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**Datasheet for the decision
of 19 January 2017**

Case Number: T 1152/13 - 3.3.03

Application Number: 04775999.8

Publication Number: 1622951

IPC: C08F214/26

Language of the proceedings: EN

Title of invention:
HIGH MELT FLOW FLUOROPOLYMER

Patent Proprietor:
The Chemours Company FC, LLC

Opponent:
3M Innovative Properties Company

Headword:

Relevant legal provisions:
RPBA Art. 12(4)
EPC Art. 123(2), 54, 56

Keyword:

Late-filed request - submitted with the statement of grounds
of appeal

Amendments - extension beyond the content of the application
as filed (no)

Novelty (yes)

Inventive step (yes)

Decisions cited:

Catchword:



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Case Number: T 1152/13 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 19 January 2017

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Decision under appeal: **Interlocutory decision of the Opposition**
Division of the European Patent Office posted on
20 March 2013 concerning maintenance of the
European Patent No. 1622951 in amended form.

Composition of the Board:

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

Summary of Facts and Submissions

I. The appeals by the patent proprietor and the opponent lie from the interlocutory decision of the opposition division posted on 20 March 2013 according to which it was held that European Patent 1 622 951 could be maintained in amended form on the basis of the claims according to the set of claims designated "first auxiliary request 1a" filed during oral proceedings before the opposition division on 7 February 2013.

II. The claims of the application as filed which are relevant to the present decision read as follows:

"1. A partially-crystalline copolymer comprising tetrafluoroethylene, hexafluoropropylene in an amount corresponding to HFPI of from about 2.8 to 5.3, said copolymer being polymerized and isolated in the absence of added alkali metal salt, having a melt flow rate of within the range of about 30 ± 3 g/10 min, and having no more than about 50 unstable endgroups."

"7. The copolymer of claim 1 wherein said alkali metal salt is a potassium salt."

"8. A partially-crystalline copolymer comprising tetrafluoroethylene, hexafluoropropylene in an amount corresponding to HFPI of from about 2.8 to 5.3, said copolymer being substantially free of alkali metal salt, having a melt flow rate of within the range of about 30 ± 3 g/10 min, and having no more than about 50 unstable endgroups."

III. The granted patent included 10 claims, claims 1, 2, 8 and 9 reading as follows (in claim 1, additions as compared to claim 8 as originally filed are indicated

in **bold**, deletions in ~~strikethrough~~):

"1. A partially-crystalline copolymer comprising tetrafluoroethylene, hexafluoropropylene in an amount corresponding to HFPI of from ~~about~~ 2.8 to 5.3, said copolymer being substantially free of alkali metal salt, having a melt flow rate of within the range of ~~about~~ 30±3 g/10 min, and having no more than ~~about~~ 50 ~~unstable endgroups~~ **fifty -CF₂CH₂OH, -CONH₂, -COF and -COOH endgroups per million carbon atoms.**"

"2. The copolymer of claim 1, wherein said copolymer is polymerized and isolated in the absence of added alkali metal salt."

"8. The copolymer of claim 2 wherein said alkali metal salt is a potassium salt."

"9. Process comprising extruding the copolymer of claim 1 at a melt temperature of at least 740°F (393°C) and shear rate of at least 800 sec⁻¹."

Claims 3-7 and 10 were dependent on claims 2 and 9, respectively.

IV. A notice of opposition to the patent was filed requesting revocation of the patent in its entirety.

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

D2: DE 199 03 657 A1

D4: DE 100 48 730 A1

D6: US 6 429 237

D7: US 5 677 404

D8: US 5 703 185

D9-D12: Shipments documentation and "Prüfdaten" of FEP X 6322 22 and "Dyneon FEP" (alleged public prior use)

D14: US 4 743 658

D15: Modern Fluoropolymers, Ed. by J. Scheirs, Wiley series in polymer science, 2002, pages 229, 236-237

The contested decision was based *inter alia* on the granted patent as main request and on "first auxiliary request 1" and "first auxiliary request 1a" both filed during oral proceedings before the opposition division. Claim 1 of said "first auxiliary request 1" read as follows (in claim 1, additions as compared to claim 8 as originally filed are indicated in **bold**, deletions in ~~strikethrough~~):

"1. A partially-crystalline copolymer comprising tetrafluoroethylene, hexafluoropropylene in an amount corresponding to HFPI of from ~~about~~ 2.8 to 5.3, said copolymer being substantially free of alkali metal salt, having a melt flow rate of within the range of ~~about~~ 30±3 g/10 min, and ~~having no more than about 50 unstable endgroups~~ **wherein said copolymer is fluorinated so as to reduce the total number of -CF₂CH₂OH, -CONH₂, -COF and -COOH endgroups to no more than fifty per million carbon atoms.**"

The wording of claims 2 to 10 of said "first auxiliary request 1" was identical to that of granted claims 2-10, respectively.

"First auxiliary request 1a" differed from "first auxiliary request 1" only in that claims 2 and 8 were deleted.

The decision of the opposition division, as far as relevant to the present decision, can be summarised as follows:

- The granted patent did not meet the requirements of Article 123(2) EPC because the feature relating to the upper limit on the content of specific endgroups mentioned in granted claim 1 was originally disclosed only in combination with a particular fluorination treatment, which feature was not in the granted claims;
- The specification in claim 1 of "first auxiliary request 1" that the feature was obtained by fluorination addressed the issue of added subject-matter. However, claims 2 and 8 of "first auxiliary request 1" did not meet the requirements of Article 123(2) EPC;
- The subject-matter of the claims of "first auxiliary request 1a" was sufficiently disclosed, novel over *inter alia* D2 and D4 and inventive starting from D2 as closest prior art. In respect of inventive step, D2 was held to be a better starting point than D4 and it was considered that examples A-F and H of the patent in suit showed that the subject-matter being claimed solved the technical problem of providing a copolymer which could be extruded at a lower temperature over a broad polymer melt temperature range to provide insulated wire of high quality.

VI. The patent proprietor (appellant 1) lodged an appeal against the above decision and, in its statement of grounds of appeal, requested that the decision of the opposition division be set aside and the patent be

maintained as granted (main request) or on the basis of the first auxiliary request filed therewith, which corresponded to "first auxiliary request 1" as filed during the oral proceedings before the opposition division.

VII. The opponent (appellant 2) lodged an appeal against the above decision and requested that the decision of the opposition division be set aside and the patent be revoked. Simultaneously the following documents were *inter alia* filed:

A1: DE 1 901 872

A2: US60/208 626 (cited in D14)

A3: "Modern Fluoropolymers", edited by J. Scheirs, John Wiley & Sons, 1997, pages 533-534

VIII. In its reply (dated 14 April 2014) to appellant 2's statements of grounds of appeal appellant 1 requested that the patent be maintained as granted (main request) or in the alternative, that the patent be maintained in amended form according to any of the first to twenty-seventh auxiliary requests filed therewith, whereby the first auxiliary request was identical to the first auxiliary request filed with its statement of grounds of appeal. In addition, the following document was filed:

A7: WO 99/54889

IX. With letter of 13 January 2017 appellant 1 filed the following document:

A9: US 2004/0132927

X. With letter of 18 January 2017 appellant 2 submitted the following documents:

D15": pages 223-237 of D15

A10: Fluoroplastics, Vol. 2, Melt Processible Fluoropolymers, S. Ebnesajjad, 2003, pages 531-539

XI. During the oral proceedings, which were held on 19 January 2017, appellant 2 objected to the admission to the proceedings of all pending auxiliary requests, including the first auxiliary request filed with letter of 14 April 2014. Also, the only request finally maintained by appellant 1 was the request filed as first auxiliary request with letter of 14 April 2014. The Board's decision was announced at the end of those oral proceedings.

XII. The arguments of appellant 1, as far as relevant to the present decision, were essentially as follows:

(a) Admission of the request

The operative request was filed with appellant 1's statement of grounds of appeal and had been continuously defended throughout the appeal proceedings. It was further identical to "first auxiliary request 1" already submitted during the opposition proceedings and on which it had been decided upon. Therefore, there was no reason not to admit the operative request to the proceedings.

(b) Article 123(2) EPC

The subject-matter of operative claim 1 was based on original claim 8 and on the passage on page 4,

lines 21-35 of the application as filed. In the context of the patent in suit it was known in the art that a fluorination aimed at reducing the amounts of unstable endgroups and led to the conversion of those endgroups to $-CF_3$, as indicated in D15". In that textbook reference to D14 was in particular made in the same context as in the application as filed. In that respect, it was derivable from D15" as well as from A1, A2, A9, D4 and D14 that only the endgroups were affected by such a fluorination process whereas the polymer chain remained intact. There was no reason to consider that the sparging step mentioned on page 4, lines 33-35 of the application as filed was in any way essential or mandatory. Besides, such a sparging step was a known purification process which had no influence on the structure of the polymers *per se*. Therefore, its inclusion in operative claim 1 was not necessary.

The subject-matter of claim 2 was based on page 3, lines 11-13 and 33-37 of the application as filed.

It was further derivable from the application as filed that potassium salts as specified in claim 8 should be avoided.

Therefore, operative claims 1, 2 and 8 satisfied the requirements of Article 123(2) EPC.

(c) Novelty over D2

Although the determination method of the melt flow rate parameter was not specified in operative claim 1, it was indicated in the patent in suit to be according to ASTM D1238. The skilled person

working in the technical field of the patent in suit knew that melt flow rates measured according to ASTM D1238 were determined at a temperature of 372 °C and with a load of 5 kg, as indicated in all the documents cited in the proceedings disclosing that parameter. Therefore, there was no reason to read operative claim 1 differently. Considering that D2 failed to disclose tetrafluoroethylene-hexafluoropropylene (TFE/HFP) copolymers having a melt flow rate in the range of 30±3 g/10 min as determined with ASTM D1238 at a temperature of 372 °C and with a load of 5 kg, it did not anticipate the subject-matter of operative claim 1. In that respect, the unit "g/min" disclosed throughout D2 was an obvious error and should read "g/10 min".

(d) Novelty over D4

Example 3 of D4 did not disclose that the fluoropolymer prepared therein was subjected to a fluorination process. Reading example 3 of D4 in combination with either paragraph 5 or paragraph 14 of D4 was based on hindsight and did not amount to a direct and unambiguous disclosure. Besides, in paragraph 14 of D4, reference was only made to electric isolations in "Local Area Networks" (LAN), which did not mandatorily mean LAN "cables". Even if LAN cables were meant, it was derivable from A7 that other parts of those cables, different from the wire coating, could be made of fluoropolymers. Therefore, D4 also did not disclose the use of the copolymers of example 3 for wire coating. Finally, the fluorination method taught in D4 led to amounts of endgroups different from -CF₃ as high as 70 per million carbon atoms, which was higher than the

level specified in operative claim 1. Therefore, the subject-matter of claim 1 was novel over example 3 of D4.

(e) Inventive step

The closest prior art was D2, in particular the copolymer prepared in the examples. D4 did not belong to the same technical field and did not address the same problem as in the patent in suit and was, thus, not a suitable starting point. The subject-matter of operative claim 1 differed from the examples of D2 in the specific range of the melt flow rate. Examples A-H of the patent in suit showed that the technical problem effectively solved resided in the provision of fluorinated ethylene propylene (FEP) copolymers allowing a greater flexibility in the processing of wire coating, in particular in terms of a lower extrusion temperature, a broader melt temperature window and a larger draw down ratio. Neither D2 nor any of the documents cited in the proceedings taught that said problem could be solved by selecting a fluoropolymer having a melt flow rate as defined in operative claim 1. To the contrary, it was derivable from D6 that the skilled person would not be motivated to increase the melt flow rate. Therefore, an inventive step was given.

XIII. The arguments of appellant 2, as far as relevant to the present decision, may be summarised as follows:

(a) Admission of the request

The operative request was filed after the prescribed period and should have been filed in the

first instance proceedings. According to the Rules of Procedure of the Boards of Appeal, its admissibility was left at the Board's discretion.

(b) Article 123(2) EPC

The passage at page 4, lines 21-35 of the application as filed imposed to perform a fluorination according to D14, which was not reflected in operative claim 1.

Besides, depending on the conditions under which a fluorination process was conducted, endgroups different from -CF₃ could well be obtained, in particular depending on the nature of the fluorination agent, of the initiator and/or of the chain transfer agent used. All the references relied upon by appellant 1 in order to show that any fluorination mandatorily led to -CF₃ endgroups were related to one and the same process, namely that of D14.

Also, the passage at page 14, lines 21-35 of the application as filed only disclosed a fluorination process in combination with a sparging step according to D14, which was not reflected in operative claim 1.

The subject-matter of operative claims 2 and 8 was not disclosed in the application as filed in combination with the amount of specific endgroups now being present in those claims.

For those reasons, operative claims 1, 2 and 8 did not satisfy the requirements of Article 123(2) EPC.

(c) Novelty over D2

In operative claim 1 no mention was made of any determination method and/or experimental conditions (e.g. temperature, load) to be used for the melt flow rate parameter. Therefore, the copolymers defined in said claim 1 encompassed copolymers having a melt flow range in the range of 30 ± 3 g/10 min as determined using any method and under any experimental conditions. It was evident that the copolymers of example 1/sample 1 and example 2/sample 11 of D2, which exhibited a melt flow rate of 20 or 24 g/10min as measured according to ASTM D1238 at 372 °C and with a load of 5 kg would exhibit a melt flow range in the range of 30 ± 3 g/10 min if a different temperature and/or load conditions were used. Therefore, the subject-matter of operative claim 1 was not novel over examples 1 and 2 of D2.

(d) Novelty over D4

The subject-matter of operative claim 1 differed from the copolymer prepared in example 3 of D4 only in that it was subjected to a fluorination so as to exhibit no more than fifty $-\text{CF}_2\text{CH}_2\text{OH}$, $-\text{CONH}_2$, $-\text{COF}$ and $-\text{COOH}$ endgroups per million carbon atoms. However, it was derivable from paragraph 5 of D4 that the purpose of D4 was to provide fluoropolymers with few unstable endgroups, which were to be eliminated by a fluorination process according to e.g. A1, A2 or D14, which specifically taught levels of unstable groups lower than 6 per million carbon atoms (D14) or unambiguously taught complete conversion of the unstable endgroups to $-\text{CF}_3$ (A1, A2). Besides, it was derivable from the

properties of the fluoropolymers disclosed for each intended use contemplated in D4, that the fluoropolymer prepared in example 3 of D4 was to be used as electric insulation in LAN cables as indicated in paragraph 14 of D4. In that respect, it was notorious that such FEP copolymers were used as wire coating in LAN cables as shown in A3 and A10. Also, it was known that such FEPs were required to be thermally stable i.e. to exhibit very low amounts of unstable endgroups. Therefore, D4 disclosed that the copolymers of example 3 should be subjected to a fluorination process to reduce the amount of unstable endgroups according to operative claim 1. Consequently, the subject-matter of operative claim 1 was not novel over example 3 of D4.

(e) Inventive step

Either D2 or D4 could be considered as representing the closest prior art document. In particular, since the EPO case law did not impose to select a single closest prior art, objections starting from two different documents should be considered.

Should D2 be considered as closest prior art, the subject-matter of operative claim 1 differed in particular from the fluoropolymer of example 2/sample 11 in that it had a melt flow rate of 30 ± 3 g/10 min (as compared to a melt flow rate of 24 g/10 min). In that respect, the unit "g/min" disclosed throughout D2 was an obvious error and should read "g/10 min".

For the following reasons, it could not be considered that the technical problem formulated by

appellant 1 was effectively solved:

- Examples A-H of the patent in suit did not illustrate the subject-matter of the closest prior art and were, therefore, not adequate in order to show that any technical problem was effectively solved, in particular not over the whole breadth of the operative claims e.g. for bipolymers similar to those of sample 11 of D2;
- Example G of the patent in suit showed that a copolymer according to operative claim 1 did not lead to wire coatings of good quality and, thus, did not solve the problem addressed by the patent in suit;
- It was shown in Tables 3 and 4 of D2 that the fluoropolymer of sample 11 could be extruded over a broad range of temperature and at a temperature as low as 380 °C;
- The claims did not recite any conditions on how the processing should be conducted. Therefore, the problem had to be solved irrespective of process conditions.

In view of the above, the problem effectively solved over D2 could only reside in the provision of further, alternative fluorocopolymers for wire coating.

In the absence of any specific information related to the determination method of melt flow rate in operative claim 1 (see section (c) above), the melt flow rate range specified in operative claim 1 was meaningless and could not confer an inventive step.

Besides, D2 taught that melt flow rate was not critical and that melt flow rates of ≥ 15 were necessary for high speed wire coating, whereby no upper limit in terms of melt flow rate was set. Therefore, the skilled person seeking for a mere alternative to D2 would use any fluoropolymers having such a melt flow rate, including those with a melt flow rate in the range of 30 ± 3 g/10 min according to operative claim 1, which were well known in the art as shown in D1, D4, D7 or D9-D12. In that respect, D6 was a single patent document and did not represent common general knowledge which would have prevented the skilled person from using fluoropolymers having higher melt flow rate.

For those reasons, the subject-matter of operative claim 1 would be arrived at by routine optimisation experiments starting from example 2/sample 11 of D2 and was not inventive.

XIV. The patent proprietor (appellant 1) requested that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the first auxiliary request filed with the letter of 14 April 2014.

The opponent (appellant 2) requested that the decision under appeal be set aside and that the patent be revoked.

Reasons for the Decision

1. Admission of the request

The sole operative request is the first auxiliary request filed with appellant 1's reply (letter of 14 April 2014) to appellant 2's statement of grounds of appeal. Said request is identical to both the first auxiliary request filed with appellant 1's statement of grounds of appeal and to the "first auxiliary request 1" filed during the opposition proceedings and decided upon in the contested decision. Said request was further never withdrawn by appellant 1 during the present appeal. Under such circumstances, the operative request is part of the proceedings pursuant to Article 12(1)(a)(b) RPBA and appellant 2's objection according to which the operative request was late-filed has to be rejected. Also, it cannot be held that said request should have been filed in the first instance proceedings, since it indeed was, contrary to appellant 2's submission. Therefore, there is no room for the Board not to admit said request pursuant to Article 12(4) RPBA.

2. Amendments: Article 123(2) EPC

2.1 Appellant 2 argued that operative claims 1, 2 and 8 did not satisfy the requirements of Article 123(2) EPC.

2.2 Claim 1

The objection is related to the replacement of the expression "having no more than about 50 unstable endgroups" in original claim 8 by "wherein said copolymer is fluorinated so as to reduce the total

number of $-\text{CF}_2\text{CH}_2\text{OH}$, $-\text{CONH}_2$, $-\text{COF}$ and $-\text{COOH}$ endgroups to no more than fifty per million carbon atoms".

2.2.1 It was undisputed that the only passage of the application as filed wherein that amount of those specific endgroups is mentioned is in the paragraph at page 4, lines 21-35 of the application as filed, which reads as follows:

"Polymers according to this invention are fluorinated as disclosed in U.S. Patent No. 4,743,658 to convert thermally or hydrolytically unstable end groups to the stable $-\text{CF}_3$ endgroup. By thermally unstable is meant that the endgroup reacts, usually by decomposition, at temperatures at which fluoropolymers are melt-processed, generally between 300 and 400°C. Examples of unstable endgroups affected by the fluorine treatment are $-\text{CF}_2\text{CH}_2\text{OH}$, $-\text{CONH}_2$, $-\text{COF}$, and $-\text{COOH}$. Fluorination is conducted so as to reduce the total number of the four types of unstable endgroups to no greater than about $50/10^6$ carbon atoms in the polymer backbone. Preferably, the sum of these unstable endgroups after fluorine treatment is no greater than about $20/10^6$ carbon atoms, and with respect to the first three-named endgroups, preferably less than about 6 such endgroups/ 10^6 carbon atoms. The fluorine treatment is followed by the sparging of the fluorine-treated pellets as disclosed in U.S. Patent No. 4,743,658, to rid the fluoropolymer of extractable fluoride."

2.2.2 Although said passage of the application as filed is directed to the fluorination according to D14 (US 4 743 658), it is derivable from the application as a whole (claims 1 and 8; page 2 "Brief summary of the invention") that a crucial element of the invention is to stabilise against degradation the fluorinated

polymers defined in the claims by reducing to a low level its unstable endgroups. In that respect, the passage at page 4 of the application as filed cited above is the only part of the application as filed dealing with a fluorination process. In particular, none of the original claims was related to that process feature. It is further noted that the degradation problems associated with the fluoropolymers endgroups and the stabilisation of those polymers by fluorination of the unstable endgroups is well known in the art, as illustrated in D15" (page 227-229: sections 2.2.2 to 2.2.4) which, being a textbook on fluoropolymers, is considered to represent the common general knowledge of the skilled person in the technical field of fluoropolymers. In section 2.2.4 of D15" it is in particular stated that for high-purity applications the endgroups have to be perfluorinated, i.e. converted to $-CF_3$, which occurs by splitting off the endgroups without discernible chain degradation, whereby reference is *inter alia* made to D14 and A1 (references [19] and [23] of D15"). In view of the above, it is concluded that the information derivable by the skilled person reading the application as filed as a whole is that a crucial element of the invention resides in the limitation of the unstable endgroups of the fluoropolymers by means of fluorination but not in the specific fluorination process used to achieve that result i.e. it is essential that the copolymers defined in the original set of claims are stabilised by a fluorination process so as to exhibit a reduced amount of unstable endgroups, which result may be obtained as disclosed in D14 but is not mandatorily limited thereto.

2.2.3 Appellant 2 argued that not all fluorination processes would be equivalent and "could well lead" to different

endgroups than $-CF_3$. However, no evidence was provided in that respect, in particular no evidence was put forward to contradict the above finding according to which the skilled person would understand that the fluorination process as added to claim 1 refers to a perfluorination to convert the unstable endgroups to the stable $-CF_3$. Said conclusion is in particular supported by the fact that D15", D14 and A1 all teach that the unstable endgroups are converted to $-CF_3$, whereby no restriction is made in respect of the type of initiator, chain transfer agent and/or fluorination agent although said features are mentioned (D15": section 2.2.4 and 3.2; D14: column 1, lines 41-67; column 3, lines 37-41 and 62; column 4, lines 22-32; A1: claims 6-11, 15, 17; paragraph bridging pages 3-4; page 4, second full paragraph). Also, no evidence was provided by appellant 2 to refute the similar conclusion already drawn in section 6.1 of the contested decision.

- 2.2.4 Although a sparging step is also mentioned in the passage at page 4, lines 21-35 of the application as filed, no other passage of the application as filed is related to that feature. Also, said feature is merely indicated in the last sentence of said passage in a qualitative and very general manner without any limitation to a definite product feature which should be necessarily implied. Therefore, also in that respect, it is concluded that the information derivable from the application as filed as a whole is that an essential element of the products of the invention resides in the reduction of the unstable endgroups of the fluoropolymers but not in the presence of a sparging step. In other words, it cannot be concluded that the fluorination process and the sparging step mentioned at page 4, lines 21-35 of the application as

filed are inextricably associated one with each other as features of the product disclosed in the original application and that those features can only be read in combination. Therefore, that argument was not persuasive.

2.2.5 In view of the above, the amendment of operative claim 1 "wherein said copolymer is fluorinated so as to reduce the total number of $-CF_2CH_2OH$, $-CONH_2$, $-COF$ and $-COOH$ endgroups to no more than fifty per million carbon atoms" is based on the combination of original claim 8 with the passage at page 4, lines 21-35 of the application as filed.

2.3 Claims 2 and 8

2.3.1 As compared to claim 1, the copolymers of claim 2 are further characterised in that they should be "polymerized and isolated in the absence of added alkali metal salt."

In that respect, the copolymers of operative claim 1 are characterised *inter alia* in that they are "substantially free of alkali metal salt". According to page 3, lines 35-37 of the application as filed, the expression "substantially salt-free" refers to polymers made using deionised water and polymerised and isolated without the use of alkali metal salts. The requirement that no alkali metal salt should be used is further indicated on page 3, lines 24-26 of the application as filed. It is further confirmed in a general manner on page 4, lines 9-12 of the application as filed that no alkali metal salt should be used in the polymerisation or in the isolation of the fluoropolymers of the present invention. Considering that those passages of the application as filed are all indicated in a general

manner, they apply to any embodiment of the application as filed, in particular to the fluoropolymers of operative claim 1, for which it was shown above that they are supported by the application as filed. For those reasons, the combination of the features of operative claims 1 and 2 is, in the circumstances of the case, supported by the application as filed.

- 2.3.2 As compared to the copolymers of claim 2, the copolymers of claim 8 are further characterised in that the alkali metal salt should not be a potassium salt.

The fact that potassium ion should be avoided is derivable from the statements on page 3, lines 15-16 and 30-31 and on page 4, lines 17-18 of the application as filed. This is also derivable from original claim 7, albeit in relation to fluoropolymers defined in a similar (although not identical) manner to that of operative claim 1 (compare the wording of original claims 1 and 8). Therefore, following the same line of argumentation as for claim 2, the combination of features mentioned in operative claim 8 is supported by the application as filed.

- 2.4 For those reasons, appellant 2's objection according to which operative claims 1, 2 and 8 did not satisfy the requirements of Article 123(2) EPC is rejected.

3. Novelty

- 3.1 Appellant 2 argued that operative claim 1 was anticipated by examples 1 and 2 of D2 and by example 3 of D4.

3.2 Novelty over D2

3.2.1 Examples 1 and 2 of D2 disclose the preparation in the absence of alkali metal salt of a TFE/HFP copolymer having an HFP amount of 13 wt.% and exhibiting a melt flow rate of 20 and 24 g/10 min, respectively, as measured by ASTM D1238 at 372°C with a load of 5 kg (page 5, line 51 to page 6, line 3; page 7, lines 30-34; page 5, lines 25-27). In that respect, it is noted that both parties agreed that the unit g/min indicated for MFR in D2 was an obvious error and could only read g/10 min. According to column 2, lines 28-42 of the patent in suit the hexafluoropropylene index (HFPI) of those copolymers may be calculated by dividing the HFP amount by 3.2, which leads to an HFPI value of 4.1. Samples A1 and A11 of examples 1 and 2 of D2 are further fluorinated so as to exhibit an amount of 18 and 28 endgroups per million carbon atoms (page 6, lines 3-7; page 7, line 35).

3.2.2 The only point of dispute between the parties was whether or not the MFR values of 20 and 24 g/10 min disclosed for samples A1 and A11, respectively, of D2 amounted to a melt flow rate of 30±3 g/10 min according to operative claim 1.

Although the determination method of the melt flow rate parameter is not mentioned in operative claim 1 it is indicated at column 2, lines 52-53 of the patent in suit that it is determined according to standard ASTM D1238. Several documents cited in the present proceedings show that, in the technical field of fluoropolymers, melt flow rate determination according to ASTM D1238 is usually carried out at a temperature of 372 °C and with a load of 5 kg (D1: paragraph 24; D2: page 5, lines 25; D4: paragraph 23; A9:

paragraph 51). No evidence to the contrary was submitted by appellant 2. Under such circumstances, the argument according to which the melt flow rate parameter specified in operative claim 1 could be determined under any temperature and any load has to be rejected and the subject-matter of operative claim 1 is *inter alia* characterised in that the copolymers exhibit a melt flow rate of 30 ± 3 g/10 min as determined according to ASTM D1238 at a temperature of 372 °C and with a load of 5 kg.

Considering that the copolymers prepared in examples 1 and 2 of D2 exhibit melt flow rates of 20 and 24 g/10 min, respectively, as determined according to ASTM D1238 at a temperature of 372 °C and with a load of 5 kg, they do not anticipate the subject-matter of operative claim 1.

3.3 Novelty over D4

3.3.1 Example 3 of D4 discloses the preparation in the absence of alkali metal salt of a TFE/HFP/PMPVE (3-methoxy-n-propylvinylether) copolymer with an HFP amount of 13.1 (HFPI of 4.1) and a MFR of 28 g/10 min as determined according to ASTM D1238 at 372°C and with a load of 5kg (D4: paragraph 38 and 23; page 3, lines 1-5).

3.3.2 Both parties agreed that it is not explicitly disclosed in D4 that the copolymer prepared in example 3 is stabilised by fluorination so as to exhibit no more than fifty unstable endgroups as specified in operative claim 1.

3.3.3 According to paragraph 18 of D4, the copolymers of D4 may be stabilised against degradation by conversion by

fluorination of their endgroups to stable $-CF_3$ endgroups, albeit without any quantitative information regarding the amounts of unstable endgroups remaining after that treatment. However, it is indicated in claim 3 of D4 that the copolymers of D4 may exhibit up to 70 endgroups different from $-CF_3$ per million carbon atoms. In view of the above, it is considered that even if, to appellant 2's benefit, the skilled person were to stabilise the copolymer of example 3 of D4 by fluorination according to the teaching of D4, the resulting polymer could exhibit an amount of endgroups different from $-CF_3$ which is higher than the range of "no more than fifty" specified in operative claim 1. In that respect, it is further noted that paragraph 5 of D4 deals with the description of the prior art, whereby it is indicated that it is known to stabilise fluoropolymers by fluorination of their endgroups according to e.g. A1 or D14. However, D4 fails to contain any hint to the use of those methods on the copolymer of example 3, let alone to the amounts of endgroups to be achieved therewith.

Therefore, it cannot be concluded that example 3 of D4 directly and unambiguously discloses a copolymer as defined in operative claim 1, in particular in terms of the fluorination and of the amounts of endgroups.

3.3.4 Under those circumstances there is no need for the Board to deal with the other arguments submitted by appellant 2, in particular in respect of the combination of example 3 with paragraph 14 of D4.

3.4 For those reasons, appellant 2's novelty objections in view of D2 and D4 are rejected.

4. Inventive step

4.1 Closest prior art

4.1.1 Whereas appellant 1 held that, as in the contested decision, D2 constituted the closest prior art, appellant 2 argued that both D2 and D4 would be suitable closest prior art documents.

4.1.2 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 (see Case Law of the Boards of Appeal of the EPO, 8th edition, 2016, I.D.3.1).

4.1.3 The patent in suit relates to an extrudable fluoropolymer with high melt flow which can be extruded at high speed. The fluoropolymer is employed as insulation on cables (wire coating). Close control of extrusion conditions is required. Further lot-to-lot variations of the fluoropolymer can interfere with the control of the extrusion process (paragraph 3). According to paragraph 4 of the patent there is a need for further improvement in high speed extrusion in particular to provide insulation with few or no sparks or lumps over a broader temperature range.

4.1.4 D2 relates to a melt processable granulate of copolymers of TFE and HFP with improved processability for wire and cable applications. According to the brief overview of the invention at page 3, lines 20-24, D2 aims to provide a material for wire and cable coating which can be processed at higher temperatures and

speeds whilst maintaining consistent quality and improvements in the extrusion efficiency. High speed wire coating of such fluoropolymers is further illustrated in the examples of D2.

- 4.1.5 D4 relates to fluoro-copolymers and aims to provide polymers which are thermoplastically processable, with high flex-life/flexural fatigue strength, high flexibility, high environmental stress crack resistance and low cold flow. The polymers are suitable for processing by sintering (paragraph 7). Areas of application are indicated in claim 8 and include pipes/tubes (page 3, lines 39 and 60) in particular fuel pipes (passage bridging pages 3 and 4), electrical insulators in local area networks (page 3, line 49) and gaskets/seals (page 4 line 11).

The application as insulators in local area networks (LANs) mentioned in paragraph 14 of D4 is not explicitly directed to LAN cables nor to their wire coating. In that respect, it is further known from e.g. A7 that LAN cables are known for which various parts (Figure 1: primary insulation 14, secondary jacketing 80 and separator 50) may be made of fluoro-copolymers (A7: page 14, lines 23-26; page 17, line 29 to page 18, line 2; page 15, line 22 and page 16, lines 5-6). Therefore, even if the indication of electric insulators in LANs given in paragraph 14 of D4 would be understood as being directed to LAN cables, to appellant 2's benefit, it could not be concluded that said passage of D4 mandatorily hints to wire coating. Besides, D4 does not disclose any information regarding high speed extrusion.

- 4.1.6 In view of the above, both the technical field and the problems addressed in D2 are the same as in the patent

in suit, while D4 does not relate to polymers developed for the same purpose and cannot for that reason be considered as a suitable starting point for the evaluation of inventive step. Therefore, in the circumstances of the case, D2 constitutes the closest prior art document and it is not required that the Board assesses the presence of an inventive step also starting from D4 as closest prior art as argued by appellant 2, as such a choice could be made by the skilled person aiming at solving the problems posed by the patent in suit only as a result of hindsight, i.e. knowing the solution proposed by the patent in suit.

4.2 The distinguishing feature

Within D2 the most relevant disclosure is example 2/sample A11 which, as shown in section 3.2 above, deals with the preparation of a fluoropolymer from which the subject-matter of operative claim 1 only differs by the feature of the melt flow rate, whereby its melt flow rate is closer to the range according to operative claim 1 than the fluoropolymer of example 1/sample A1 (melt flow rates of claim 1, sample A1 and sample A11 are 30 ± 3 , 20 and 24 g/10 min, respectively).

4.3 Technical problem effectively solved

4.3.1 Appellant 1 argued that the examples of the patent in suit showed that the technical problem solved by the subject-matter being claimed resided in the provision of FEP copolymers allowing a greater flexibility in the processing of wire coating, in particular in terms of a lower extrusion temperature, a broader melt temperature window and a larger draw down ratio.

- 4.3.2 It is indicated in paragraphs 14 and 15 of the patent in suit that all the examples of the patent in suit were carried out using a TFE/HFP/PEVE (perfluoro ethyl vinyl ether) copolymer (approximately 87/12/1 wt.%) prepared according to example 10 of D8, whereby it was not disputed that those copolymers illustrate the subject-matter of operative claim 1.

The comparison of example H (illustrative of the invention) with examples A-G (for comparison) show that the copolymers defined in claim 1 allow wire coating at high speed at lower extrusion temperature (393°C instead of 404°C, which is more economical and allows to reduce the thermal degradation) with higher process flexibility both in terms of melt temperature window (examples A-C: around 6°C; example H: around 12 °C) and larger draw down ratio (example D: 97:1 to 85:1; example H: 80-100:1).

- 4.3.3 It is correct that, as argued by appellant 2, the examples of the patent in suit all deal with terpolymers and not with bipolymers according to example 2/sample A11 of D2, i.e. there is no direct comparison to the closest prior art. However, it is relevant that those examples clearly demonstrate that an advantageous effect is achieved by means of the feature distinguishing the claimed subject-matter from the closest prior art, namely a melt flow rate of 30±3 g/10 min.

Although that conclusion had already been drawn by the first instance (see section 6.6 of the contested decision, in particular the paragraph bridging pages 9 and 10 and the following one), appellant 2 has provided no evidence on appeal to refute it. To the contrary, the allegation that the effect shown in the patent in

suit would not be present on the whole scope of the claims but only for the specific fluoropolymer used in the examples of the patent in suit is not supported by any facts and, therefore, cannot be retained.

- 4.3.4 It is further true that, as argued by appellant 2, example G of the patent in suit was performed with a copolymer according to claim 1 and led to wire coating having inadequate quality (paragraph 23). However, said example G deals with an extrusion carried out as in example A, i.e. at a temperature of 404 °C. As indicated above, the technical problem to be solved is to provide a copolymer which can be extruded at a lower temperature while providing further improvement in terms of operating window for melt temperature and draw down ratio. For the specific terpolymer used in the examples of the patent in suit, it is therefore shown that the copolymers defined in operative claim 1 solve those problems when the extrusion temperature is decreased from 404 °C (as used in comparative examples A-G) to 393 °C (example H according to the invention). In that respect, it cannot be agreed with appellant 2's argument according to which the problem had to be solved irrespective of process conditions because the claims did not recite any conditions on how the processing should be conducted. Indeed, operative claim 1 is directed to a product claim for which it is sufficient to show that an improvement is achieved for a specific treatment relevant for the use of interest (here: an extrusion at 393 °C) without any need to include a mention of the specific treatment in the product claim. Therefore, all what example G shows is that an extrusion temperature of 404 °C is too high and should not be taken into account in the formulation of the problem effectively solved. Considering that this is the case for the

problem to be solved formulated by appellant 1 (see section 4.3.1), example G of the patent in suit cannot be held to show that that problem is not solved, as argued by appellant 2.

- 4.3.5 Appellant 2 argued that the problem defined above was already solved in D2 because it was indicated in Tables 3 and 4 of D2 that the fluoropolymer of sample A11 could be extruded over a broad range of temperature and at a temperature as low as 380 °C.

However, it was not disputed that the copolymer used in the examples of the patent in suit (a 87/12/1 wt.% TFE/HFP/PEVE copolymer) is different from that of sample A11 of D2 (a 87/13 wt.% TFE/HFP copolymer). Therefore the performance of both polymers may not be fairly compared one to each other. Rather, as already indicated in section 4.3.3 above it would have been the duty of appellant 2, who is challenging the correctness of the opposition division's conclusion and the general validity of the tests in the patent in suit, to show that the technical effect demonstrated in the patent in suit is not achieved for the copolymer of D2, i.e. that increasing the melt flow rate of sample A11 of D2 so as to be in the range defined in operative claim 1, did not lead to the improvements shown in terms of a lower extrusion temperature, a broader melt temperature window and/or a larger draw down ratio. In the absence of any evidence in that respect, appellant 2's objection fails to convince.

- 4.3.6 In view of the above, the definition of the technical problem effectively solved as proposed by appellant 1 (section 4.3.1) is correct.

4.4 Obviousness

4.4.1 The question has to be answered whether the skilled person desiring to solve the above identified problem 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 claimed subject matter. In particular, it has to be assessed whether there is any hint in the prior art to increase the melt flow rate of the copolymer of example 2/sample A11 from 24 g/10 min to a value within the range of 30 ± 3 g/10 min in order to provide the improvements supporting the technical problem defined in section 4.3.1 above.

4.4.2 In that respect, appellant 2's submission according to which the absence of any specific information related to the determination method of melt flow rate in operative claim 1 rendered the melt flow rate range specified in operative claim 1 to be meaningless cannot be adhered to, as explained above (section 3.2.2).

4.4.3 Although D2 teaches that the melt flow rate is not a critical parameter and that melt flow rates of ≥ 15 g/10 min are necessary for high speed wire coating (page 3, lines 45-46), that statement is not related to improvements in terms of a lower extrusion temperature, a broader melt temperature window and a larger draw down ratio. In the present case, it was in particular not shown why the skilled person would have increased the melt flow rate of the fluoropolymer of sample A11 in the hope of solving the above indicated problem ("could-would approach": Case Law *supra* I.D.5).

4.4.4 Similarly, in view of the fact that the problem effectively solved is formulated in terms of an improvement, the fact that it is known in the art how

to increase the melt flow rate of fluoropolymers is not sufficient in order to render the subject-matter now being claimed obvious. Rather, it would have been the duty of appellant 2 to show why the skilled person would have done so in order to solve the technical problem defined above. Therefore, the objection based on the combination of D2 with either D1, D4, D7 or with D9-D12 cannot succeed.

4.4.5 For the same reason, it cannot be agreed with appellant 2 that the subject-matter of operative claim 1 would be arrived at by routine optimisation experiments starting from example 2/sample A11 of D2. To the contrary, it is indicated in D6 that the skilled person would not be inclined to increase the melt flow rate of a fluoropolymer similar to those of D2 because it may be detrimental for other reasons and, thus, rather decrease the flexibility of a high speed extrusion process for wire coating (D6: claim 1 and column 3, lines 22-27). Although D6 is a single patent document it shows that increasing the melt flow rate of a fluoropolymer may be related to technical difficulties and that the modification of the teaching of the closest prior art in order to arrive at the subject-matter of operative claim 1 is not mandatorily trivial.

4.4.6 In view of the above, it is concluded that it was not shown that any of the documents cited provides a hint to solve the technical problem identified above by increasing the melt flow rate of the copolymer of example 2/sample A11 of D2 so as to be in the range of 30 ± 3 g/10 min according to operative claim 1.

4.5 Therefore, the subject-matter of operative claim 1 is inventive. For the same reasons, the subject-matter of

claims 2-8, which are dependent on claim 1, and that of claims 9-10, which is directed to a process comprising extruding the copolymer of claim 1 is also inventive.

5. Adaptation of the description

No objections were raised by appellant 2 against the description as adapted before the opposition division to a set of claims whose claim 1 is identical to operative claim 1. The Board sees no reason to analyse the adaptation of the description in any further detail.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to maintain the patent in amended form on the basis of the first auxiliary request filed with the letter of 14 April 2014 and page 2 to 6 of the description filed during the oral proceedings before the opposition division on 7 February 2013.

The Registrar:

The Chairman:



B. ter Heijden

D. Semino

Decision electronically authenticated