

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2018/082583

International filing date (day/month/year)
26.11.2018

Priority date (day/month/year)
27.11.2017

International Patent Classification (IPC) or both national classification and IPC
INV. C09K5/04

Applicant
RPL HOLDINGS LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. ☐ forming part of the international application as filed:
 - ☐ in the form of an Annex C/ST.25 text file.
 - ☐ on paper or in the form of an image file.
 - b. ☐ furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
 - ☐ in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - ☐ on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-15</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-15</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-15</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

- D1** WO 2017/151488 A1 (CHEMOURS CO FC LLC [US]) 8 September 2017 (2017-09-08)
- D2** WO 2016/156812 A1 (RPL HOLDINGS LTD [GB]) 6 October 2016 (2016-10-06)
- D3** US 2014/222699 A1 (LOW ROBERT ELLIOTT [GB]) 7 August 2014 (2014-08-07)
- D4** US 2015/315446 A1 (YANA MOTTA SAMUEL F [US] ET AL) 5 November 2015 (2015-11-05)
- D5** US 2016/024361 A1 (YANA MOTTA SAMUEL F [US] ET AL) 28 January 2016 (2016-01-28)

2 **Novelty and inventive step:**

2.1 R1234yf in mixture:

D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses refrigerant compositions. The compositions comprise HFC-32, HFC-125, HFO-1234yf, HFC-134a, and CO₂. The refrigerant compositions are useful in processes to produce cooling and heating, in methods for replacing refrigerant R-410A or R-22, and in refrigeration, air conditioning or heat pump systems. The compositions are non-flammable and match cooling performance for R-22 and R-410A within 15%. Additionally, these compositions may serve as replacements for R-404A, R-507, R407A, R407C and/or R-407F in refrigeration, air conditioning or heat pump systems.

The subject-matter of claim 1 therefore differs from this known **D1** in that R227ea is additionally present and is therefore new (Article 33(2) PCT).

A technical effect based on the distinguishing feature is not demonstrated.

The problem to be solved by the present invention may be regarded as the

provision of further compositions.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

On page 25, line 2 of **D1** reference is made to 1,1,1,2,3,3,3-heptafluoropropane (= R227ea) as example of a tracer which can be additionally present. On page 24, lines 20-28 the concentration of a tracer is indicated as being up to 1000 ppm. However, to choose the 1,1,1,2,3,3,3-heptafluoropropane as additional compound and to add it in a concentration of at least 1 weight percent to the composition of **D1** is not obvious to a person skilled in the art. The tracer is only one amongst several options for additional components of the composition. The skilled person has to make several several selections (tracer---> specific tracer) and to increase the concentration of the specific tracer added.

D2 discloses (claims) a composition containing HFC-227ea, but the skilled person has no incentive to combine the teachings of **D1** and **D2**.

The presence of an inventive step can be acknowledged.

2.2 R1234ze(E) in mixture:

D2 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses refrigerant compositions. In claim 1 the following composition is indicated

A refrigerant composition comprising:

R125 20-35%

R32 20-35%

R1234ze(E) 25-50%

R227ea 1-10%

wherein the percentages are by weight and are selected from the ranges quoted to total 100%.

The subject-matter of claim 1 therefore differs from this known **D2** in that carbon dioxide is additionally present and is therefore new (Article 33(2) PCT).

A technical effect based on the distinguishing feature is not demonstrated.

The problem to be solved by the present invention may be regarded as the

provision of further compositions.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The presence of carbon dioxide in refrigerant compositions is well-known to the skilled person. E.g. **D3** relates to a heat transfer composition comprising up to about 30 % by weight carbon dioxide (R-744), from about 30 % to about 80 % by weight difluoromethane (R-32), and 1,3,3,3-tetrafluoropropene (R-1234ze), preferably trans-R-1234ze. But the skilled person has no incentive to specifically add carbon dioxide to the composition of D2 and to arrive at the claimed composition.

The presence of an inventive step can be acknowledged.

- 2.3 Claims 2-15 are dependent on claim 1 and as such also meet(s) the requirements of the PCT with respect to novelty and inventive step.

Re Item VIII

Certain observations on the international application

Present claim 15 refers to 1-30 % of R134a. This is in contradiction with the amount of R134a indicated in claim 1, which is 0-15 %. The same clarity issue applies with regard to several parts of the description (several compositions indicated on pages 20-23, 27-30, 32-35 are not within the claimed scope of claim 1).