

Hydrofluorocarbons (HFCs) of Various Types and Their Global Warming Potential (GWP)

The table below includes the information published by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). It includes recognized refrigerant numbers for HFCs, both pure substances and mixtures, as well as commonly used HCFCs in the country. The GWP values are currently calculated based on the Montreal Protocol according to the Fourth Assessment Report (AR4) published by the Intergovernmental Panel on Climate Change (IPCC). These values will be updated in the future as changes are announced under the Montreal Protocol.

HCFCs

ASHRAE number	Common name	IUPAC Chemical name	Condensed Formula	GWP (AR4)
R-22	HCFC-22	chlorodifluoromethane	CHClF ₂	1,810
R-141b	HCFC-141b	1,1-dichloro-1-fluoroethane	CH ₃ CCl ₂ F	725
R-142b	HCFC-142b	1-chloro-1,1-difluoroethane	CH ₃ CClF ₂	2,310
R-225	HCFC-225	1,2-Dichloro-1,1,3,3,3-pentafluoropropane	C ₃ HF ₅ Cl ₂	595
R-123	HCFC-123	2,2-dichloro-1,1,1-trifluoroethane	CHCl ₂ CF ₃	77.0000
R-124	HCFC-124	2-chloro-1,1,1,2-tetrafluoroethane	CHClF ₂ CF ₃	609.0000

HFCs

ASHRAE number	Common name	IUPAC Chemical name	Condensed Formula	GWP (AR4)
R-23	HFC-23	trifluoromethane (fluoroform)	CHF ₃	14,800
R-32	HFC-32	difluoromethane	CH ₂ F ₂	675
R-41	HFC-41	fluoromethane (methyl fluoride)	CH ₃ F	92
R-125	HFC-125	pentafluoroethane	CHF ₂ CF ₃	3,500
R-134	HFC-134	1,1,2,2-tetrafluoroethane	CHF ₂ CHF ₂	1,100
R-134a	HFC-134a	1,1,1,2-tetrafluoroethane	CH ₂ FCF ₃	1,430
R-143	HFC-143	1,1,2-trifluoroethane	CH ₂ FCHF ₂	353
R-143a	HFC-143a	1,1,1-trifluoroethane	CH ₃ CF ₃	4,470
R-152	HFC-152	1,2-difluoroethane	CH ₂ FCH ₂ F	53
R-152a	HFC-152a	1,1-difluoroethane	CH ₃ CHF ₂	124

R-227ea	HFC-227ea	1,1,1,2,3,3,3-heptafluoropropane	CF ₃ CHF ₂ CF ₃	3,220
R-236cb	HFC-236cb	1,1,1,2,2,3-hexafluoropropane	CH ₂ FCF ₂ CF ₃	1,340
R-236ea	HFC-236ea	1,1,1,2,3,3-hexafluoropropane	CHF ₂ CHF ₂ CF ₃	1,370
R-236fa	HFC-236fa	1,1,1,3,3,3-hexafluoropropane	CF ₃ CH ₂ CF ₃	9,810
R-245ca	HFC-245ca	1,1,2,2,3-pentafluoropropane	CH ₂ FCF ₂ CHF ₂	693
R-245fa	HFC-245fa	1,1,1,3,3-pentafluoropropane	CHF ₂ CH ₂ CF ₃	1,030
R-365mfc	HFC-365mfc	1,1,1,3,3-pentafluorobutane	CF ₃ CH ₂ CF ₂ CH ₃	794
R-43-10 mee	HFC-43-10mee	1,1,1,2,2,3,4,5,5,5-decafluoropentane	CF ₃ CHF ₂ CHF ₂ CF ₂ CF ₃	1,640

Zeotropic and Azeotropic Blends

ASHRAE number	GWP (AR4)	Components and mass fraction (%)
R-400	10,450	R-12/114 (must be specified) (50.0/50.0) (60.0/40.0)
R-401A	1,182	R-22/152a/124 (53.0/13.0/34.0)
R-401B	1,288	R-22/152a/124 (61.0/11.0/28.0)
R-401C	933	R-22/152a/124 (33.0/15.0/52.0)
R-402A	2,788	R-125/290/22 (60.0/2.0/38.0)
R-402B	2,416	R-125/290/22 (38.0/2.0/60.0)
R-403A	3,124	R-290/22/218 (5.0/75.0/20.0)
R-403B	4,457	R-290/22/218 (5.0/56.0/39.0)
R-404A	3,922	R-125/143a/134a (44.0/52.0/4.0)
R-405A	5,328	R-22/152a/142b/C318 (45.0/7.0/5.5/42.5)
R-406A	1,943	R-22/600a/142b (55.0/4.0/41.0)
R-407A	2,107	R-32/125/134a (20.0/40.0/40.0)
R-407B	2,804	R-32/125/134a (10.0/70.0/20.0)
R-407C	1,774	R-32/125/134a (23.0/25.0/52.0)
R-407D	1,627	R-32/125/134a (15.0/15.0/70.0)
R-407E	1,552	R-32/125/134a (25.0/15.0/60.0)
R-407F	1,825	R-32/125/134a (30.0/30.0/40.0)
R-407G	1,463	R-32/125/134a (2.5/2.5/95.0)
R-407H	1,495	R-32/125/134a (32.5/15.0/52.5)

R-407I	1,459	R-32/125/134a (19.5/8.5/72.0)
R-408A	3,152	R-125/143a/22 (7.0/46.0/47.0)
R-409A	1,585	R-22/124/142b (60.0/25.0/15.0)
R-409B	1,560	R-22/124/142b (65.0/25.0/10.0)
R-410A	2,088	R-32/125 (50.0/50.0)
R-410B	2,229	R-32/125 (45.0/55.0)
R-411A	1,597	R-1270/22/152a) (1.5/87.5/11.0)
R-411B	1,711	R-1270/22/152a (3.0/94.0/3.0)
R-411C	1,730	HC-1270/HCFC-22/HFC-152a (3.0/95.5/1.5)
R-412A	2,286	R-22/218/142b (70.0/5.0/25.0)
R-413A	2,053	R-218/134a/600a (9.0/88.0/3.0)
R-414A	1,478	R-22/124/600a/142b (51.0/28.5/4.0/16.5)
R-414B	1,362	R-22/124/600a/142b (50.0/39.0/1.5/9.5)
R-415A	1,507	R-22/152a (82.0/18.0)
R-415B	546	R-22/152a (25.0/75.0)
R-416A	1,084	R-134a/124/600 (59.0/39.5/1.5)
R-417A	2,346	R-125/134a/600 (46.6/50.0/3.4)
R-417B	3,027	R-125/134a/600 (79.0/18.3/2.7)
R-417C	1,809	R-125/134a/600 (19.5/78.8/1.7)
R-418A	1,741	R-290/22/152a (1.5/96.0/2.5)
R-419A	2,967	R-125/134a/E170 (77.0/19.0/4.0)
R-419B	2,384	R-125/134a/E170 (48.5/48.0/3.5)
R-420A	1,536	R-134a/142b (88.0/12.0)

R-421A	2,631	R-125/134a (58.0/42.0)
R-421B	3,190	R-125/134a (85.0/15.0)
R-422A	3,143	R-125/134a/600a (85.1/11.5/3.4)
R-422B	2,526	R-125/134a/600a (55.0/42.0/3.0)
R-422C	3,085	R-125/134a/600a (82.0/15.0/3.0)
R-422D	2,729	R-125/134a/600a (65.1/31.5/3.4)
R-422E	2,592	R-125/134a/600a (58.0/39.3/2.7)
R-423A	2,280	134a/227ea (52.5/47.5)
R-424A	2,440	R-125/134a/600a/600/601a (50.5/47.0/0.9/1.0/0.6)
R-425A	1,505	R-32/134a/227ea (18.5/69.5/12)
R-426A	1,508	R-125/134a/600/601a (5.1/93.0/1.3/0.6)
R-427A	2,138	R-32/125/143a/134a (15.0/25.0/10.0/50.0)
R-427C	2,063	R-32/125/143a/134a (25.0/25.0/10.0/40.0)
R-428A	3,607	R-125/143a/290/600a (77.5/20.0/0.6/1.9)
R-429A	12	R-E170/152a/600a (60.0/10.0/30.0)
R-430A	94	R-152a/600a (76.0/24.0)
R-431A	36	R-290/152a (71.0/29.0)
R-432A	0	R-1270/E170 (80.0/20.0)
R-433A	0	R-1270/290 (30.0/70.0)
R-433B	0	R-1270/290 (5.0/95.0)
R-433C	0	R-1270/290 (25.0/75.0)
R-434A	3,245	R-125/143a/134a/600a (63.2/18.0/16.0/2.8)
R-435A	25	R-E170/152a (80.0/20.0)

R-436A	0	R-290/600a (56.0/44.0)
R-436B	0	R-290/600a (52.0/48.0)
R-436C	0	R-290/600a (95.0/5.0)
R-437A	1,805	R-125/134a/600/601 (19.5/78.5/1.4/0.6)
R-438A	2,264	R-32/125/134a/600/601a (8.5/45.0/44.2/1.7/0.6)
R-439A	1,983	R-32/125/600a (50.0/47.0/3.0)
R-440A	144	R-290/134a/152a (0.6/1.6/97.8)
R-441A	0	R-170/290/600a/600 (3.1/54.8/6.0/36.1)
R-442A	1,888	R-32/125/134a/152a/227ea (31.0/31.0/30.0/3.0/5.0)
R-443A	0	R-1270/290/600a (55.0/40.0/5.0)
R-444A	87	R-32/152a/1234ze(E) (12.0/5.0/83.0)
R-444B	293	R-32/152a/1234ze(E) (41.5/10.0/48.5)
R-445A	129	R-744/134a/1234ze(E) (6.0/9.0/85.0)
R-446A	459	R-32/1234ze(E)/600 (68.0/29.0/3.0)
R-447A	582	R-32/125/1234ze(E) (68.0/3.5/28.5)
R-447B	739	R-32/125/1234ze (E) (68.0/8.0/24.0)
R-448A	1,386	R-32/125/1234yf/134a/1234ze(E) (26.0/26.0/20.0/21.0/7.0)
R-448B	1,320	R-32/125/1234yf/134a/1234ze(E) (21.0/21.0/20.0/31.0/7.0)
R-449A	1,396	R-32 /125 /1234yf /134a (24.3/24.7/25.3/25.7)
R-449B	1,411	R-32/125/1234yf/134a (25.2/24.3/23.2/27.3)
R-449C	1,250	R-32/125/1234yf/134a (20.0/20.0/31.0/29.0)

R-450A	601	R-134a/1234ze(E) (42.0/58.0)
R-451A	146	R-1234yf/134a (89.8/10.2)
R-451B	160	R-1234yf/134a (88.8/11.2)
R-452A	2,139	R-32/125/1234yf (11.0/59.0/30.0)
R-452B	697	R-32/125/1234yf (67.0/7.0/26.0)
R-452C	2,219	R-32/125/1234yf (12.5/61.0/26.5)
R-453A	1,765	R-32/125/134a/227ea/600/601a (20.0/20.0/53.8/5.0/0.6/0.6)
R-454A	236	R-32/1234yf (35.0/65.0)
R-454B	465	R-32/1234yf (68.9/31.1)
R-454C	145	R-32/1234yf (21.5/78.5)
R-455A	145	R-744/32/1234yf (3.0/21.5/75.5)
R-456A	684	R-32/134a/1234ze(E) (6.0/45.0/49.0)
R-457A	136	R-32/1234yf/152a (18.0/70.0/12.0)
R-457B	249	R-32/1234yf/152a (35.0/55.0/10.0)
R-458A	1,650	R-32/125/134a/227ea/236fa (20.5/4.0/61.4/13.5/0.6)
R-459A	459	R-32/1234yf/1234ze(E) (68.0/26.0/6.0)
R-459B	142	LTR 11: R-32/1234yf/1234ze(E) (21.0/69.0/10.0)
R-460A	2,101	LTR 10: R-32/125/134a/1234ze(E) (12.0/52.0/14.0/22.0)
R-460B	1,350	LTR4X10: R-32/125/134a/1234ze(E) (28.0/25.0/20.0/27.0)
R-460C	762	R-32/125/134a/1234ze(E) (2.5/2.5/46.0/49.0)

R-461A	2,767	R-125/143a/134a/227ea/600a (55.0/5.0/32.0/5.0/3.0)
R-462A	2,249	R-32/125/143a/134a/600 (9.0/42.0/2.0/44.0/3.0)
R-463A	1,493	R-744/32/125/1234yf/134a (6.0/36.0/30.0/14.0/14.0)
R-464A	1,320	R-32/125/1234ze(E)/227ea (27.0/27.0/40.0/6.0)
R-465A	142	R-32/290/1234yf (21.0/7.9/71.1)
R-466A	733	R-32/125/131I (49.0/11.5/39.5)
R-467A	1,359	R-32/125/134a/600a (22.0/5.0/72.4/0.6)
R-468A	145	R-1132a/32/1234yf (3.5/21.5/75.0)
R-469A	1,357	R-744/32/125 (35.0/32.5/32.5)
R-470A	976	R-744/32/125/134a/1234ze(E)/227ea (10.0/17.0/19.0/7.0/44.0/3.0)
R-470B	748	R-744/32/125/134a/1234ze(E)/227ea (10.0/11.5/11.5/3.0/57.0/7.0)
R-471A	138	R-1234ze(E)/227ea/1336mzz(E) (78.7/4.3/17.0)
R-472A	353	R-744/32/134a (69.0/12.0/19.0)
R-473A	1,830	R-1132a/23/744/125 (20.0/10.0/60.0/10.0)
R-500	8,077	R-12/152a (73.8/26.2)
R-501	4,083	R-22/12 (75.0/25.0)
R-502	4,657	R-22/115 (48.8/51.2)
R-503	14,560	R-23/13 (40.1/59.9)
R-504	4,143	R-32/115 (48.2/51.8)
R-505	8,502	R-12/31 (78.0/22.0)
R-506	4,490	R-31/114 (55.1/44.9)

R-507A	3,985	R-125/143a (50.0/50.0)
R-508A	13,214	R-23/116 (39.0/61.0)
R-508B	13,396	R-23/116 (46.0/54.0)
R-509A	5,741	R-22/218 (44.0/56.0)
R-510A	0	R-E170/600a (88.0/12.0)
R-511A	0	R-290/E170 (95.0/5.0)
R-512A	189	R-134a/152a (5.0/95.0)
R-513A	629	R-1234yf/134a (56.0/44.0)
R-513B	593	R-1234yf/134a (58.5/41.5)
R-514A	0	R-1336mzz(Z)/1130(E) (74.7/25.3)
R-515A	386	R-1234ze (E)/227ea (88.0/12.0)
R-515B	287	R-1234ze(E)/227ea (91.1/8.9)
R-516A	139	R-1234yf/134a/152a (77.5/8.5/14.0)