



Distr.: General
24 April 2020
English only



United Nations
Environment
Programme

Open-ended Working Group of the Parties to
the Montreal Protocol on Substances that
Deplete the Ozone Layer
Forty-second meeting
Montreal, Canada, 13–17 July 2020*

Mixtures containing controlled substances and the new online tool for mixtures and blends to facilitate processing and reporting

Note by the Secretariat

1. The present note summarizes information related to mixtures containing controlled substances and a new online tool for mixtures and blends that the Secretariat wishes to bring to the attention of the parties.

I. Information on mixtures containing controlled substances

2. In preparation for the forty-first meeting of the Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, held in Bangkok from 1 to 5 July 2019, the Secretariat issued document UNEP/OzL.Pro.WG.1/41/INF/5/Rev.1, which was to be periodically updated. The document summarizes information related to mixtures used primarily in the refrigeration sector, whether containing controlled substances or not. The information is intended to facilitate the process by which parties report quantities of mixtures traded,¹ given that mixtures used in the refrigeration industry are evolving rapidly.

3. The annex to the present note presents a consolidated and updated version of the annex to document UNEP/OzL.Pro.WG.1/41/INF/5/Rev.1. The information presented was provided by the Flexible and Rigid Foams Technical Options Committee, the Halons Technical Options Committee, the Medical and Chemicals Technical Options Committee, the Methyl Bromide Technical Options Committee and the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee; the latter submitted an excerpt from its 2020 report containing updates on refrigerants and new mixtures. The excerpt enumerates updates since the publication of the *2018 Report of the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee*, highlighting one new single-component refrigerant and eight refrigerant mixtures that have received a designation or classification under ASHRAE Standard 34 of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers and/or under ISO 817:2014 of the International Standards Organization. The nine refrigerants and their composition are listed in the following table.

* Some agenda items will be discussed online and others will be deferred to a later date.

¹ Previously, parties were required to calculate and report only the derived/calculated amounts of controlled substances contained in mixtures.

New refrigerants that have received an ASHRAE or ISO designation or classification

<i>ASHRAE number</i>	<i>Chemical name and formula or composition</i>
IFC-1311 ^a	Trifluoroiodomethane (CF ₃ I)
R-427B	HFC-32 = 20.6%, HFC-125 = 25.6%, HFC-143a = 19%, HFC-134a = 34.8%
R-466A	HFC-32 = 49%, HFC-125 = 11.5%, IFC-1311 = 39.5%
R-467A	HFC-32 = 22%, HFC-125 = 5%, HFC-134a = 72.4%, HC-600a = 0.6%
R-468A	HFC-1132a = 3.5%, HFC-32 = 21.5%, HFO-1234yf = 75%
R-469A	R-744 = 35%, HFC-32 = 32.5%, HFC-125 = 32.5%
R-470A	R-744 = 10%, HFC-32 = 17%, HFC-125 = 19%, HFC-134a = 7%, HFO-1234ze(E) = 44%, HFC-227ea = 3%
R-470B	R-744 = 10%, HFC-32 = 11.5%, HFC-125 = 11.5%, HFC-134a = 3%, HFO-1234ze(E) = 57%, HFC-227ea = 7%
R-515B	HFO-1234ze(E) = 91.1%, HFC-227ea = 8.9%

^a New single-component refrigerant.

II. New online tool for mixtures and blends

4. The Secretariat has developed an online tool to facilitate parties' understanding, processing and reporting of amounts that include mixtures, blends and pure substances.

5. The new tool on the Secretariat's website will allow users to input different amounts for different substances or mixtures in tons.² The tool will then display a table of derived amounts of controlled substances contained in the entered mixtures or substances, grouped by their annex groups. The display of derived amounts includes amounts in tons, ozone-depleting-potential (ODP) tons and CO₂ equivalent tons. The tables can easily be copied to the clipboard.

6. The tool includes graphics that illustrate the data flows from the amounts entered for substances or mixtures/blends to the derived amounts of controlled substances, grouped by their annex groups. The graphics can easily be printed or downloaded in PDF format. The tool also includes a search and filtering function for the mixture names and the chemical formulas to make it easier to select and input substances and mixtures. The tool for mixtures and blends can be accessed at <https://ozone.unep.org/mixtures-blends-tool>.

² All references to "tons" are to metric tons.

Annex

Illustrative lists of refrigerant mixtures and blends

1. The information in this annex updates the illustrative lists of mixtures containing substances controlled under the Montreal Protocol, which are outlined in section 11 of the instructions and guidelines appended to the revised forms for reporting Article 7 data that were approved in decision XXX/10 of the Thirtieth Meeting of the Parties (UNEP/OzL.Pro.30/11, annex III, appendix I).
2. The lists contain known mixtures, some of which contain controlled substances and some of which do not,¹ together with their compositions. Based on the percentages of the controlled substances in the mixtures, the Secretariat has calculated their ozone-depleting-potential and global-warming-potential values.² Those values are for information purposes only; the Secretariat uses the values for each component of the mixtures when calculating production and consumption levels in ozone-depleting potential (in metric tons) and CO₂ equivalence, in order to reflect the appropriate values in the corresponding annex groups.
3. The following colour code has been applied to the rows in the tables to allow easier identification of the different updates to or types of information:
 - (a) Rows for mixtures that do not contain any controlled substances are coloured light green.
 - (b) Rows for new mixtures that have received an ASHRAE or ISO designation or classification and were not included in document UNEP/OzL.Pro.WG.1/41/INF/5/Rev.1 are coloured light yellow. All these mixtures contain controlled substances.
 - (c) Rows for mixtures that contain controlled substances and were not listed in section 11 of the instructions and guidelines approved under decision XXX/10 are coloured light orange.

Table 1
Zeotropic mixtures^a

No.	ASHRAE number / trade name	Other trade names	Ozone-depleting potential ^b	Global-warming potential ^b	Composition
1.	R-400 ^c		1	10450	CFC-12 = 50%, CFC-114 = 50%
			1	10540	CFC-12 = 60%, CFC-114 = 40%
2.	R-401A	MP-39	0.03663	1182.48	HCFC-22 = 53%, HFC-152a = 13%, HCFC-124 = 34%
3.	R-401B	MP-66	0.03971	1288.26	HCFC-22 = 61%, HFC-152a = 11%, HCFC-124 = 28%
4.	R-401C	MP-52	0.02959	932.58	HCFC-22 = 33%, HFC-152a = 15%, HCFC-124 = 52%
5.	R-402A	HP-80	0.0209	2787.8	HFC-125 = 60%, HC-290 = 2%, HCFC-22 = 38%
6.	R-402B	HP-81	0.033	2416	HFC-125 = 38%, HC-290 = 2%, HCFC-22 = 60%

¹ Mixtures that do not contain controlled substances are listed for parties' information in order to reduce queries about mixtures that would otherwise have been excluded from the list.

² The values of ozone-depleting potential (ODP) and global-warming potential (GWP) are based on the values assigned under the Montreal Protocol. For substances for which ODP and/or GWP values are not assigned, default values of 0 have been applied.

No.	ASHRAE number / trade name	Other trade names	Ozone-depleting potential ^b	Global-warming potential ^b	Composition
7.	R-403A	ISCEON 69-S/69S	0.04125	1357.5	HC-290 = 5%, HCFC-22 = 75%, PFC-218 = 20%
8.	R-403B	ISCEON 69-L/69L	0.0308	1013.6	HC-290 = 5%, HCFC-22 = 56%, PFC-218 = 39%
9.	R-404A	HP-62, FX-70, Forane 404A	0	3921.6	HFC-125 = 44%, HFC-143a = 52%, HFC-134a = 4%
10.	R-405A	Greencool G2015	0.028325	950.23	HCFC-22 = 45%, HCFC-142b = 5.5%, HFC-152a = 7%, PFC-C318 = 42.5%
11.	R-406A	GHG/GHG 12	0.0569	1942.6	HCFC-22 = 55%, HC-600a = 4%, HCFC-142b = 41%
12.	R-406B	GHG-HP	0.0559	1892.6	HCFC-22 = 65%, HC-600a = 4%, HCFC-142b = 31%
13.	R-407A	Klea 60, Forane 407A	0	2107	HFC-32 = 20%, HFC-125 = 40%, HFC-134a = 40%
14.	R-407B	Klea 61	0	2803.5	HFC-32 = 10%, HFC-125 = 70%, HFC-134a = 20%
15.	R-407C	Klea 66, AC9000, Forane 407C	0	1773.85	HFC-32 = 23%, HFC-125 = 25%, HFC-134a = 52%
16.	R-407D		0	1627.25	HFC-32 = 15%, HFC-125 = 15%, HFC-134a = 70%
17.	R-407E		0	1551.75	HFC-32 = 25%, HFC-125 = 15%, HFC-134a = 60%
18.	R-407F	Genetron Performax LT	0	1824.5	HFC-32 = 30%, HFC-125 = 30%, HFC-134a = 40%
19.	R-407G		0	1462.875	HFC-32 = 2.5%, HFC-125 = 2.5%, HFC-134a = 95%
20.	R-407H		0	1495.125	HFC-125 = 15%, HFC-134a = 52.5%, HFC-32 = 32.5%
21.	R-407I		0	1458.725	HFC-32 = 19.5%, HFC-125 = 8.5%, HFC-134a = 72%
22.	R-408A	FX-10, Forane 408A	0.02585	3151.9	HFC-125 = 7%, HFC-143a = 46%, HCFC-22 = 47%
23.	R-409A	FX-56	0.04825	1584.75	HCFC-22 = 60%, HCFC-124 = 25%, HCFC-142b = 15%

No.	ASHRAE number / trade name	Other trade names	Ozone-depleting potential ^b	Global-warming potential ^b	Composition
24.	R-409B	FX-57	0.04775	1559.75	HCFC-22 = 65%, HCFC-124 = 25%, HCFC-142b = 10%
25.	R-410A	AZ-20, Puron, Suva 9100, Forane 410A	0	2087.5	HFC-32 = 50%, HFC-125 = 50%
26.	R-410B	AC9100	0	2228.75	HFC-32 = 45%, HFC-125 = 55%
27.	R-411A	Greencool G2018a	0.048125	1597.39	HO-1270 = 1.5%, HCFC-22 = 87.5%, HFC-152a = 11%
28.	R-411B	Greencool G2018b	0.0517	1705.12	HO-1270 = 3%, HCFC-22 = 94%, HFC-152a = 3%
29.	R-411C	Greencool G2018c	0.052525	1730.41	HO-1270 = 3%, HCFC-22 = 95.5%, HFC-152a = 1.5%
30.	R-412A	Arcton TP5R	0.05475	1844.5	HCFC-22 = 70%, PFC-218 = 5%, HCFC-142b = 25%
31.	R-413A	ISCEON 49	0	1258.4	PFC-218 = 9%, HFC-134a = 88%, HC-600a = 3%
32.	R-414A	GHG-X4, Autofrost, Chill-It	0.045045	1477.815	HCFC-22 = 51%, HCFC-124 = 28.5%, HC-600a = 4%, HCFC-142b = 16.5%
33.	R-414B	Hot Shot, Kar Kool	0.042255	1361.96	HCFC-22 = 50%, HCFC-124 = 39%, HC-600a = 1.5%, HCFC-142b = 9.5%
34.	R-415A		0.0451	1506.52	HCFC-22 = 82%, HFC-152a = 18%
35.	R-415B		0.01375	545.5	HCFC-22 = 25%, HFC-152a = 75%
36.	R-416A	FRIGC (FR-12)	0.00869	1084.255	HFC-134a = 59%, HCFC-124 = 39.5%, HC-600 = 1.5%
37.	R-417A	ISCEON 59, NU-22	0	2346	HFC-125 = 46.6%, HFC-134a = 50%, HC-600 = 3.4%
38.	R-417B		0	3026.69	HFC-125 = 79%, HFC-134a = 18.3%, HC-600 = 2.7%
39.	R-417C		0	1809.34	HFC-125 = 19.5%, HFC-134a = 78.8%, HC-600 = 1.7%
40.	R-418A		0.0528	1740.7	HC-290 = 1.5%, HCFC-22 = 96%, HFC-152a = 2.5%
41.	R-419A		0	2966.7	HFC-125 = 77%, HFC-134a = 19%, HC-E170 = 4%

No.	ASHRAE number / trade name	Other trade names	Ozone-depleting potential ^b	Global-warming potential ^b	Composition
42.	R-419B		0	2383.9	HFC-125 = 48.5%, HFC-134a = 48%, HC-E170 = 3.5%
43.	R-420A	Choice Refrigerant, Choice R420A	0.0078	1535.6	HFC-134a = 88%, HCFC-142b = 12%
44.	R-421A	Choice R421A	0	2630.6	HFC-125 = 58%, HFC-134a = 42%
45.	R-421B	Choice 421B	0	3189.5	HFC-125 = 85%, HFC-134a = 15%
46.	R-422A	ISCEON 79	0	3142.95	HFC-125 = 85.1%, HFC-134a = 11.5%, HC-600a = 3.4%
47.	R-422B	ICOR XAC1	0	2525.6	HFC-125 = 55%, HFC-134a = 42%, HC-600a = 3%
48.	R-422C	ICOR XLT1	0	3084.5	HFC-125 = 82%, HFC-134a = 15%, HC-600a = 3%
49.	R-422D	ISCEON MO29	0	2728.95	HFC-125 = 65.1%, HFC-134a = 31.5%, HC-600a = 3.4%
50.	R-422E		0	2591.99	HFC-125 = 58%, HFC-134a = 39.3%, HC-600a = 2.7%
51.	R-423A		0	2280.25	HFC-134a = 52.5%, HFC-227ea = 47.5%
52.	R-424A	RS-44 (new comp.)	0	2439.6	HFC-125 = 50.5%, HFC-134a = 47%, HC-600a = 0.9%, HC-600 = 1%, HC-601a = 0.6%
53.	R-425A		0	1505.125	HFC-32 = 18.5%, HFC-134a = 69.5%, HFC-227ea = 12%
54.	R-426A	RS-24 (new comp.)	0	1508.4	HFC-125 = 5.1%, HFC-134a = 93%, HC-600 = 1.3%, HC-601a = 0.6%
55.	R-427A	Forane 427A	0	2138.25	HFC-32 = 15%, HFC-125 = 25%, HFC-143a = 10%, HFC-134a = 50%
56.	R-427B			2381.99	HFC-32 = 20.6%, HFC-125 = 25.6%, HFC-143a = 19%, HFC-134a = 34.8%
57.	R-428A	RS-52	0	3606.5	HFC-125 = 77.5%, HFC-143a = 20%, HC-290 = 0.6%, HC-600a = 1.9%

No.	ASHRAE number / trade name	Other trade names	Ozone-depleting potential ^b	Global-warming potential ^b	Composition
58.	R-429A		0	12.4	HC-E170 = 60%, HFC-152a = 10%, HC-600a = 30%
59.	R-430A		0	94.24	HFC-152a = 76%, HC-600a = 24%
60.	R-431A		0	35.96	HC-290 = 71%, HFC-152a = 29%
61.	R-432A		0	0	HO-1270 = 80%, HC-E170 = 20%
62.	R-433A		0	0	HO-1270 = 30%, HC-290 = 70%
63.	R-433B		0	0	HO-1270 = 5%, HC-290 = 95%
64.	R-433C		0	0	HO-1270 = 25%, HC-290 = 75%
65.	R-434A	RS-45	0	3245.4	HFC-125 = 63.2%, HFC-143a = 18%, HFC-134a = 16%, HC-600a = 2.8%
66.	R-435A		0	24.8	HC-E170 = 80%, HFC-152a = 20%
67.	R-436A		0	0	HC-290 = 56%, HC-600a = 44%
68.	R-436B		0	0	HC-290 = 52%, HC-600a = 48%
69.	R-436C		0	0	HC-290 = 95%, HC-600a = 5%
70.	R-437A		0	1805.05	HFC-125 = 19.5%, HFC-134a = 78.5%, HC-600 = 1.4%, HC-601 = 0.6%
71.	R-438A	KDD5, ISCEON MO99	0	2264.435	HFC-32 = 8.5%, HFC-125 = 45%, HFC-134a = 44.2%, HC-600 = 1.7%, HC-601a = 0.6%
72.	R-439A		0	1982.5	HFC-32 = 50%, HFC-125 = 47%, HC-600a = 3%
73.	R-440A		0	144.152	HC-290 = 0.6%, HFC-134a = 1.6%, HFC-152a = 97.8%
74.	R-441A	HCR-188C	0	0	HC-170 = 3.1%, HC-290 = 54.8%, HC-600a = 6%, HC-600 = 36.1%
75.	R-442A	RS-50	0	1887.97	HFC-32 = 31%, HFC-125 = 31%, HFC-134a = 30%, HFC-152a = 3%, HFC-227ea = 5%

No.	ASHRAE number / trade name	Other trade names	Ozone-depleting potential ^b	Global-warming potential ^b	Composition
76.	R-443A		0	0	HO-1270 = 55%, HC-290 = 40%, HC-600a = 5%
77.	R-444A		0	87.2	HFC-32 = 12%, HFC-152a = 5%, HFO-1234ze(E) = 83%
78.	R-444B		0	292.525	HFC-32 = 41.5%, HFO-1234ze(E) = 48.5%, HFC-152a = 10%
79.	R-445A		0	128.7	R-744 = 6%, HFC-134a = 9%, HFO-1234ze(E) = 85%
80.	R-446A		0	459	HFC-32 = 68%, HFO-1234ze(E) = 29%, HC-600 = 3%
81.	R-447A		0	581.5	HFC-32 = 68%, HFC-125 = 3.5%, HFO-1234ze(E) = 28.5%
82.	R-447B		0	739	HFC-32 = 68%, HFC-125 = 8%, HFO-1234ze(E) = 24%
83.	R-448A	Solstice N-40	0	1385.8	HFC-32 = 26%, HFC-125 = 26%, HFO-1234yf = 20%, HFC-134a = 21%, HFO-1234ze(E) = 7%
84.	R-449A	Forane 449A, XP40, Opteon XP-40	0	1396.035	HFC-32 = 24.3%, HFC-125 = 24.7%, HFO-1234yf = 25.3%, HFC-134a = 25.7%
85.	R-449B	Arkema	0	1410.99	HFC-32 = 25.2%, HFC-125 = 24.3%, HFO-1234yf = 23.2%, HFC-134a = 27.3%
86.	R-449C		0	1249.7	HFC-32 = 20%, HFC-125 = 20%, HFO-1234yf = 31%, HFC-134a = 29%
87.	R-450A	Solstice N-13	0	600.6	HFO-1234ze(E) = 58%, HFC-134a = 42%
88.	R-451A		0	145.86	HFO-1234yf = 89.8%, HFC-134a = 10.2%
89.	R-451B		0	160.16	HFO-1234yf = 88.8%, HFC-134a = 11.2%
90.	R-452A		0	2139.25	HFO-1234yf = 30%, HFC-32 = 11%, HFC-125 = 59%
91.	R-452B		0	697.25	HFC-32 = 67%, HFC-125 = 7%, HFO-1234yf = 26%
92.	R-452C		0	2219.375	HFC-32 = 12.5%, HFC-125 = 61%, HFO-1234yf = 26.5%

No.	ASHRAE number / trade name	Other trade names	Ozone-depleting potential ^b	Global-warming potential ^b	Composition
93.	R-453A		0	1765.34	HFC-32 = 20%, HFC-125 = 20%, HFC-134a = 53.8%, HFC-227ea = 5%, HC-600 = 0.6%, HC-601a = 0.6%
94.	R-454A		0	236.25	HFC-32 = 35%, HFO-1234yf = 65%
95.	R-454B		0	465.075	HFC-32 = 68.9%, HFO-1234yf = 31.1%
96.	R-454C		0	145.125	HFC-32 = 21.5%, HFO-1234yf = 78.5%
97.	R-455A		0	145.125	R-744 = 3%, HFC-32 = 21.5%, HFO-1234yf = 75.5%
98.	R-456A		0	684	HFC-32 = 6%, HFC-134a = 45%, HFO-1234ze(E) = 49%
99.	R-457A		0	136.38	HFC-32 = 18%, HFO-1234yf = 70%, HFC-152a = 12%
100.	R-458A		0	1649.955	HFC-32 = 20.5%, HFC-125 = 4%, HFC-134a = 61.4%, HFC-227ea = 13.5%, HFC-236fa = 0.6%
101.	R-459A		0	459	HFC-32 = 68%, HFO-1234yf = 26%, HFO-1234ze(E) = 6%
102.	R-459B		0	141.75	HFC-32 = 21%, HFO-1234yf = 69%, HFO-1234ze(E) = 10%
103.	R-460A		0	2101.2	HFC-32 = 12%, HFC-125 = 52%, HFC-134a = 14%, HFO-1234ze(E) = 22%
104.	R-460B		0	1350	HFC-32 = 28%, HFC-125 = 25%, HFC-134a = 20%, HFO-1234ze(E) = 27%
105.	R-460C		0	762.175	HFC-32 = 2.5%, HFC-125 = 2.5%, HFC-134a = 46%, HFO-1234ze(E) = 49%
106.	R-461A		0	2767.1	HFC-125 = 55%, HFC-143a = 5%, HFC-134a = 32%, HFC-227ea = 5%, HC-600a = 3%
107.	R-462A		0	2249.35	HFC-32 = 9%, HFC-125 = 42%, HFC-143a = 2%, HFC-134a = 44%, HC-600 = 3%

No.	ASHRAE number / trade name	Other trade names	Ozone-depleting potential ^b	Global-warming potential ^b	Composition
108.	R-463A		0	1493.2	R-744 = 6%, HFC-32 = 36%, HFC-125 = 30%, HFO-1234yf = 14%, HFC-134a = 14%
109.	R-464A		0	1320.45	HFC-32 = 27%, HFC-125 = 27%, HFO-1234ze(E) = 40%, HFC-227ea = 6%
110.	R-465A		0	141.75	HFC-32 = 21%, HC-290 = 7.9%, HFO-1234yf = 71.1%
111.	R-466A			733.25	HFC-32 = 49%, HFC-125 = 11.5%, IFC-1311 = 39.5%
112.	R-467A			1358.82	HFC-32 = 22%, HFC-125 = 5%, HFC-134a = 72.4%, HC-600a = 0.6%
113.	R-468A			145.125	HFC-1132a = 3.5%, HFC-32 = 21.5%, HFO-1234yf = 75%
114.	R-469A			1356.875	R-744 = 35%, HFC-32 = 32.5%, HFC-125 = 32.5%
115.	R-470A			976.45	R-744 = 10%, HFC-32 = 17%, HFC-125 = 19%, HFC-134a = 7%, HFO-1234ze(E) = 44%, HFC-227ea = 3%
116.	R-470B			748.425	R-744 = 10%, HFC-32 = 11.5%, HFC-125 = 11.5%, HFC-134a = 3%, HFO-1234ze(E) = 57%, HFC-227ea = 7%

^a See para. 3 of the annex for an explanation of the colours used for different rows.

^b The values of ozone-depleting potential (ODP) and global-warming potential (GWP) are based on the values assigned under the Montreal Protocol. For substances for which ODP and/or GWP values are not assigned, default values of 0 have been applied. GWP values for CFCs and HCFCs contained in mixtures would normally be applied for the baseline years used to determine HFC baselines.

^c No specific formulation exists for R-400; therefore, the percentage of each component in the mixture must be specified.

Table 2
Azeotropic mixtures^a

No.	ASHRAE number / trade name	Other trade names	Ozone- depleting potential ^b	Global-warming potential ^b	Composition
1.	R-500	Carrene #7	0.738	8076.688	CFC-12 = 73.8%, HFC-152a = 26.2%
2.	R-501		0.29125	4082.5	HCFC-22 = 75%, CFC-12 = 25%
3.	R-502		0.33404	4656.72	HCFC-22 = 48.8%, CFC-115 = 51.2%
4.	R-503		0.599	5934.8	HFC-23 = 40.1%, CFC-13 = 59.9%
5.	R-504		0.3108	4143.01	HFC-32 = 48.2%, CFC-115 = 51.8%
6.	R-505		0.7844	8502	CFC-12 = 78%, HCFC-31 = 22%
7.	R-506		0.461	4500	CFC-114 = 45%, HCFC-31 = 55%
8.	R-507A	AZ-50, Forane 507A	0	3985	HFC-125 = 50%, HFC-143a = 50%
9.	R-508A	Klea 5R3	0	5772	HFC-23 = 39%, PFC-116 = 61%
10.	R-508B	Suva 95	0	6808	HFC-23 = 46%, PFC-116 = 54%
11.	R-509	TP5R2	0.0253	832.6	HCFC-22 = 46%, PFC-218 = 54%
12.	R-509A	Arcton TP5R2	0.0242	796.4	HCFC-22 = 44%, PFC-218 = 56%
13.	R-510A		0	0	HC-E170 = 88%, HC-600a = 12%
14.	R-511A		0	0	HC-290 = 95%, HC-E170 = 5%
15.	R-512A		0	189.3	HFC-134a = 5%, HFC-152a = 95%
16.	R-513A	XP10 / DR11, Opteon XP-10	0	629.2	HFO-1234yf = 56%, HFC-134a = 44%
17.	R-513B		0	593.45	HFO-1234yf = 58.5%, HFC-134a = 41.5%
18.	R-514A		0	0	HFO-1336mzz(Z) = 74.7%, HCO-1130(E) = 25.3%
19.	R-515A		0	386.4	HFO-1234ze(E) = 88%, HFC-227ea = 12%
20.	R-515B			286.58	HFO-1234ze(E) = 91.1%, HFC-227ea = 8.9%
21.	R-516A		0	138.91	HFO-1234yf = 77.5%, HFC-134a = 8.5%, HFC-152a = 14%

^a See para. 3 of the annex for an explanation of the colours used for different rows.

^b The values of ozone-depleting potential (ODP) and global-warming potential (GWP) are based on the values assigned under the Montreal Protocol. For substances for which ODP and/or GWP values are not assigned, default values of 0 have been applied. GWP values for CFCs and HCFCs contained in mixtures would normally be applied for the baseline years used to determine HFC baselines.

Table 3
Other mixtures

No.	Trade name	Ozone-depleting potential ^a	Global-warming potential ^a	Composition
1.	FX20	0.03025	2570.5	HFC-125 = 45%, HCFC-22 = 55%
2.	FX55	0.059	2010	HCFC-22 = 60%, HCFC-142b = 40%
3.	D136	0.03784	1191.23	HCFC-22 = 50%, HCFC-124 = 47%, HC-600a = 3%
4.	Daikin Blend	0.0154	911.3	HFC-23 = 2%, HFC-32 = 28%, HCFC-124 = 70%
5.	FRIGC	0.00858	1081.21	HCFC-124 = 39%, HFC-134a = 59%, HC-600a = 2%
6.	Free Zone	0.01235	1568.6	HCFC-142b = 19%, HFC-134a = 79%, Lubricant = 2%
7.	GHG-X5	0.0323	2376.6	HCFC-22 = 41%, HCFC-142b = 15%, HFC-227ea = 40%, HC-600a = 4%
8.	NARM-502	0.0495	2375.2	HCFC-22 = 90%, HFC-152a = 5%, HFC-23 = 5%
9.	NASF-S-III ^b	0.04814	1545.713	HCFC-22 = 82%, HCFC-123 = 4.75%, HCFC-124 = 9.5%, HC-600a = 3.75%

^a The values of ozone-depleting potential (ODP) and global-warming potential (GWP) are based on the values assigned under the Montreal Protocol. For substances for which ODP and/or GWP values are not assigned, default values of 0 have been applied. GWP values for HCFCs contained in mixtures would normally be applied for the baseline years used to determine HFC baselines.

^b A halon alternative.

Table 4
Methyl bromide mixtures

No.	Trade name	Ozone-depleting potential ^a	Global-warming potential ^a	Composition
1.	Methyl bromide with chloropicrin (67/33)	0.402	0	Methyl bromide = 67%, Chloropicrin = 33%
2.	Methyl bromide with chloropicrin (98/2)	0.588	0	Methyl bromide = 98%, Chloropicrin = 2%

^a The values of ozone-depleting potential (ODP) and global-warming potential (GWP) are based on the values assigned under the Montreal Protocol. For substances for which ODP and/or GWP values are not assigned, default values of 0 have been applied.

Table 5
Mixtures reported by parties^a as part of their submissions of Article 7 data

No.	Trade name	Ozone-depleting potential ^b	Global-warming potential ^b	Composition
1.	365mfc/227ea	0	915.3	HFC-365mfc = 95%, HFC-227ea = 5%
2.	R-437D	0	1809	HC-600a = 1%, HFC-125 = 19%, HFC-134a = 80%
3.	Isceon 89	0	3010	HFC-125 = 86%, PFC-218 = 9%, HC-290 = 5%

^a Mixtures reported by parties as part of their submission of Article 7 data.

^b The values of ozone-depleting potential (ODP) and global-warming potential (GWP) are based on the values assigned under the Montreal Protocol. For substances for which ODP and/or GWP values are not assigned, default values of 0 have been applied. GWP values for HCFCs contained in mixtures would normally be applied for the baseline years used to determine HFC baselines.

Table 6
Examples of mixtures traded as blowing agent blends and mixtures contained in pre-blended polyols^a

Foam type	Component 1	Component 2	Component 3
XPS	Any HFC or HFO/ HCFO	HFC-152a, CO ₂ , butane, ethanol, methylenchloride (DME), alcohols	
PU	Any HFC or HFO/ HCFO	Pentanes, methyl formate, formic acid, trans-dichloroethane (DCE), water	
PU and polyol blends	HFC-365mfc	HFC-227ea	
PU	HFC-245fa	HFC-365mfc	
PU	HFC-245fa	HFC-134a	
PU	HFC-245fa	HFC-134a	Pentane ^b
PU	HFO-1233zd(E)	Cyclopentane	
PU	HFO-1336mzzm(Z)	HFO-1336mzzm(E)	
PU	HFO-1336mzzm(Z)	Other pentanes	
PU	HFO-1233zd(E)	Other pentanes	
PU and XPS	HFO-1233zd(E)	HFO-1234ze(E)	
XPS	HFO-1234ze(E)	Methylenchloride (DME)	
XPS	HFO-1234ze(E)	Ethanol	
XPS	HFO-1234ze(E)	Normal butane	
XPS	HFO-1234ze(E)	Isobutane	
XPS	HFC-134a	HFC-152a	
XPS	HFC-134a, HFC-134	HFC-152a	
PU	HFC-134a	HFC-134	
XPS	HCFC-142b	HCFC-22	

<i>Foam type</i>	<i>Component 1</i>	<i>Component 2</i>	<i>Component 3</i>
PU	HCFC-141b ^c	HFC-245fa ^c	
PU	HFC-245fa	Trans 1,2-dichloroethylene	
Flexible foams	Super-critical CO ₂ ^d	Methylal	
Flexible foams	Methylene chloride	Water	
Phenolic	2-chloropropane	Pentane	
PU	Pentane blends	Combinations of iso-, n-, cyclopentanes	

Note: For polyurethane (PU), water may be added in the foam-making process as a co-blowing agent. Similarly, for extruded polystyrene (XPS), carbon dioxide may be added as a co-blowing agent. The use of water and/or carbon dioxide in basic foam technology helps to reduce costs.

^a In accordance with decision I/12A of the First Meeting of the Parties, imports and exports of pre-blended polyols containing controlled substances (either alone or in mixtures) are excluded from the calculation of consumption. Foam manufacturers may combine any blowing agents (e.g., methyl formate, pentanes, HCFCs, HFCs, HFOs, HCFOs, CO₂) in foams or polyol blends in proprietary or commercially marketed blends.

^b Pentanes could be any isomers: iso-, normal or cyclo-pentane.

^c HCFC-141b is blended with HFC-245fa in some cases when the allocation or quota of HCFC-141b is reduced and the supply of HCFC-141b is insufficient to meet demand.

^d Nucleation agent for flexible foams.