. Auxiliary request 2 is therefore not allowable, as its subject-matter is devoid of an inventive step.

*Auxiliary request 4*

8. Claim 1 of auxiliary request 4 corresponds to claim 1 of the main request in which the HLMFR of the HMW component (a) is amended from of 0.1 to 5.0 g/10 minutes to 0.3 to 4.0 g/10 minutes and the density of the LMW component (b) is amended from 0.960 to 0.980 g/$cm^3$ to 0.965 to 0.975 g/$cm^3$. It corresponds therefore to claim 1 of auxiliary request 2 whose subject-matter has been found to lack an inventive step with the additional restriction concerning the HLMFR of the HMW component (a), amended from 0.1 to 5.0 g/10 minutes to 0.3 to 4.0 g/10 minutes.

8.1 It is undisputed that this additional modification to auxiliary request 2 results in a further distinguishing feature over the closest prior art in which the HMW component (a) exhibits a HLMFR of 0.16 g/10 minutes. It is also uncontested that the formulation of the problem

successfully solved over the prior art remains the same.

8.2 Arguing that a vast amount of possibilities was offered to the skilled person for modifying the polyethylene for injection moulding of example 1 of D4, the respondent submitted that the three modifications over the closest prior art consisting of a higher HLMFR for the overall composition in the range from 50 to 200 g/10 minutes (point 2, above, last paragraph), a density of the LMW component (b) marginally higher in the range from 0.965 to 0.975 g/cm$^3$ (point 7.1 above) and a higher HLMFR for the HMW component (a) in the range of 0.3 to 4.0 g/10 minutes could only be arrived at with the foreknowledge of the present invention. This is in the Board's opinion not convincing.

8.3 It results from the assessment of inventive step given for auxiliary request 2, that the skilled person, guided by the teaching in paragraphs [0012], [0013], [0016] and [0024] of D4, would have found obvious to increase the HLMFR of the overall composition in the range from 50 to 200 g/10 minutes and the density of the LMW component (b) in the range from 0.965 to 0.975 g/cm$^3$, while meeting at the same time the additional parametric requirements defined in claim 1 of auxiliary request 2, which are identical to those defined in claim 1 of the main request. Moreover, as shown in points 4.2 and 4.3 above, increasing the melt flow rate of both components (a) and (b) is an obvious measure for the skilled person. The selection for the HMW component (a) of a HLMFR within the range of 0.3 to 4.0 g/10 minutes out of the range of 0.05 to 10 g/10 minutes taught in paragraph [0024] of D4 is in this context the mere result of routine experimentation

which therefore does not require inventive activity, as pointed out in paragraphs 4.2 and 4.3 above.

8.4 On that basis, for the same reasons as given for auxiliary request 2, the subject-matter of claim 1 of auxiliary request 4 does not involve an inventive step within the meaning of Article 56 EPC.

*Auxiliary requests 5 and 6*

9. Claim 1 of auxiliary request 5 and 6 corresponds to claim 1 of the main request in which the MWD of the polyethylene for injection moulding is defined to be 15 or more and to exceed 17, respectively. The respondent did not explain how this amendment, aimed at overcoming the objection that claim 1 of the main request would lack novelty over example 2 of D1, example 4 of D2 and example 3 of D3 (rejoinder, page 29, sections concerning auxiliary requests 1 and 2, renumbered at a latter stage as auxiliary request 5 and 6), would be suitable to overcome the finding of a lack of inventive step of the subject-matter of claim 1 of the main request over the composition of example 1 of D4. The respondent merely referred to their inventive step arguments for the main request (letter of 26 October 2023, page 15, section 5.3). The Board has no reason to consider that this is the case.

It is undisputed that this amendment does not introduce any additional distinguishing feature over the polyethylene for injection moulding of example 1 of D4 exhibiting a MWD of 18 (see point 2 above). It is therefore not apparent how this additional, but not distinguishing, feature would result in a different formulation of the problem solved over the closest prior art. Furthermore, as shown in relation to the

main request, the obvious modification of the polyethylene for injection moulding of example 1 of D4 consisting in increasing the proportion of the LMW component (b), while increasing at the same time the melt flow rate of both components (a) and (b) results in a composition having a MWD in accordance with both auxiliary requests 5 and 6. This is illustrated with examples 2, 4 and 6 of the patent in suit.

Moreover, as pointed by the appellant in their letter of 27 June 2023 (pages 14 and 15, sections concerning auxiliary requests 1 and 2, renumbered at a latter stage as auxiliary request 5 and 6), reference being made to D15, the common general knowledge would have guided the skilled person towards composition having an increased MWD for an increased fluidity and therefore improved processability, implying the necessity to keep a high MWD. It can be in this regard referred to D15 (left-hand column, third paragraph, last sentence), as well as to D16 (page 351, abstract; page 352, first and third paragraph), according to which processability at a given MFR increases with a broadening of the molecular weight distribution.

On that basis, it is concluded that the subject-matter of claim 1 of auxiliary requests 5 and 6 does not involve an inventive step either. These requests are consequently not allowable.

*Auxiliary requests 7, 9, 11, 12, 14 and 16*

10. Claim 1 of any of auxiliary requests 7, 9 and 11 corresponds to claim 1 of the main request and auxiliary requests 2 and 4, respectively, in which the polyethylene for injection moulding is defined "*to form a fuel tank*". Claim 1 of any of auxiliary requests 12,

14 and 16 corresponds to claim 1 of the main request and auxiliary requests 2 and 4, respectively, in which the claim does not any more concern a polyethylene for injection moulding, but "*a molded article obtained by injection molding using polyethylene for injection molding, wherein the molded article is a fuel tank*". The composition of the closest prior is also used for forming a fuel tank by injection moulding. It is undisputed that these additional features have no impact on the assessment of inventive step and the conclusion arrived at in respect of claim 1 of the main request and auxiliary requests 2 and 4. These requests are therefore not allowable either.

*Auxiliary requests 17, 19, 21 to 24, 26, 28, 29, 31 and 33*

11. Claim 1 of auxiliary requests 17, 19, 21 to 24, 26, 28, 29, 31 and 33 corresponds to claim 1 of the main request and auxiliary requests 2, 4 to 7, 9, 11, 12, 14 and 16, respectively, the subject-matter of which does not involve an inventive step as indicated above. Auxiliary requests 17, 19, 21 to 24, 26, 28, 29, 31 and 33 are therefore also not allowable.

*Auxiliary requests 34, 36 and 38*

12. Claim 1 of auxiliary requests 34, 36 and 38 corresponds to claim 1 of auxiliary requests 7, 9 and 11, respectively. For the reasons given above, the subject-matter defined with these requests lacks an inventive step. These auxiliary requests are thus not allowable.

**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:

D. Hampe D. Semino

Decision electronically authenticated