

Treibhauspotentiale (Global Warming Potential, GWP) ausgewählter Verbindungen und deren Gemische gemäß Viertem (AR4) und Fünftem (AR5) IPCC Sachstandsbericht sowie Verordnung (EU) 2024/573 (F-Gas-VO) bezogen auf einen Zeitraum von 100 Jahren

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Industrielle Bezeichnung	Chemische Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
Teil(chlor) fluorierte Kohlenwasserstoffe (HFKW und HFCKW)					
HFKW-23	Trifluormethan	CHF ₃	14 800	12 400	14 800
HFKW-32	Difluormethan	CH ₂ F ₂	675	677	675
HFKW-41	Fluormethan	CH ₃ F	92	116	92
HFKW-125	1,1,1,2,2-Pentafluorethan	CF ₃ -CHF ₂	3 500	3 170	3 500
HFKW-134	1,1,2,2-Tetrafluorethan	CHF ₂ -CHF ₂	1 100	1 120	1 100
HFKW-134a	1,1,1,2-Tetrafluorethan	CF ₃ -CH ₂ F	1 430	1 300	1 430
HFKW-143	1,1,2-Trifluorethan	CHF ₂ -CH ₂ F	353	328	353
HFKW-143a	1,1,1-Trifluorethan	CF ₃ -CH ₃	4 470	4 800	4 470
HFKW-152	1,2-Difluorethan	CH ₂ F-CH ₂ F	53	16	53
HFKW-152a	1,1-Difluorethan	CHF ₂ -CH ₃	124	138	124
HFKW-161	Fluorethan	CH ₂ F-CH ₃	12	4	12
HFKW-227ea	1,1,1,2,3,3,3-Heptafluorpropan	CF ₃ -CHF-CF ₃	3 220	3 350	3 220
HFKW-236cb	1,1,1,2,2,3-Hexafluorpropan	CF ₃ -CF ₂ -CH ₂ F	1 340	1 210	1 340
HFKW-236ea	1,1,1,2,3,3-Hexafluorpropan	CF ₃ -CHF-CHF ₂	1 370	1 330	1 370
HFKW-236fa	1,1,1,3,3,3-Hexafluorpropan	CF ₃ -CH ₂ -CF ₃	9 810	8 060	9 810
HFKW-245ca	1,1,2,2,3-Pentafluorpropan	CHF ₂ -CF ₂ -CH ₂ F	693	716	693

Industrielle Bezeichnung	Chemische Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
HFKW-245fa	1,1,1,3,3-Pentafluorpropan	CF ₃ -CH ₂ -CHF ₂	1 030	858	1 030
HFKW-365mfc	1,1,1,3,3-Pentafluorbutan	CF ₃ -CH ₂ -CF ₂ -CH ₃	794	804	794
HFKW-43-10mee	1,1,1,2,2,3,4,5,5,5-Decafluorpentan	CF ₃ -CF ₂ -CHF-CHF-CF ₃	1 640	1 650	1 640
HCKW-1130 (E)	trans-1,2-Dichlorethen	CHCl=CHCl		1	
HFKW-1132 (E)	trans-1,2-Difluorethen	CHF=CHF		1	>1
HFKW-1132a	1,1-Difluorethen	CH ₂ =CF ₂		1	0,052
HFCKW-1224yd (Z)	cis-1-Chlor-2,3,3,3-Tetrafluorprop-1-en	CHCl=CF-CF ₃ (Z)		1	0,06
HFCKW-1233xf	2-Chlor-3,3,3-Trifluorprop-1-en	CH ₂ =CCl-CF ₃			1
HFCKW-1233zd (E)	trans-1-Chlor-3,3,3-Trifluorprop-1-en	CHCl=CH-CF ₃ (E)	4,5 ²	1	3,88
HFKW-1234yf	2,3,3,3-Tetrafluorprop-1-en	CH ₂ =CF-CF ₃	4 ²	1	0,501
HFKW-1234ze (E)	trans-1,3,3,3-Tetrafluorprop-1-en	CHF=CH-CF ₃ (E)	7 ²	1	1,37
HFKW-1336mzz (E)	trans-1,1,1,4,4,4-Hexafluorbut-2-en	CF ₃ -CH=CH-CF ₃ (E)			17,9
HFKW-1336mzz (Z)	cis-1,1,1,4,4,4-Hexafluorbut-2-en	CF ₃ -CH=CH-CF ₃ (Z)	9 ²	2	2,08
	1,1,1,2,3,4,5,5,5-Nonfluor-4-trifluormethyl-pent-2-en	CF ₃ -CF=CF-CF(CF ₃) ₂			1
Perfluorierte Kohlenwasserstoffe (FKW)					
FKW-14	Tetrafluormethan (Perfluormethan)	CF ₄	7 390	6 630	7 380
FKW-116	Hexafluorethan (Perfluorethan)	C ₂ F ₆	12 200	11 100	12 400
FKW-c-216	Hexafluorcyclopropan (Perfluorcyclopropan)	c-C ₃ F ₆	17 340	9 200	9 200
FKW-218	Oktafluorpropan (Perfluorpropan)	C ₃ F ₈	8 830	8 900	9 290
FKW-c-318	Oktafluorcyclobutan (Perfluorcyclobutan)	c-C ₄ F ₈	10 300	9 540	10 200
FKW-3-1-10	Decafluorbutan (Perfluorbutan)	C ₄ F ₁₀	8 860	9 200	10 000
FKW-4-1-12	Dodecafluorpentan (Perfluorpentan)	C ₅ F ₁₂	9 160	8 550	9 220
FKW-4-1-14	Perfluor-2-methylpentan	CF ₃ -CF(CF ₃)-CF ₂ -CF ₂ -CF ₃ (i-C ₆ F ₁₄)			7 370

Industrielle Bezeichnung	Chemische Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
FKW-5-1-14	Tetradecafluorhexan (Perfluorhexan)	C ₆ F ₁₄	9 300	7 910	8 620
FKW-9-1-18	Octadecafluordecalin (Perfluordecalin)	C ₁₀ F ₁₈	7 500	7 190	7 480
Andere perfluorierte Verbindungen					
	Schwefelhexafluorid	SF ₆	22 800	23 500	24 300
	Stickstofftrifluorid	NF ₃	17 200	16 100	17 400
	Trifluormethylschwefel-pentafluorid	SF ₅ CF ₃	17 700	17 400	18 500
	Sulfuryldifluorid	SO ₂ F ₂		4 090	4 630
R-13I1	Trifluoriodmethan	CF ₃ I	0,4		
	Heptafluorisobutyronitril	(CF ₃) ₂ CF-CN (i-C ₃ F ₇ CN)			2 750
	Perfluor-N-methylmorpholin	C ₅ F ₁₁ NO			8 800
	Perfluortripropylamin	C ₉ F ₂₁ N			9 030
	Perfluortributylamin (PFTBA)	C ₁₂ F ₂₇ N			8 490

Tabelle 2: Treibhauspotentiale (GWP₁₀₀) (chlor)fluorierter Ether (HFE, HCFE), fluorierter Alkohole und Ketone und Perfluorpolyether (PFPE)

Industrielle Bezeichnung	Chemische Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
(Chlor)Fluorierte Ether (HFE und HCFE)					
HFE-125		CHF ₂ -O-CF ₃	14 900	12 400	14 300
HFE-134 (HG-00)		CHF ₂ -O-CHF ₂	6 320	5 560	6 630
HFE-143a		CH ₃ -O-CF ₃	756	523	616
HFE-227ea		CF ₃ -CHF-O-CF ₃	1 540	6 450	7 520
HCFE-235ca2 (Enfluran)		CHF ₂ -O-CF ₂ -CHFCl		583	654
HCFE-235da2 (Isofluran)		CHF ₂ -O-CHCl-CF ₃	350	491	539
HFE-236ca12 (HG-10)		CHF ₂ -O-CF ₂ -O-CHF ₂	2 800	5 350	6 060
HFE-236ea2 (Desfluran)		CHF ₂ -O-CHF-CF ₃	989	1 790	2 590
HFE-236fa		CF ₃ -CH ₂ -O-CF ₃	487	979	1 100
HFE-245cb2		CF ₃ -CF ₂ -O-CH ₃	708	654	747
HFE-245fa1		CHF ₂ -CH ₂ -O-CF ₃	286	828	934
HFE-245fa2		CHF ₂ -O-CH ₂ -CF ₃	659	812	878
HFE-254cb1		CH ₃ -O-CF ₂ -CHF ₂	359	301	328
HFE-263mf		CF ₃ -CH ₂ -O-CH ₃	11	1	2,06
HFE-329mcc2		CF ₃ -CF ₂ -O-CF ₂ -CHF ₂	919	3 070	3 770
HFE-338mcf2		CF ₃ -CH ₂ -O-CF ₂ -CF ₃	552	929	1 040
HFE-338mmz1		(CF ₃) ₂ CH-O-CHF ₂	380	2 620	3 040
HFE-338pcc13 (HG-01)		CHF ₂ -O-CF ₂ -CF ₂ -O-CHF ₂	1 500	2 910	3 320
HFE-347mcc3 (HFE-7000)		CH ₃ -O-CF ₂ -CF ₂ -CF ₃	575	530	576
HFE-347mcf2		CHF ₂ -CH ₂ -O-CF ₂ -CF ₃	374	854	963
HFE-347mmy1		(CF ₃) ₂ CF-O-CH ₃	343	363	392
HFE-347mmz1 (Sevofluran)		CH ₂ F-O-CH(CF ₃) ₂		216	195
HFE-347pcf2		CHF ₂ -CF ₂ -O-CH ₂ -CF ₃	580	889	980
HFE-356mec3		CH ₃ -O-CF ₂ -CHF-CF ₃	101	387	264
HFE-356mm1		(CF ₃) ₂ CH-O-CH ₃	27	14	8,13

Industrielle Bezeichnung	Chemische Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
HFE-356pcc3		CH ₃ -O-CF ₂ -CF ₂ -CHF ₂	110	413	277
HFE-356pcf2		CHF ₂ -CH ₂ -O-CF ₂ -CHF ₂	265	719	831
HFE-356pcf3		CHF ₂ -O-CH ₂ -CF ₂ -CHF ₂	502	446	484
HFE-365mcf3		CF ₃ -CF ₂ -CH ₂ -O-CH ₃	11	1	1,6
HFE-374pc2		CHF ₂ -CF ₂ -O-CH ₂ -CH ₃	557	627	12,5
HFE-449s1 (HFE-7100)		C ₄ F ₉ -O-CH ₃	297	421	460
HFE-569sf2 (HFE-7200)		C ₄ F ₉ -O-C ₂ H ₅	59	57	60,7
HFE-43-10pccc124 (H-Galden 1040x)		CHF ₂ -O-CF ₂ -O-C ₂ F ₄ -O-CHF ₂	1 870	2 820	3 220
n-HFE-7100		CF ₃ -CF ₂ -CF ₂ -CF ₂ -O-CH ₃			544
i-HFE-7100		(CF ₃) ₂ CF-CF ₂ -O-CH ₃			437
i-HFE-7200		(CF ₃) ₂ CF-CF ₂ -O-CH ₂ -CH ₃			34,3
HFE-7300		n-(CF ₃) ₂ CF-CF(O-CH ₃)-C ₂ F ₅			405
Fluorierte Alkohole und Ketone					
	2,2,3,3,3-Pentafluorpropan-1-ol	CF ₃ -CF ₂ -CH ₂ -OH	42	19	34,3
	Bis(trifluormethyl) methanol	(CF ₃) ₂ CH-OH	195	182	206
	Octafluortetramethylen-hydroxymethyl-Gruppe	-(CF ₂) ₄ CH(OH)-	73	13	13,6
	1,1,1,3,4,4,4-Heptafluor-3-(trifluormethyl)butan-2-on	CF ₃ -C(O)-CF(CF ₃) ₂			0,29
	Perfluor(2-methyl-3-pentanon)	CF ₃ -CF ₂ -C(O)-CF(CF ₃) ₂			0,114
Perfluorpolyether (PFPE)					
PFPME	Perfluorpolymethyl isopropylether	CF ₃ (O-CF(CF ₃)CF ₂) _n -(O-CF ₂) _m -O-CF ₃ (n,m=1)	10 300	9 710	10 300

Tabelle 3: Treibhauspotentiale (GWP₁₀₀) halogenfreier Stoffe

Industrielle Bezeichnung	Chemische Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP F-Gas-VO ⁵
	Methan	CH ₄	25	27,9
R-170	Ethan	CH ₃ -CH ₃	5,5	0,437
R-290	Propan	CH ₃ -CH ₂ -CH ₃	3,3	0,02
R-600	n-Butan	CH ₃ -CH ₂ -CH ₂ -CH ₃	4	0,006
R-600a	i-Butan (Isobutan)	(CH ₃) ₂ CH-CH ₃	3	0
R-601	n-Pentan	CH ₃ -CH ₂ -CH ₂ -CH ₂ -CH ₃	5 ⁴	0
R-601a	i-Pentan (Isopentan)	(CH ₃) ₂ CH-CH ₂ -CH ₃	5 ⁴	0
	Cyclopentan	C ₅ H ₁₀		0
R-E170	Dimethylether (DME)	CH ₃ -O-CH ₃	1	1
R-610	Diethylether	CH ₃ -CH ₂ -O-CH ₂ -CH ₃	4	4
R-611	Methylformiat	HCOOCH ₃	25	11
R-702	Wasserstoff	H ₂	6	6
R-717	Ammoniak	NH ₃	0	0
R-718	Wasser	H ₂ O	0	0
R-723	Dimethylether-Ammoniak-Gemisch	R-717 (NH ₃): 60% R-E170 (CH ₃ -O-CH ₃): 40%	1	1
R-744	Kohlendioxid	CO ₂	1	1
R-1150	Ethen (Ethylen)	CH ₂ =CH ₂	3,7	4
R-1270	Propen (Propylen)	CH ₂ =CH-CH ₃	1,8	0

Tabelle 4: Treibhauspotentiale (GWP₁₀₀) von HFKW-Gemischen / Kältemittelblends

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
R-404A	HFKW-125 (CHF ₂ -CF ₃): 44% HFKW-134a (CH ₂ F-CF ₃): 4% HFKW-143a (CH ₃ -CF ₃): 52%	3 922	3 943	3 922
R-407A	HFKW-32 (CH ₂ F ₂): 20% HFKW-125 (CHF ₂ -CF ₃): 40% HFKW-134a (CF ₃ -CH ₂ F): 40%	2 107	1 923	2 107
R-407B	HFKW-32 (CH ₂ F ₂): 10% HFKW-125 (CHF ₂ -CF ₃): 70% HFKW-134a (CF ₃ -CH ₂ F): 20%	2 804	2 547	2 804
R-407C	HFKW-32 (CH ₂ F ₂): 23% HFKW-125 (CHF ₂ -CF ₃): 25% HFKW-134a (CH ₂ F-CF ₃): 52%	1 774	1 624	1 774
R-407D	HFKW-32 (CH ₂ F ₂): 15% HFKW-125 (CHF ₂ -CF ₃): 15% HFKW-134a (CF ₃ -CH ₂ F): 70%	1 627	1 487	1 627
R-407E	HFKW-32 (CH ₂ F ₂): 25% HFKW-125 (CHF ₂ -CF ₃): 15% HFKW-134a (CF ₃ -CH ₂ F): 60%	1 552	1 425	1 552
R-407F	HFKW-32 (CH ₂ F ₂): 30% HFKW-125 (CHF ₂ -CF ₃): 30% HFKW-134a (CF ₃ -CH ₂ F): 40%	1 825	1 674	1 825
R-407G	HFKW-32 (CH ₂ F ₂): 2,5% HFKW-125 (CHF ₂ -CF ₃): 2,5% HFKW-134a (CF ₃ -CH ₂ F): 95%	1 463	1 331	1 463
R-407H	HFKW-32 (CH ₂ F ₂): 32,5% HFKW-125 (CHF ₂ -CF ₃): 15% HFKW-134a (CF ₃ -CH ₂ F): 52,5%	1 495	1 378	1 495
R-407I	HFKW-32 (CH ₂ F ₂): 19,5% HFKW-125 (CHF ₂ -CF ₃): 8,5% HFKW-134a (CF ₃ -CH ₂ F): 72%	1 459	1 337	1 459
R-410A	HFKW-32 (CH ₂ F ₂): 50% HFKW-125 (CHF ₂ -CF ₃): 50%	2 088	1 924	2 088
R-410B	HFKW-32 (CH ₂ F ₂): 45% HFKW-125 (CHF ₂ -CF ₃): 55%	2 229	2 048	2 229
R-413A	HFKW-134a (CH ₂ F-CF ₃): 88% FKW-218 (CF ₃ -CF ₂ -CF ₃): 9% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 3%	2 053	1 945 ¹	2 095
R-417A	HFKW-125 (CHF ₂ -CF ₃): 46,6% HFKW-134a (CH ₂ F-CF ₃): 50% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 3,4%	2 346	2 127 ¹	2 346

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
R-417B	HFKW-125 (CHF ₂ -CF ₃): 79% HFKW-134a (CH ₂ F-CF ₃): 18,3% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 2,7%	3 027	2 742 ¹	3 027
R-417C	HFKW-125 (CHF ₂ -CF ₃): 19,5% HFKW-134a (CH ₂ F-CF ₃): 78,8% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 1,7%	1 809	1 643 ¹	1 809
R-419A	HFKW-125 (CHF ₂ -CF ₃): 77% HFKW-134a (CF ₃ -CH ₂ F): 19% R-E170 (CH ₃ -O-CH ₃) ¹ : 4%	2 967	2 688 ¹	2 967
R-419B	HFKW-125 (CHF ₂ -CF ₃): 48,5% HFKW-134a (CF ₃ -CH ₂ F): 48% R-E170 (CH ₃ -O-CH ₃) ¹ : 3,5%	2 384	2 161 ¹	2 384
R-421A	HFKW-125 (CHF ₂ -CF ₃): 58% HFKW-134a (CF ₃ -CH ₂ F): 42%	2 631	2 385	2 631
R-421B	HFKW-125 (CHF ₂ -CF ₃): 85% HFKW-134a (CF ₃ -CH ₂ F): 15%	3 190	2 890	3 190
R-422A	HFKW-125 (CHF ₂ -CF ₃): 85,1% HFKW-134a (CF ₃ -CH ₂ F): 11,5% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 3,4%	3 143	2 847 ¹	3 143
R-422B	HFKW-125 (CHF ₂ -CF ₃): 55% HFKW-134a (CF ₃ -CH ₂ F): 42% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 3%	2 526	2 290 ¹	2 526
R-422C	HFKW-125 (CHF ₂ -CF ₃): 82% HFKW-134a (CF ₃ -CH ₂ F): 15% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 3%	3 085	2 794 ¹	3 085
R-422D	HFKW-125 (CHF ₂ -CF ₃): 65,1% HFKW-134a (CF ₃ -CH ₂ F): 31,5% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 3,4%	2 729	2 473 ¹	2 729
R-422E	HFKW-125 (CHF ₂ -CF ₃): 58% HFKW-134a (CF ₃ -CH ₂ F): 39,3% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 2,7%	2 592	2 350 ¹	2 592
R-423A	HFKW-134a (CF ₃ -CH ₂ F): 52,5% HFKW-227ea (CF ₃ -CHF-CF ₃): 47,5%	2 280	2 274	2 280
R-424A	HFKW-125 (CHF ₂ -CF ₃): 50,5% HFKW-134a (CF ₃ -CH ₂ F): 47% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 1% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 0,9% R-601a ((CH ₃) ₂ CH-CH ₂ -CH ₃) ⁴ : 0,6%	2 440 ⁴	2 212 ^{1,4}	2 440
R-425A	HFKW-32 (CH ₂ F ₂): 18,5% HFKW-134a (CF ₃ -CH ₂ F): 69,5% HFKW-227ea (CF ₃ -CHF-CF ₃): 12%	1 505	1 431	1 505

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
R-426A	HFKW-125 (CHF ₂ -CF ₃): 5,1% HFKW-134a (CF ₃ -CH ₂ F): 93% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 1,3% R-601a ((CH ₃) ₂ CH-CH ₂ -CH ₃) ⁴ : 0,6%	1 508 ⁴	1 371 ^{1,4}	1 508
R-427A	HFKW-32 (CH ₂ F ₂): 15% HFKW-125 (CHF ₂ -CF ₃): 25% HFKW-134a (CF ₃ -CH ₂ F): 50% HFKW-143a (CH ₃ -CF ₃): 10%	2 138	2 024	2 138
R-427C	HFKW-32 (CH ₂ F ₂): 25% HFKW-125 (CHF ₂ -CF ₃): 25% HFKW-134a (CF ₃ -CH ₂ F): 40% HFKW-143a (CH ₃ -CF ₃): 10%	2 063	1 962	2 063
R-428A	HFKW-125 (CHF ₂ -CF ₃): 77,5% HFKW-143a (CH ₃ -CF ₃): 20% R-290 (CH ₃ -CH ₂ -CH ₃) ¹ : 0,6% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 1,9%	3 607	3 417 ¹	3 607
R-429A	HFKW-152a (CHF ₂ -CH ₃): 10% R-E170 (CH ₃ -O-CH ₃) ¹ : 60% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 30%	14	15 ¹	13
R-430A	HFKW-152a (CHF ₂ -CH ₃): 76% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 24%	95	106 ¹	94
R-431A	HFKW-152a (CHF ₂ -CH ₃): 29% R-290 (CH ₃ -CH ₂ -CH ₃) ¹ : 71%	38	42 ¹	36
R-434A	HFKW-125 (CHF ₂ -CF ₃): 63,2% HFKW-134a (CF ₃ -CH ₂ F): 16% HFKW-143a (CH ₃ -CF ₃): 18% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 2,8%	3 245	3 076 ¹	3 245
R-435A	HFKW-152a (CHF ₂ -CH ₃): 20% R-E170 (CH ₃ -O-CH ₃) ¹ : 80%	26	28 ¹	26
R-437A	HFKW-125 (CHF ₂ -CF ₃): 19,5% HFKW-134a (CF ₃ -CH ₂ F): 78,5% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 1,4% R-601 (CH ₃ -CH ₂ -CH ₂ -CH ₂ -CH ₃) ⁴ : 0,6%	1 805 ⁴	1 639 ^{1,4}	1 805
R-438A	HFKW-32 (CH ₂ F ₂): 8,5% HFKW-125 (CHF ₂ -CF ₃): 45% HFKW-134a (CF ₃ -CH ₂ F): 44,2% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 1,7% R-601a ((CH ₃) ₂ CH-CH ₂ -CH ₃) ⁴ : 0,6%	2 265 ⁴	2 059 ^{1,4}	2 264
R-439A	HFKW-32 (CH ₂ F ₂): 50% HFKW-125 (CHF ₂ -CF ₃): 47% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 3%	1 983	1 828 ¹	1 983
R-440A	HFKW-134a (CF ₃ -CH ₂ F): 1,6% HFKW-152a (CHF ₂ -CH ₃): 97,8% R-290 (CH ₃ -CH ₂ -CH ₃) ¹ : 0,6%	144	156 ¹	144

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
R-442A	HFKW-32 (CH ₂ F ₂): 31% HFKW-125 (CHF ₂ -CF ₃): 31% HFKW-134a (CF ₃ -CH ₂ F): 30% HFKW-152a (CHF ₂ -CH ₃): 3% HFKW-227ea (CF ₃ -CHF-CF ₃): 5%	1 888	1 754	1 888
R-444A	HFKW-32 (CH ₂ F ₂): 12% HFKW-152a (CHF ₂ -CH ₃): 5% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 83%	93 ²	89	88
R-444B	HFKW-32 (CH ₂ F ₂): 41,5% HFKW-152a (CHF ₂ -CH ₃): 10% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 48,5%	296 ²	295	293
R-445A	HFKW-134a (CF ₃ -CH ₂ F): 9% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 85% R-744 (CO ₂): 6%	135 ²	118	130
R-446A	HFKW-32 (CH ₂ F ₂): 68% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 29% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 3%	461 ²	461 ¹	459
R-447A	HFKW-32 (CH ₂ F ₂): 68% HFKW-125 (CHF ₂ -CF ₃): 3,5% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 28,5%	583 ²	572	582
R-447B	HFKW-32 (CH ₂ F ₂): 68% HFKW-125 (CHF ₂ -CF ₃): 8% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 24%	741 ²	714	739
R-448A	HFKW-32 (CH ₂ F ₂): 26% HFKW-125 (CHF ₂ -CF ₃): 26% HFKW-134a (CF ₃ -CH ₂ F): 21% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 20% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 7%	1 387 ²	1 273	1 386
R-448B	HFKW-32 (CH ₂ F ₂): 21% HFKW-125 (CHF ₂ -CF ₃): 21% HFKW-134a (CF ₃ -CH ₂ F): 31% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 20% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 7%	1 321 ²	1 211	1 320
R-449A	HFKW-32 (CH ₂ F ₂): 24,3% HFKW-125 (CHF ₂ -CF ₃): 24,7% HFKW-134a (CF ₃ -CH ₂ F): 25,7% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 25,3%	1 397 ²	1 282	1 396
R-449B	HFKW-32 (CH ₂ F ₂): 25,2% HFKW-125 (CHF ₂ -CF ₃): 24,3% HFKW-134a (CF ₃ -CH ₂ F): 27,3% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 23,2%	1 412 ²	1 296	1 411

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
R-449C	HFKW-32 (CH ₂ F ₂): 20% HFKW-125 (CHF ₂ -CF ₃): 20% HFKW-134a (CF ₃ -CH ₂ F): 29% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 31%	1 251 ²	1 147	1 250
R-450A	HFKW-134a (CF ₃ -CH ₂ F): 42% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 58%	605 ²	547	601
R-451A	HFKW-134a (CF ₃ -CH ₂ F): 10,2% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 89,8%	149 ²	133	146
R-451B	HFKW-134a (CF ₃ -CH ₂ F): 11,2% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 88,8%	164 ²	146	161
R-452A	HFKW-32 (CH ₂ F ₂): 11% HFKW-125 (CHF ₂ -CF ₃): 59% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 30%	2 140 ²	1 945	2 139
R-452B	HFKW-32 (CH ₂ F ₂): 67% HFKW-125 (CHF ₂ -CF ₃): 7% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 26%	698 ²	676	697
R-452C	HFKW-32 (CH ₂ F ₂): 12,5% HFKW-125 (CHF ₂ -CF ₃): 61% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 26,5%	2 220 ²	2 019	2 220
R-453A	HFKW-32 (CH ₂ F ₂): 20% HFKW-125 (CHF ₂ -CF ₃): 20% HFKW-134a (CF ₃ -CH ₂ F): 53,8% HFKW-227ea (CF ₃ -CHF-CF ₃): 5% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 0,6% R-601a ((CH ₃) ₂ CH-CH ₂ -CH ₃) ⁴ : 0,6%	1 765 ⁴	1 636 ^{1,4}	1 765
R-454A	HFKW-32 (CH ₂ F ₂): 35% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 65%	239 ²	238	237
R-454B	HFKW-32 (CH ₂ F ₂): 68,9% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 31,1%	466 ²	467	465
R-454C	HFKW-32 (CH ₂ F ₂): 21,5% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 78,5%	148 ²	146	146
R-454D	HFKW-32 (CH ₂ F ₂): 43% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 57%	293 ²	292	291
R-455A	HFKW-32 (CH ₂ F ₂): 21,5% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 75,5% R-744 (CO ₂): 3%	148 ²	146	146
R-455B	HFKW-32 (CH ₂ F ₂): 42% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 52% R-744 (CO ₂): 6%	286 ²	285	284
R-455C	HFKW-32 (CH ₂ F ₂): 43% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 54% R-744 (CO ₂): 3%	292 ²	292	291

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
R-456A	HFKW-32 (CH ₂ F ₂): 6% HFKW-134a (CF ₃ -CH ₂ F): 45% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 49%	687 ²	626	685
R-457A	HFKW-32 (CH ₂ F ₂): 18% HFKW-152a (CHF ₂ -CH ₃): 12% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 70%	139 ²	139	137
R-457B	HFKW-32 (CH ₂ F ₂): 35% HFKW-152a (CHF ₂ -CH ₃): 10% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 55%	251 ²	251	249
R-457C	HFKW-32 (CH ₂ F ₂): 7,5% HFKW-152a (CHF ₂ -CH ₃): 14,5% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 78%	72 ²	72	69
R-457D	HFKW-32 (CH ₂ F ₂): 4% HFKW-152a (CHF ₂ -CH ₃): 14% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 82%	48 ²	47	45
R-458A	HFKW-32 (CH ₂ F ₂): 20,5% HFKW-125 (CHF ₂ -CF ₃): 4% HFKW-134a (CF ₃ -CH ₂ F): 61,4% HFKW-227ea (CF ₃ -CHF-CF ₃): 13,5% HFKW-236fa (CF ₃ -CH ₂ -CF ₃): 0,6%	1 650	1 564	1 650
R-459A	HFKW-32 (CH ₂ F ₂): 68% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 26% HFKW-1234ze (E) (CF ₃ -CH=CHF) ² : 6%	460 ²	461	459
R-459B	HFKW-32 (CH ₂ F ₂): 21% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 69% HFKW-1234ze (E) (CF ₃ -CH=CHF) ² : 10%	145 ²	143	142
R-460A	HFKW-32 (CH ₂ F ₂): 12% HFKW-125 (CHF ₂ -CF ₃): 52% HFKW-134a (CF ₃ -CH ₂ F): 14% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 22%	2 103 ²	1 912	2 102
R-460B	HFKW-32 (CH ₂ F ₂): 28% HFKW-125 (CHF ₂ -CF ₃): 25% HFKW-134a (CF ₃ -CH ₂ F): 20% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 27%	1 352 ²	1 242	1 350
R-460C	HFKW-32 (CH ₂ F ₂): 2,5% HFKW-125 (CHF ₂ -CF ₃): 2,5% HFKW-134a (CF ₃ -CH ₂ F): 46% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 49%	766 ²	695	763
R-461A	HFKW-125 (CHF ₂ -CF ₃): 55% HFKW-134a (CH ₂ F-CF ₃): 32% HFKW-143a (CH ₃ -CF ₃): 5% HFKW-227ea (CF ₃ -CHF-CF ₃): 5% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 3%	2 767	2 567 ¹	2 767

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
R-462A	HFKW-32 (CH ₂ F ₂): 9% HFKW-125 (CHF ₂ -CF ₃): 42% HFKW-134a (CH ₂ F-CF ₃): 44% HFKW-143a (CH ₃ -CF ₃): 2% R-600 (CH ₃ -CH ₂ -CH ₂ -CH ₃) ¹ : 3%	2 249	2 060 ¹	2 249
R-463A	HFKW-32 (CH ₂ F ₂): 36% HFKW-125 (CHF ₂ -CF ₃): 30% HFKW-134a (CH ₂ F-CF ₃): 14% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 14% R-744 (CO ₂): 6%	1 494 ²	1 377	1 493
R-464A	HFKW-32 (CH ₂ F ₂): 27% HFKW-125 (CHF ₂ -CF ₃): 27% HFKW-227ea (CF ₃ -CHF-CF ₃): 6% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 40%	1 323 ²	1 240	1 321
R-465A	HFKW-32 (CH ₂ F ₂): 21% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 71,1% R-290 (CH ₃ -CH ₂ -CH ₃) ¹ : 7,9%	145 ²	143 ¹	142
R-466A	HFKW-32 (CH ₂ F ₂): 49% HFKW-125 (CHF ₂ -CF ₃): 11,5% R-13I1 (CF ₃ I) ¹ : 39,5%	733	696 ¹	733 ¹
R-467A	HFKW-32 (CH ₂ F ₂): 22% HFKW-125 (CHF ₂ -CF ₃): 5% HFKW-134a (CF ₃ -CH ₂ F): 72,4% R-600a ((CH ₃) ₂ CH-CH ₃) ¹ : 0,6%	1 359	1 249 ¹	1 359
R-468A	HFKW-32 (CH ₂ F ₂): 21,5% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 75% HFKW-1132a (CH ₂ =CF ₂) ³ : 3,5%	148 ^{2,3}	146	146
R-468B	HFKW-32 (CH ₂ F ₂): 13% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 81% HFKW-1132a (CH ₂ =CF ₂) ³ : 6%	91 ^{2,3}	89	88
R-468C	HFKW-32 (CH ₂ F ₂): 42% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 52% HFKW-1132a (CH ₂ =CF ₂) ³ : 6%	286 ^{2,3}	285	284
R-469A	HFKW-32 (CH ₂ F ₂): 32,5% HFKW-125 (CHF ₂ -CF ₃): 32,5% R-744 (CO ₂): 35%	1 357	1 251	1 357
R-470A	HFKW-32 (CH ₂ F ₂): 17% HFKW-125 (CHF ₂ -CF ₃): 19% HFKW-134a (CF ₃ -CH ₂ F): 7% HFKW-227ea (CF ₃ -CHF-CF ₃): 3% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 44% R-744 (CO ₂): 10%	980 ²	909	977

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
R-470B	HFKW-32 (CH ₂ F ₂): 11,5% HFKW-125 (CHF ₂ -CF ₃): 11,5% HFKW-134a (CF ₃ -CH ₂ F): 3% HFKW-227ea (CF ₃ -CHF-CF ₃): 7% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 57% R-744 (CO ₂): 10%	753 ²	717	749
R-471A	HFKW-227ea (CF ₃ -CHF-CF ₃): 4,3% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 78,7% HFKW-1336mzz (E) (CHF ₂ -CF ₃) ⁵ : 17,0%	147 ^{2,5}	148 ⁵	143
R-472A	HFKW-32 (CH ₂ F ₂): 12% HFKW-134a (CF ₃ -CH ₂ F): 19% R-744 (CO ₂): 69%	353	329	353
R-472B	HFKW-32 (CH ₂ F ₂): 10% HFKW-134a (CF ₃ -CH ₂ F): 32% R-744 (CO ₂): 58%	526	484	526
R-473A	HFKW-23 (CHF ₃): 10% HFKW-125 (CHF ₂ -CF ₃): 10% HFKW-1132a (CH ₂ =CF ₂) ³ : 20% R-744 (CO ₂): 60%	1 831 ³	1 558	1 831
R-474A	HFKW-1132 (E) (CHF=CHF) ³ : 23% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 77%	3 ^{2,3}	1	1
R-474B	HFKW-1132 (E) (CHF=CHF) ³ : 31,5% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 68,5%	3 ^{2,3}	1	1
R-475A	HFKW-134a (CF ₃ -CH ₂ F): 43% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 45% HFKW-1234ze (E) (CF ₃ -CH=CHF) ² : 12%	618 ²	560	615
R-476A	HFKW-134a (CF ₃ -CH ₂ F): 10% HFKW-1234ze (E) (CF ₃ -CH=CHF) ² : 78% HFKW-1336mzz (E) (CF ₃ -CH=CH-CF ₃) ⁵ : 12%	151 ^{2,5}	133 ⁵	146
R-478A	HFKW-32 (CH ₂ F ₂): 26% HFKW-125 (CHF ₂ -CF ₃): 15% HFKW-134a (CF ₃ -CH ₂ F): 15% HFKW-152a (CHF ₂ -CH ₃): 3% HFKW-227ea (CF ₃ -CHF-CF ₃): 4% HFKW-1234ze (E) (CF ₃ -CH=CHF) ² : 30% R-744 (CO ₂): 7%	1 050 ²	985	1 048
R-479A	HFKW-32 (CH ₂ F ₂): 21,5% HFKW-1132 (E) (CHF=CHF) ³ : 28% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 50,5%	147 ^{2,3}	146	146
R-480A	HFKW-227ea (CF ₃ -CHF-CF ₃): 9% HFKW-1234ze (E) (CF ₃ -CH=CHF) ² : 86% R-744 (CO ₂): 5%	296 ²	302	291

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
R-481A	HFKW-32 (CH ₂ F ₂): 16,9% HFKW-125 (CHF ₂ -CF ₃): 6,3% HFKW-134a (CF ₃ -CH ₂ F): 74,4% HFKW-1233zd (E) (CHCl=CH-CF ₃) ² : 1,8% R-601a ((CH ₃) ₂ CH-CH ₂ -CH ₃) ⁴ : 0,6%	1 399 ^{2,4}	1 281 ⁴	1 399
R-482A	HFKW-134a (CF ₃ -CH ₂ F): 10% HFKW-1224yd (Z) (CHCl=CF-CF ₃) ³ : 6,5% HFKW-1234ze (E) (CF ₃ -CH=CHF) ² : 83,5%	143 ^{2,3}	130	143
R-485A	HFKW-32 (CH ₂ F ₂): 21% HFKW-1132a (CH ₂ =CF ₂) ³ : 10% R-744 (CO ₂): 69%	143	143	142
R-486A	HFKW-134a (CF ₃ -CH ₂ F): 6,3% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 21,9% HFKW-1234ze (E) (CF ₃ -CH=CHF) ² : 33,8% R-131l (CF ₃ I) ¹ : 38%	93 ²	83 ¹	91 ¹
R-488A	HFKW-32 (CH ₂ F ₂): 6% HFKW-152a (CHF ₂ -CH ₃): 3% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 50% HFKW-1234ze (E) (CF ₃ -CH=CHF) ² : 41%	49 ²	46	45
R-507A	HFKW-125 (CHF ₂ -CF ₃): 50% HFKW-143a (CH ₃ -CF ₃): 50%	3 985	3 985	3 985
R-508A	HFKW-23 (CHF ₃): 39% FKW-116 (C ₂ F ₆): 61%	13 214	11 607	13 336
R-508B	HFKW-23 (CHF ₃): 46% FKW-116 (C ₂ F ₆): 54%	13 396	11 698	13 504
R-511A	HFKW-152a (CHF ₂ -CH ₃): 5% R-290 (CH ₃ -CH ₂ -CH ₃) ¹ : 95%	9	10 ¹	6
R-512A	HFKW-134a (CF ₃ -CH ₂ F): 5% HFKW-152a (CHF ₂ -CH ₃): 95%	189	196	189
R-513A	HFKW-134a (CF ₃ -CH ₂ F): 44% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 56%	631 ²	573	629
R-513B	HFKW-134a (CF ₃ -CH ₂ F): 41,5% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 58,5%	596 ²	540	594
R-514A	HFKW-1336mzz (Z) (CF ₃ -CH=CH-CF ₃) ² : 74,7% HCKW-1130 (E) (CHCl=CHCl) ³ : 25,3%	7 ^{2,3}	2	2 ³
R-515A	HFKW-227ea (CF ₃ -CHF-CF ₃): 12% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 88%	393 ²	403	388
R-515B	HFKW-227ea (CF ₃ -CHF-CF ₃): 8,9% HFKW-1234ze (E) (CHF=CH-CF ₃) ² : 91,1%	293 ²	299	288
R-516A	HFKW-134a (CF ₃ -CH ₂ F): 8,5% HFKW-152a (CHF ₂ -CH ₃): 14% HFKW-1234yf (CH ₂ =CF-CF ₃) ² : 77,5%	142 ²	131	139

Industrielle Bezeichnung	Chemische Formel / Zusammensetzung	GWP AR4 ¹	GWP AR5 ³	GWP F-Gas-VO ⁵
Isceon® MO89	HFKW-125 (CF ₃ -CHF ₂): 86% FKW-218 (CF ₃ -CF ₂ -CF ₃): 9% R-290 (CH ₃ -CH ₂ -CH ₃) ¹ : 5%	3 805	3 527 ¹	3 846

¹ GWP₁₀₀ aus: Climate Change 2007: *The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.

² GWP₁₀₀ aus: WMO (World Meteorological Organization), Scientific Assessment of Ozone Depletion: 2010, Global Ozone Research and Monitoring Project–Report No. 52, Geneva, Switzerland, 2010.

³ GWP₁₀₀ aus: Climate Change 2013: *The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

⁴ Standardwert aufgrund des GWP₁₀₀ anderer Kohlenwasserstoffe.

⁵ GWP₁₀₀ aus: Verordnung (EU) 2024/573 des Europäischen Parlaments und des Rates vom 7. Februar 2024 über fluorierte Treibhausgase, zur Änderung der Richtlinie (EU) 2019/1937 und zur Aufhebung der Verordnung (EU) Nr. 517/2014. <https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX:32024R0573> (07.03.2024).

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