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**Datasheet for the decision
of 10 May 2016**

Case Number: T 0783/14 - 3.3.09

Application Number: 08020700.4

Publication Number: 2036943

IPC: C08J9/14

Language of the proceedings: EN

Title of invention:

Compositions containing fluorine-substituted olefins

Patent Proprietor:

Honeywell International Inc.

Opponent:

Mexichem Amanco Holding S.A. de C.V.

Headword:

Relevant legal provisions:

EPC Art. 76(1), 56
RPBA Art. 13(1), 16(1)

Keyword:

Divisional application - added subject-matter (no)
Late-filed evidence - admitted (yes)
Inventive step (yes)
Apportionment of costs (no)

Decisions cited:

Catchword:



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Case Number: T 0783/14 - 3.3.09

D E C I S I O N
of Technical Board of Appeal 3.3.09
of 10 May 2016

Appellant: Mexichem Amanco Holding S.A. de C.V.
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted on
6 February 2014 maintaining European patent
No. 2036943 in amended form.

Composition of the Board:

Chairman W. Sieber
Members: J. Jardón Álvarez
E. Kossonakou

Summary of Facts and Submissions

I. This decision concerns the appeal filed by the opponent against the interlocutory decision of the opposition division that European patent No. 2 036 943 as amended met the requirements of the EPC.

II. The granted patent originated from a divisional application of the earlier European patent application No. 03777896.6 and contained 20 claims. Claim 1, the only claim relevant for the present decision, read as follows:

"1. Use as a blowing agent of a composition comprising 1,3,3,3-tetrafluoropropene (HFO-1234ze)."

III. The opponent had requested revocation of the patent in its entirety on the grounds of Article 100(a) (lack of novelty and inventive step), (b) and (c) EPC.

The documents cited during the opposition proceedings included:

D1: WO 2004/037913 A2 (the parent application);

D5: JP 10-139697 A, and its English translation, D5a;

D6: EP 0 398 147 A2;

D7: JP 4-110388 A and its English translation, D7a;

D11: J. Jones, National Aeronautical and Space Administration Contract No. NAS-7-918, Technical Support Package on "Nearly Azeotrope Mixtures to Replace Refrigerant 12", August 1992, (42 pages);

D12: US 5 001 287 A; and

D14: US 4 972 003 A.

IV. The opposition division maintained the patent in amended form on the basis of the set of claims filed on 31 October 2013 as main request. This request included 20 claims, claim 1 reading as follows:

"1. Use as a blowing agent of a composition comprising 1,3,3,3-tetrafluoropropene (HFO-1234ze), wherein the composition comprises at least about 5% by weight of HFO-1234ze."

V. The opposition division's decision can be summarised as follows:

- The subject-matter of the claims was directly and unambiguously derivable from the application documents.
- The patent met the requirements of sufficiency of disclosure. Although the patent did not give any examples in which HFO-1234ze was used as a blowing agent, the opposition division saw no reason why the claimed subject-matter could not be carried out by the skilled person. Moreover, the opponent had not provided any evidence to show that the invention could not be carried out.
- The subject-matter of claim 8 ("A foamable composition which is foamable to form a thermoplastic foam and which comprises 1,3,3,3-tetrafluoropropene (HFO-1234ze) as a blowing agent") was novel over the disclosure of D5/D5a and the subject-matter of all claims involved an

inventive step starting from D6 as closest prior-art document.

- The opposition division did not admit D14 into the proceedings because it had been filed late and did not appear to be *prima facie* relevant. In its view, D14 did not contain any more information than D6, which was already in the proceedings.

VI. On 27 March 2014 the opponent (in the following: the appellant) lodged an appeal. In the statement setting out the grounds of appeal, filed on 12 June 2014, the appellant requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

VII. In its reply dated 20 October 2014, the patent proprietor (in the following: the respondent) disputed the arguments submitted by the appellant and requested that the appeal be dismissed (main request), or that the patent be maintained on the basis of the claims of one of auxiliary requests 1 to 3 as filed with the reply.

VIII. In a communication dated 10 November 2015, the board indicated the points to be discussed during the oral proceedings.

IX. With letter dated 6 April 2016 the respondent filed a further auxiliary request (auxiliary request 4).

X. With letter dated 7 April 2016 the appellant filed a further submission including:

- Exhibit E1: US 2008/0026977 A1; and

- A declaration by Dr Stuart Corr dated 6 April 2016 (5 pages) including exhibits SC01 to SC07, namely:

SC01: A list of selected publications in the field by Dr Corr (4 pages);

SC02: P. Ashford, "'CFC-FREE' - The Scope of the Achievement So Far", *Cellular Polymers III*, Paper 6, pages 1 to 6, undated;

SC03: WO 91/13968 A1;

SC04: WO 02/098529 A1;

SC05: Index of addenda to ANSI/ASHRAE Standard 34, published by the American Society of Heating, Refrigerating and Air-Conditioning Engineers Inc., 31 pages;

SC06: BSR/ASHRAE addendum z to ANSI/ASHRAE Standard 34-2007; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2008, 5 pages; and

SC07: M.C. Bogdan *et al.*, "Status Report on the Development of HFC-245fa as a Blowing Agent", *POLYURETHANES EXPO '96*, pages 394 to 403.

XI. On 4 May 2016 the respondent filed a further submission requesting that the appellant's submissions of 7 April 2016 not be admitted into the proceedings, and an award of costs.

XII. On 10 May 2016 oral proceedings before the board were held. During them, the respondent replaced its previous main request with a new main request including only

claims 1 and 2 of its previous main request. Further, it filed a description adapted to the claims of the main request.

Claim 1 of the main request is identical to claim 1 before the opposition division (see point IV above). Claim 2 is dependent on claim 1 and requires that the composition comprises "at least about 15% by weight of HFO-1234ze".

XIII. The arguments of the appellant, insofar as they are relevant for the present decision, may be summarised as follows:

- Claims 1 and 2 contain added subject-matter. Their subject-matter could not be derived from the parent application as filed by merely selecting HFO-1234ze from a single list, because it was also necessary to select foam blowing applications from the large number of uses that were contemplated for the disclosed fluoroalkenes. In fact, there was no teaching in the parent application that would lead the skilled person to recognise a particular utility for HFO-1234ze as a blowing agent. Moreover, the parent application was about refrigeration and there was no experimental evidence for the other uses.
- The opposition division had wrongly exercised its discretion not to admit D14. It had considered only novelty while the document was also very pertinent for inventive step. In any case, D14 included more information than D6.
- The declaration of Dr Corr and the documents attached thereto should be admitted into the

proceedings; they were used merely to support arguments already on file and/or as evidence of common general knowledge.

- The claimed subject-matter lacked inventive step starting from D6 as closest prior art, either in view of D6 alone or in combination with D7, a document from the neighbouring field of refrigeration.

XIV. The relevant arguments of the respondent may be summarised as follows:

- The parent application as filed directly and unambiguously disclosed the combination of all features of claim 1. The part of the specification concerned with blowing agents indicated that the blowing agent might comprise one or more of the inventive compositions in an amount of at least 5% by weight. HFO-1234ze was specifically defined as an "even more preferred" compound of the invention. Only one selection was necessary to arrive at the subject-matter of claim 1.
- The opposition division had exercised its discretion not to admit D14 in the proceedings according to the right principles, namely on the basis that it was no more relevant than D6 for both novelty and inventive step.
- The closest prior art was actually D5, which even discouraged the skilled person from using HFO-1234ze as blowing agent. The approach of the appellant in starting from D6 was artificial, because there had been significant developments in the field since its publication. But even starting

from D6 as closest prior art, the claimed subject-matter involved an inventive step. D6 did not address the problem of global warming and gave no hint to the use of HFO-1234ze to solve the problem addressed by the invention. The arguments of the opponent were made with hindsight. Moreover the combination with D7 was also made with knowledge of the invention. The appellant's assertion that a skilled person would understand that compounds which were used as refrigerants would be suitable for use as blowing agents was a gross simplification and in fact only made with knowledge of the invention.

- The submissions of the appellant of 7 April 2016 should not be admitted into the proceedings. Moreover, the respondent requested an award of costs for the time necessary to review and rebut these submissions.

XV. The appellant requested that:

- the decision under appeal be set aside and that European patent No. 2 036 943 be revoked in its entirety; and
- D14 be admitted into the proceedings.

XVI. The respondent requested that:

- the patent be maintained on the basis of claims 1 and 2 of the main request as filed during the oral proceedings before the board on 10 May 2016;
- subsidiarily, that the patent be maintained on the basis of the claims of one of auxiliary requests 1

to 4; auxiliary requests 1 to 3 filed on 20 October 2014 and auxiliary request 4 filed with letter dated 6 April 2016;

- exhibit E1, Dr Corr's declaration and its attachments SC01 to SC04 not be admitted into the appeal proceedings; and
- be apportioned costs under Article 16 RPBA.

Reasons for the Decision

MAIN REQUEST

1. *Amendments (Articles 76(1)/100(c) EPC)*

- 1.1 The patent in suit was granted on a divisional application of the earlier European patent application No. 03777896.6, filed on 27 October 2003 as an international application and published as WO 2004/037913 A2 (D1 in these proceedings). Therefore, to comply with Articles 76(1) and 100(c) EPC, the subject-matter of the patent in suit may not extend beyond the content of the earlier (parent) application as filed.

The relevant criterion in this context is whether the skilled person can derive the claimed subject-matter directly and unambiguously, using common general knowledge, from the parent application as filed as a whole, either explicitly or implicitly.

- 1.2 There is undisputedly no explicit disclosure in D1 of the subject-matter of the two claims of the main

request. So the question is whether or not there is an implicit one.

- 1.2.1 As stated at page 4, last paragraph, "Applicants have thus come to appreciate a need for compositions, and particularly heat transfer compositions, fire extinguishing/suppression compositions, blowing agents, solvent compositions, and compatibilizing agents, that are potentially useful in numerous applications ... while avoiding one or more of the disadvantages noted above."

This need is said to be satisfied by compositions comprising one or more C3 or C4 fluoroalkenes, preferably compounds having Formula I (page 5, line 3). Even more preferred compounds have Formula II (page 5, line 24 to page 6, line 2). It should be mentioned at this juncture that the compounds of Formula II represent a further limitation of the compounds of the more general Formula I.

Thus, it is already apparent from the rather general part of D1 that compositions comprising one or more C3 or C4 fluoroalkenes may be used as blowing agents.

- 1.2.2 The part of the description which is specifically concerned with blowing agents starts at page 9, line 9, under the heading "BLOWING AGENTS, FOAMS AND FOAMABLE COMPOSITIONS", where it is stated:

"Blowing agents may also comprise or constitute one or more of the present compositions. As mentioned above, the compositions of the present invention may include the compounds of the present invention in widely ranging amounts. It is generally preferred, however, that for preferred compositions

for use as blowing agents in accordance with the present invention, compound(s) in accordance with Formula I, and even more preferably Formula II, are present in an amount that is at least about 5% by weight, and even more preferably at least about 15% by weight, of the composition."

This is a direct disclosure in D1 that preferred compositions for blowing agents comprise compound(s) of Formula I, more preferably of Formula II, in an amount of at least about 5% by weight, preferably about 15% by weight.

- 1.2.3 When putting this teaching into practice the skilled person would turn to the general part of the description where, starting at page 5, line 15 under the heading "THE COMPOSITIONS", the compounds to be used in the composition are described in more detail.

Page 6, lines 5 to 8 basically repeats the above mentioned general statement of page 4:

"Applicants believe that, in general, the compounds of the above identified Formulas I and II are generally effective and exhibit utility in refrigerant compositions, blowing agent compositions, compatibilizers, and solvent compositions of the present invention."

Particularly preferred embodiments are then listed at page 6, lines 25 to 30:

"It is even more preferred that the compounds of the present invention are the tetrafluoropropene and pentafluoropropene compounds in which the unsaturated terminal carbon has not more than

one F substituent, specifically: **1,3,3,3-tetrafluoropropene (HFO-1234ze)**; 2,3,3,3-tetrafluoropropene (HFO-1234yf); and 1,2,3,3,3-pentafluoropropene (HFO-1225ye), and any and all stereoisomers of each of these" (emphasis added by the board).

1.2.4 Thus, starting with the disclosure on page 9 of D1 only **one selection** has to be made in order to arrive at the subject-matter of claims 1 and 2, respectively, namely the selection of HFO-1234ze. A selection from one list of compounds does not result in added matter according to established case law of the boards of appeal. The parent application as filed therefore directly and unambiguously discloses the combination of all features of claims 1 and 2 of the main request.

1.3 The appellant argued that, in order to arrive at the claimed subject-matter, it was further necessary to select foam-blowing applications from the large number of uses that were contemplated for the disclosed fluoroalkenes, when there is no teaching in D1 that would lead the skilled person to recognise a particular utility for HFO-1234ze. Although other uses were mentioned in D1, it was quite clear that D1 was about refrigeration. Only this application was exemplified. There was no experimental support of the other uses, in particular of HFO-1234ze as a blowing agent composition. It further disputed the assumption that the general teaching of preferred C3-C4 fluoroalkenes could be applied to each of the specific uses that were subsequently discussed in D1. If one took this assumption to its logical conclusion, then HFO-1234ze would be useful for flame suppression, even though it did not have the requisite non-flammability.

- 1.4 The board cannot accept these arguments.
 - 1.4.1 While it is correct that several uses are mentioned in the parent application for the fluoroalkenes described therein, no selection from a list of uses is necessary. As explained above, the use as blowing agent is explicitly described on page 9, line 9 to page 10, line 9 of D1 and this paragraph mentions the compounds of formula II as preferred. The skilled person has only to select HFO-1234ze from the list of even more preferred compounds (selection from one list).
 - 1.4.2 Given the fact that, as explained above, there is a basis for the claimed use, the appellant's arguments concerning the lack of experimental examples for the claimed use and the possible non-workability of a non-claimed use are irrelevant. These arguments might be relevant, if at all, for questions of sufficiency of disclosure and/or inventive step.
- 1.5 In summary, the board agrees with the respondent and the opposition division that the subject-matter of claims 1 and 2 does not extend beyond the content of the parent application as filed.
2. *Sufficiency (Article 100(b) EPC)*
 - 2.1 The appellant in its statement of grounds of appeal maintained the sufficiency objection raised during the opposition proceedings. It stated on page 4, lines 46 to 50 that: "We maintain our position that the patent does not provide sufficient disclosure. The patent contains very little information on foam blowing and certainly not enough to enable the skilled person to reproducibly prepare a useful foam having the properties required of a foam."

2.2 However, the appellant did not give any reasons why the decision of the opposition division in this respect, namely that the specific tetrafluoropropene was known and that the use of blowing agents was known to the skilled person, was not correct. Furthermore, as the objection was not pursued by the appellant when discussing the patentability of the claimed subject-matter at the oral proceedings, the board saw no reason to revise this aspect of the decision of the opposition division.

3. *Admission of D14*

3.1 The appellant filed D14 just one week ahead of the oral proceedings and requested that the opposition division admit it. The opposition division declined to do so, and this aspect of the decision was challenged by the appellant in the appeal proceedings.

3.2 According to EPO practice, in such a case it is not the function of the board to review all the facts and circumstances of the case as if it were the department of first instance, and to decide whether or not it would have exercised its discretion in the same way. A board of appeal should overrule the way in which a department of first instance has exercised its discretion only if it concludes that the department did so according to the wrong principles, or without taking into account the right principles, or in an unreasonable way (see Case Law of the Boards of Appeal of the European Patent Office, 7th edition 2013, IV.E. 3.6).

3.3 The admission of D14 is discussed in point 4.3 of the appealed decision. The arguments raised by the opponent

are summarised in point 4.3.1 and the reasons why they were not accepted are given in point 4.3.3, where it is stated:

"The opposition division is of the opinion that **D14** constitutes a late filed document, which does not contain more information than document **D6**. Furthermore **D14** does not appear to be prima facie relevant. In column 3, line 65 reference is made to R2134a. No information was provided in D14 which would allow to identify clearly which specific tetrafluoropropylene is meant by R2134a. **D14** does not implicitly disclose HFO-1234ze" (emphasis by the opposition division).

- 3.4 The appellant maintained that the opposition division did not apply the right principles, namely it looked at the relevance of D14 only in relation to novelty, and further erred in its judgement on the *prima facie* relevance of D14.
- 3.5 The board disagrees. Point 4.1 of the minutes of the oral proceedings before the opposition division indicates that the opponent argued that "the late filed D14 should be admitted, because it is of particular relevance in the discussion of novelty and **inventive step** ..." (emphasis by the board). The paragraph of the decision quoted above giving the reasons for the non-admission of D14 does not support the argument of the appellant that the opposition division only looked at D14 for novelty. In the absence of such an explicit statement it is the understanding of the board that the opposition division considered D14 for novelty and inventive step, as these were the objections raised by the appellant during the oral proceedings.

As to the *prima facie* relevance, the opposition division noted that no information was provided in D14 which would enable the skilled person to clearly identify which specific tetrafluoropropylene was meant by R2134a, and therefore that D14 did not contain more information than D6. The fact that D14 does not enable to identify the tetrafluoropropene used therein was even admitted by the appellant itself (the nomenclature used in D14 was neither standard nor defined in the document).

3.6 It follows from the above that the opposition division exercised its discretion according to the right principles and in a reasonable way. In view of these facts, there are no reasons for the board to overturn this part of the opposition division's decision.

4. *Admission of late-filed evidence*

4.1 The appellant filed, with letter of 7 April 2016, Exhibit E1 and a declaration from Dr Corr including attachments SC01 to SC07. The respondent requested that these submissions not be admitted into the proceedings as they had been filed only one month before the oral proceedings, and none of them was *prima facie* particularly prejudicial to the maintenance of the patent (the objection to the admission of SC07 was withdrawn during the oral proceedings).

4.2 These documents were filed by the appellant to further support its previous arguments that the claims contained added subject-matter (cf. E1) and lacked inventive step, because the skilled person wishing to develop a new blowing agent would look into the neighbouring field of refrigeration (cf. declaration and exhibits SC01 to SC04).

4.3 The board saw no reason not to admit the declaration from Dr Corr including attachments SC01 to SC04 and exercised its discretionary power to do so under Article 13(1) RPBA. SC05 and SC06 were not relied upon during the oral proceedings, so that the board saw no reason to decide on these documents. Furthermore, as stated above, the objection against SC07 had been withdrawn.

5. *Novelty*

The appellant's only novelty objection was based on D14, which however had not been admitted into the proceedings (see point 3 above).

6. *Inventive step*

6.1 The patent is directed to the use as a blowing agent of a composition comprising at least about 5% by weight of HFO-1234ze (see claim 1). The invention aims to provide alternative blowing agents for the production of foams which, at the same time, have the necessary properties required for a blowing agent and are environmentally acceptable, that is to say do not contribute substantially to ozone depletion and to global warming compared to known blowing agents (see paragraph [0014]; see also paragraphs [0027] to [0029]).

6.2 Closest prior art

6.2.1 As closest prior-art document, the appellant relied on D6 which has a priority date of 10 May 1989.

The respondent, in contrast, relied on D5, which was filed on 11 August 1997. It argued that, at the filing

date of the patent, D6 would have been considered by the skilled person as "out-of-date" technology.

6.2.2 D6 relates to the use of a halocarbon blowing system in a process for the manufacture of rigid, closed-celled polyisocyanate-based foams, particularly polyurethane, polyurethane-isocyanurate and polyurethane-urea foams. D6 addresses the problem of providing a process for the manufacture of polyurethane foams with reduced susceptibility to shrinkage and improved dimensional stability (see page 2, lines 31 and 32), and solves this problem by the use of a combination of a first halocarbon compound having a high boiling point with a second halocarbon compound having a low boiling point as blowing agent (see page 3, lines 18 to 22; see also claim 1).

According to page 2, lines 32 to 42, it would be an additional advantage if such a process could provide a significantly lower dependency on especially "hard" chlorofluorocarbon (CFC) blowing agents (i.e. those compounds in which all hydrogen atoms of the carbon backbone have been replaced by a halogen, normally fluorine and/or chlorine), through the selection of "soft" CFC blowing agents (i.e. those compounds in which at least one hydrogen atom remains on the carbon backbone, sometimes also called HCFCs). D6 does not relate to the problem of providing a low-global-warming blowing agent, unlike the claimed subject-matter.

D6 sets out a wide variety of possible compounds for each of the two components of the halocarbon blowing system including hard and soft CFCs. Tetrafluoropropylene (R-2134a; 245°K) is mentioned as a possible second halocarbon compound (page 4, line 39). However, the preferred blowing agent compositions for use in D6

are those where the first high boiling point component comprises trichlorofluoromethane (R-11), dichlorofluoroethane (R-141b), dichlorotrifluoroethane (R-123) or mixtures thereof and where the second low boiling point component is 1-chloro-1,1,-difluoroethane (R-142b) (see page 4, lines 44 to 47).

6.2.3 As pointed out by the respondent, at the priority date of the patent, which is 12 years after the publication date of D6, the field was having to phase out not only hard CFCs. Soft CFCs too were no longer seen as environmentally acceptable. This is corroborated by D5 that states in paragraphs [0002] and [0003], under the heading "Technology of the Prior Art", that R-141b and R-123 have been used as a substitute for R-11 as a blowing agent. However, HFCs such as R-141b and R-123, the preferred fluorocarbons used in D6, still have a negative effect on the ozone layer and they are to be abolished by 2020 under the Montreal Protocol. From the above it follows that, at the filing date of the patent, the skilled person was well aware of the fact that the teaching of D6 was outdated, and would not take it as the closest prior-art document.

6.2.4 Further developments led to the use of the next "generation" of blowing agents, namely non-chlorinated partially hydrogenated fluorocarbons. D5 lies in this developing field. It suggests as substitutes for R-141b and R-123, i.e. the preferred blowing agents of D6, the HFCs 1,1,1,3,3-pentafluoropropane (R-245fa) and 1,1,2,2,3-pentafluoropropane (R-245ca) (D5, paragraph [0004]). R-245fa and R-245ca are used in combination with a stabiliser in order to inhibit the formation of pentafluoropropane degradation products such as 1,1,1,3-tetrafluoropropene (R1234ze; synonymous the term HFO-1234ze used in the patent)

(paragraph [0010]). This disclosure of D5 is therefore the realistic starting point for the skilled person at the priority/filing date of the patent and is considered by the board to represent the closest prior art.

6.3 Problem to be solved and its solution

6.3.1 According to the respondent, the blowing agents used in D5 as well as other HFCs, such as 1,1,1,3-tetrafluoroethane (HFC-134a) and 1,1,1,3,3-pentafluorobutane (HFC-365mfc), still have relatively high global warming potential and are therefore environmentally not preferred. In its view, the problem to be solved by the patent had to be seen in the provision of alternative blowing agents which were environmentally acceptable in terms of ozone depletion potential and global warming potential and, at the same time, still had the necessary mosaic of properties required for a blowing agent, such as acceptable flammability, compatibility with other foam raw materials, low vapour phase thermal conductivity, low diffusion rate through the polymer and low toxicity.

6.3.2 This problem is solved by the claimed use of a composition comprising at least 5% by weight of the hydrofluoroolefin (HFO) 1,3,3,3-tetrafluoropropene (HFO-1234ze). This compound is said to possess the required properties as blowing agent and to have the properties of zero ozone depletion potential and very low global warming potential. In particular, HFO-1234ze has a global warming potential of around 6 while R-245fa used in D5 has a value of around 1020 (data provided by the respondent and not disputed by the appellant).

6.3.3 The appellant doubted that the above problem was credibly solved over the whole scope of the claim, because the claim embraced embodiments wherein the blowing agent composition comprised only a small amount of HFO-1234ze, namely 5% by weight.

6.3.4 The board, however, acknowledges that the problem has been credibly solved over the whole scope of the claim. The replacement of a less environmentally acceptable blowing agent by HFO-1234ze with very low global warming potential results automatically in an environmentally improved blowing agent in terms of global warming potential. Obviously, this effect is higher with a larger amount and smaller when only a small amount of HFO-1234ze as blowing agent is used, but it is not non-existent.

6.4 Obviousness

6.4.1 It remains to be decided whether, in view of the available prior art, it would have been obvious for the skilled person to solve the technical problem, as defined above, by the means claimed.

6.4.2 There is no suggestion in the prior art to look at HFO-1234ze, which is a member of the hydrofluoroolefins class, as a possible solution to the problem of finding a more environmentally friendly alternative blowing agent with the requisite properties.

6.4.3 HFO-1234ze is an unsaturated compound, namely a hydrofluoroolefin, while the previously used blowing agents, such as R-245fa, R-245ca, HFC-134a and HFC-365mfc, are saturated fluorocarbon compounds. As a class, the fluorinated olefins are generally more reactive than saturated blowing agents because of the

presence of the carbon-carbon double bond. It is well known that the olefins tend to self-polymerise, and that they are readily oxidised.

Indeed, fluorinated olefins, including HFO-1234ze, were considered to be undesirable impurities in blowing agents and attempts were made to suppress their formation. Thus, as set out above, D5 required the presence of stabilisers to prevent the formation of pentafluoropropane degradation products such as HFO-1234ze when using R-245fa as blowing agents.

- 6.4.4 Moreover, the hydrofluoroolefins were understood in general to be too reactive and thus unstable and/or toxic and unsuitable for use in many applications. Although D11 details part of the extensive search for replacements of the refrigerant R-12 and thus does not relate to blowing agents, it confirms the reactivity of a number of HFOs (see Table 2). In addition, D12 states at column 2, lines 28 to 37:

"The olefinic impurities which are present as impurities in the manufacture of saturated fluorocarbons and fluorohydrocarbons are particularly undesirable as contaminants as they may be toxic and for most uses their concentrations in the saturated products must be lowered to as a low level as is practically possible. This is particularly true because the fluorocarbons and fluorohydrocarbons can be widely used as solvents, cleaning agents, blowing agents and refrigerants where toxicity must be substantially eliminated."

- 6.4.5 Given what was known about the reactivity of the hydrofluoroolefins, the skilled person would not have

considered such compounds as possible alternatives when designing a new blowing agent.

6.4.6 For these reasons, the board concludes that the subject-matter of claim 1, and by the same token of claim 2, involves an inventive starting from D5 as the closest prior art.

7. *The appellant's objections on inventive step*

7.1 The appellant did not dispute that the claimed subject-matter might involve an inventive step when starting from D5 as the closest prior art. However, it argued that D6 was indeed the closest prior art as it already disclosed the use of tetrafluoropropylene as a blowing agent. The use of the specific tetrafluoropropylene HFO-1234ze would then be obvious in view of D6 alone or in combination with D7.

7.2 Firstly, the board disagrees that D6 represents the closest prior art, for the reasons already given in point 6.2 above. But even if one accepted D6 as the starting point for the assessment of inventive step, the skilled person would not arrive in an obvious manner at the claimed subject-matter, for the following reasons:

7.3 As set out in detail above, D6 relates to the use of a halocarbon blowing system comprising a combination of a first halocarbon compound having a high boiling point and a second halocarbon compound having a low boiling point.

D6 sets out a wide variety of possible compounds for each of the two components of the halocarbon blowing system including hard and soft CFCs. Propylene

halocarbons are mentioned *inter alia* as a possible second halocarbon compound, and in particular tetrafluoropropylene (R-2134a; 245°K) at page 4, line 39. However, propylene halocarbons, let alone R-2134a, are not mentioned as components of the preferred compositions of D6. Nevertheless, the appellant's inventive-step objection is based on this reference to R-2134a.

- 7.3.1 It was agreed between the parties that the nomenclature R-2134a (in the terminology of the patent this would be HFO-2134a) does not correspond to any nomenclature known in the art of fluorinated compounds. It was also agreed that the compound referred to in D6 as having a boiling point of 245°K is not HFO-1234ze as required in claim 1. Indeed the reported boiling point for *trans* HFO-1234ze is about 254°K and the reported boiling point for *cis* HFO-1234ze is about 282°K. As pointed out by the respondent, there is no combination of *cis* and *trans* HFO-1234ze which could give a boiling point of 245°K as reported for R-2134a in D6.
- 7.3.2 Notwithstanding the above, the appellant maintained that it would have been obvious for the skilled person to select other tetrafluoropropylene isomers, such as HFO-1234ze, when looking for an alternative blowing agent to those disclosed in D6, basically because D6 referred to halogenated propylene in general and no unexpected effect had been demonstrated in relation to HFO-1234ze.
- 7.3.3 In the board's view, the appellant's inventive-step attack is based on hindsight. This attack completely ignores the 12 years of development in the field of blowing agents, prior to the filing of the patent, which went in a completely different direction. To now

argue that the use of HFO-1234ze was an obvious alternative ignores the fact that many artisans in the field had apparently interpreted the teaching of D6 quite differently from the appellant, and that for many years. The appellant's approach also suffers from the following deficiencies:

- Propylene halocarbons are not amongst the preferred second components of D6. In fact the preferred compounds are all saturated halocarbons.
- The appellant's argument that D6 discloses a very limited number of compounds, one of which is HFO-1234ze, is based on a wrong assumption. There is no disclosure of a class of "tetrafluoropropylenes". Instead, page 4, line 39 of D6 discloses tetrafluoropropylene R-2134a, which is a single compound and not a class of compounds. Furthermore, it would be clear to the skilled person that the boiling point of 245°K is provided for a single compound, namely R-2134a. If "tetrafluoropropylene" did encompass a class of compounds (which it does not), the boiling point data would need to be expressed as a range.
- The boiling point of the second component halocarbon compounds of D6 has to be less than or equal to 266°K. As apparent from point 7.3.1 above, only the *trans* HFO-1234ze qualifies as a second component of the compositions of D6. However, claim 1 does not distinguish between *cis* and *trans* isomers.
- Despite the fact that propylene halocarbons, and in particular R-2134a, are mentioned in D6 as possible blowing agents, there were at least strong

reservations in the field about the use of unsaturated compounds (see point 6.4.4 above).

- 7.3.4 In summary, the arguments of the appellant based on D6 alone as closest prior art are made *a posteriori*, in the knowledge of the invention.
- 7.4 The appellant further argued that the claimed subject-matter would have been obvious in view of the combined teachings of D6 and D7.
- 7.4.1 D7 discloses the use of hydrofluorolefins such as HFO-1234ze in refrigeration applications (see page 3, lines 12 to 14 and page 4, line 34). Although D7 does not mention a possible use as blowing agent at all, the appellant argued that the field of foam blowing and refrigeration were related fields within the wider field of the development of environmentally acceptable (hydro)halocarbons.
- 7.4.2 The question to be answered here is whether the skilled person wishing to develop new blowing agents would as a matter of course have looked to those compounds being used in the field of refrigeration, as maintained by the appellant (see points 11 to 16 of the declaration of Dr Corr dated 6 April 2016 and the further documents SC02, SC03 and SC04).
- 7.4.3 The board agrees with the respondent that this is not the case. The selection of a particular compound as a blowing agent is carried out using different criteria from the selection of a compound as refrigerant. To argue, as the appellant has, that the skilled person would understand that compounds which are used as refrigerants would be suitable for use as blowing agents, because they have, for example, appropriate

boiling points, appears to be a gross simplification and it is not supported by any of SC02 to SC04.

7.4.4 The passage of SC02 cited by the appellant, namely that "HCFC-22 had been available for refrigeration uses for some years and was therefore a proven and readily available material for those foam products requiring low boiling point blowing agents" (page 4, right-hand column, first paragraph), does not suggest that it was a proven material for use as a blowing agent. Indeed SC02 goes on to indicate that HCFC-22 was found not to be suitable for use as a replacement for CFC-12 and that "preference was increasingly given to HCFC-22/HCFC-141b blends". Thus the skilled person could not simply identify a refrigerant such as HCFC-22 and use it as a blowing agent with any expectation of success.

7.4.5 Similar considerations apply to SC03 and SC04 (see abstracts of both documents) that confirm that some compounds are suitable for use as refrigerants, blowing agents, aerosol propellants, etc. However, from these documents the skilled person would not infer that all refrigerants were suitable for use as blowing agents.

In fact, compounds such as HFC-125, HFC-123, HFC-124 and HFC-32 are all commonly used as refrigerants but are not used as blowing agents. In contrast, HCFC-141b, HFC-365mfc and HFC-143 are used as blowing agents but not as refrigerants. Consequently, the skilled person wishing to develop a new blowing agent would not combine the teaching of D6 with that of D7.

7.5 For these reasons, the inventive-step objection based on D6 also fails.

8. *Apportionment of costs*

- 8.1 The respondent requested a different apportionment of costs under Article 16 RPBA in view of the time necessary to review and rebut the 130 pages of new arguments, declaration and documents submitted by the appellant with letter of 7 April 2016.
- 8.2 According to Article 16(1) RPBA the board may, subject to Article 104(1) EPC, order a party to pay some or all of another party's costs, where a party has e.g. incurred costs due to amendment of a party's case pursuant to Article 13 RPBA (Article 16(1)(a) RPBA), extension of a time limit (Article 16(1)(b) RPBA), acts or omissions prejudicing the timely and efficient conduct of oral proceedings (Article 16(1)(c) RPBA), failure to comply with a direction of the board (Article 16(1)(d) RPBA) or an abuse of procedure (Article 16(1)(e) RPBA). Only costs necessarily and reasonably incurred may be ordered to be paid (Article 16(2) RPBA). Moreover, the apportionment of costs must be equitable (Article 104(1) EPC).
- 8.3 The board cannot see any basis for ordering a different apportionment of costs in the circumstances of the present case. As indicated in point 4 above, the submissions filed with letter of 7 April 2016 merely support the appellant's arguments already in the proceedings; they do not relate to new arguments. The declaration from Dr Corr is only 5 pages long, and the accompanying documents were filed merely because they were cited in the declaration to support the arguments made. Although 130 pages appears to be at first glance a huge number, in the end the submission appears to be quite focused and commensurate.

8.4 Therefore the board does not see a compelling ground in the present situation for departing from the provisions of Article 104(1) EPC stipulating that, as a rule, each party bears the costs it has incurred.

8.5 The respondent's request therefore cannot be allowed.

AUXILIARY REQUESTS 1 TO 4

9. In view of the fact that the main request is allowable, there is no need for the board to deal with these requests.

10. During the oral proceedings the respondent filed a description adapted to the amended claims. The amendments were discussed with the respondent, which in the end had no objections to them.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of the following documents:
 - claims 1 and 2 of the new main request filed at the oral proceedings of 10 May 2016; and
 - description pages 2 to 4 filed at the oral proceedings of 10 May 2016.

The Registrar:

The Chairman:



K. Boelicke

W. Sieber

Decision electronically authenticated