

ASHRAE No.	Chemical Name	Sporlan Letter Designation	Color Designation (PMS No.) ¹	ASHRAE 34 Safety Group	CAS Registry Number/ Brand Designation	Critical Values ²			Molecular Weight
						Temperature (°F)	Pressure (psia)	Sp Vol (ft ³ /lb _m)	
R-10	tetrachloromethane (carbon tetrachloride)			B1	56-23-5	542.03	661.37	0.0287	153.82
R-11	trichlorofluoromethane	H	Orange (021)	A1	75-69-4	388.33	639.27	0.0289	137.37
R-12	dichlorodifluoromethane	F	White (N/A)	A1	75-71-8	233.55	599.89	0.0284	120.91
R-12B1	bromochlorodifluoromethane (halon 1211)				353-59-3	308.84	594.94	0.0225	165.36
R-12B2	dibromodifluoromethane (halon 1202)				75-61-6	388.6	599.0		209.82
R-13	chlorotrifluoromethane	E	Light Blue (2975)	A1	75-72-9	83.71	562.31	0.0275	104.46
R-13B1	bromotrifluoromethane (halon 1301)	T	Pinkish-Red/Coral (177)	A1	75-63-8	152.60	574.90	0.0215	148.91
R-14	tetrafluoromethane (carbon tetrafluoride)		Yellow-Brown/Mustard (124)	A1	75-73-0	-50.15	543.89	0.0256	88.01
R-20	trichloromethane (chloroform)				67-66-3	504.23	794.81	0.0324	119.38
R-21	dichlorofluoromethane			B1	75-43-4	353.21	751.30	0.0306	102.92
R-21B2	dibromofluoromethane (halon 1102)				1868-53-7				191.83
R-22	chlorodifluoromethane	V	Light Green (352)	A1	75-45-6	205.06	723.74	0.0306	86.47
R-22B1	bromodifluoromethane (halon 1201)				1511-62-2	281.89	744.33	0.0204	130.92
R-23	trifluoromethane	G	Light Blue-Gray (428)	A1	75-46-7	78.66	701.40	0.0305	70.01
R-30	dichloromethane (methylene chloride)			B2	75-09-2	455.27	881.83	0.0357	84.93
R-30B1	bromochloromethane (halon 1011)				74-97-5				129.38
R-30B2	dibromomethane (halon 1002)				74-95-3	589.7	1029.8		173.83
R-31	chlorofluoromethane				593-70-4	305.17	744.20	0.0371	68.48
R-32	difluoromethane (methylene fluoride)			A2	75-10-5	172.59	838.61	0.0378	52.02
R-40	chloromethane (methyl chloride)			B2	74-87-3	289.49	965.95	0.0446	50.49
R-41	fluoromethane (methyl fluoride)				593-53-3	111.43	855.29	0.0506	34.03
R-50	methane			A3	74-82-8	-116.70	666.40	0.0988	16.04
R-110	hexachloroethane				67-72-1	808.3	571	0.0284	236.74
R-111	pentachlorofluoroethane				354-56-3				220.28
R-112	1,1,2,2-tetrachloro-1,2-difluoroethane				76-12-0				203.83
R-112a	1,1,1,2-tetrachloro-2,2-difluoroethane				76-11-9				203.83
R-113	1,1,2-trichloro-1,2,2-trifluoroethane	Q	Dark Purple/Violet (266)	A1	76-13-1	417.31	492.00	0.0286	187.37
R-113a	1,1,1-trichloro-2,2,2-trifluoroethane				354-58-5				187.37
R-114	1,2-dichloro-1,1,2,2-tetrafluoroethane	B	Dark Blue/Navy (302)	A1	76-14-2	294.22	472.39	0.0276	170.92
R-114a	1,1-dichloro-1,2,2,2-tetrafluoroethane				374-07-2				170.92
R-114B2	1,2-dibromo-1,1,2,2-tetrafluoroethane (halon 2402)				124-73-2	418.4			259.82
R-115	chloropentafluoroethane			A1	76-15-3	175.91	452.52	0.0261	154.47
R-116	hexafluoroethane		Dark Grey (424)	A1	76-16-4	67.78	441.20	0.0258	138.01
R-120	pentachloroethane				76-01-7				202.29
R-121	1,1,2,2-tetrachloro-1-fluoroethane				354-14-3				185.84
R-121a	1,1,1,2-tetrachloro-2-fluoroethane				354-11-0				185.84
R-122	1,2,2-trichloro-1,2-difluoroethane				354-21-2				169.38
R-122a	1,1,2-trichloro-1,2-difluoroethane				354-15-4				169.38
R-122b	1,1,1-trichloro-2,2-difluoroethane				354-12-1				169.38
R-123	2,2-dichloro-1,1,1-trifluoroethane		Light Blue-Gray (428)	B1	306-83-2	362.63	531.10	0.0291	152.93
R-123a	1,2-dichloro-1,1,2-trifluoroethane				354-23-4				152.93
R-123b	1,1-dichloro-1,2,2-trifluoroethane				812-04-4				152.93
R-124	2-chloro-1,1,1,2-tetrafluoroethane	M	Deep Green (335)	A1	2837-89-0	252.10	525.66	0.0286	136.48
R-124a	1-chloro-1,1,2,2-tetrafluoroethane				354-25-6				136.48
R-125	pentafluoroethane		Medium Brown/Tan (465)	A1	354-33-6	151.12	526.34	0.0280	120.02

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R-130	1,1,2,2-tetrachloroethane				79-34-5	730.5	847.0		167.85
R-130a	1,1,1,2-tetrachloroethane				630-20-6				167.85
R-131	1,1,2-trichloro-2-fluoroethane				359-28-4				151.39
R-131a	1,1,2-trichloro-1-fluoroethane				811-95-0				151.39
R-131b	1,1,1-trichloro-2-fluoroethane				2366-36-1				151.39
R-132	1,2-dichloro-1,2-difluoroethane				431-06-1				134.94
R-132a	1,1-dichloro-2,2-difluoroethane				471-43-2				134.94
R-132b	1,2-dichloro-1,1-difluoroethane				1649-08-7				134.94
R-132c	1,1-dichloro-1,2-difluoroethane				1842-05-3				134.94
R-133	1-chloro-1,2,2-trifluoroethane				431-07-2				118.49
R-133a	2-chloro-1,1,1-trifluoroethane				75-88-7				118.49
R-133b	1-chloro-1,1,2-trifluoroethane				421-04-5				118.49
R-134	1,1,2,2-tetrafluoroethane				359-35-3				102.03
R-134a	1,1,1,2-tetrafluoroethane	J	Light Blue (2975)	A1	811-97-2	213.91	588.75	0.0313	102.03
R-140	1,1,2-trichloroethane				79-00-5				133.40
R-140a	1,1,1-trichloroethane (methyl chloroform)				71-55-6				133.40
R-141	1,2-dichloro-1-fluoroethane				430-57-9				116.95
R-141a	1,1-dichloro-2-fluoroethane				430-53-5				116.95
R-141b	1,1-dichloro-1-fluoroethane				1717-00-6	399.56	616.41	0.0348	116.95
R-142	2-chloro-1,1-difluoroethane				338-65-8				100.50
R-142a	1-chloro-1,2-difluoroethane				338-64-7				100.50
R-142b	1-chloro-1,1-difluoroethane			A2	75-68-3	278.78	597.99	0.0368	100.50
R-143	1,1,2-trifluoroethane				430-66-0				84.04
R-143a	1,1,1-trifluoroethane			A2	420-46-2	163.20	547.60	0.0370	84.04
R-150	1,2-dichloroethane				107-06-2	559.1	778.9	0.0364	98.96
R-150a	1,1-dichloroethane				75-34-3	481.7	735.3		98.96
R-151	1-chloro-2-fluoroethane				762-50-5				82.50
R-151a	1-chloro-1-fluoroethane				1615-75-4				82.50
R-152	1,2-difluoroethane				624-72-6				66.05
R-152a	1,1-difluoroethane			A2	75-37-6	235.87	655.10	0.0435	66.05
R-160	chloroethane (ethyl chloride)				75-00-3	369.1	764		64.51
R-160B1	ethyl bromide (halon 2001)				74-96-4	447.3	903.6		108.96
R-161	fluoroethane (ethyl fluoride)				353-36-6	216.0	682		48.06
R-170	ethane	K		A3	74-84-0	89.92	706.59	0.1120	30.07
R-216	2,2-dichloro-1,1,1,3,3,3-hexafluoropropane				1652-80-8				220.93
R-216a ca?	1,3-dichloro-1,1,2,2,3,3-hexafluoropropane				662-01-1				220.93
R-216b ba?	1,2-dichloro-1,1,2,3,3,3-hexafluoropropane				661-97-2				220.93
R-216c	1,1-dichloro-1,2,2,3,3,3-hexafluoropropane				2729-28-4				220.93
R-217	1-chloro-1,1,2,2,3,3,3-heptafluoropropane				422-86-6				
R-218 (ca?)	octafluoropropane			A1	76-19-7				188.02
R-227ea	1,1,1,2,3,3,3-heptafluoropropane				431-89-0	217.04	432.21	0.0276	170.03
R-236ea	1,1,1,2,3,3-hexafluoropropane				431-63-0	282.72	507.92	0.0285	152.04
R-236fa	1,1,1,3,3,3-hexafluoropropane				690-39-1	256.86	464.12	0.0291	152.04
R-245ca	1,1,2,2,3-pentafluoropropane				679-86-7	345.96	569.27	0.0306	134.05
R-245cb	1,1,1,2,2-pentafluoropropane				1814-88-6				134.05

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R-245fa	1,1,1,3,3-pentafluoropropane			A1	460-73-11	309.29	527.94	0.0310	134.05
R-C270	cyclopropane				75-19-4	257.27	809.23	0.0617	42.08
R-290	propane			A3	74-98-6	206.06	616.07	0.0706	44.10
R-C316	1,2-dichloro-1,2,3,3,4,4-hexafluorocyclobutane				356-18-3				232.94
R-C317	chloroheptafluorocyclobutane								
R-C318	octafluorocyclobutane			A1	115-25-3	239.41	402.84	0.0258	200.04
R-600	n-butane			A3	106-97-8	305.62	550.56	0.0703	58.12
R-600a	2-methyl propane (isobutane)			A3	75-28-5	274.46	527.94	0.0714	58.12
R-601	n-pentane				109-66-0	385.8	487	0.0690	72.15
R-601a	2-methyl butane (isopentane)				78-78-4	370.0	490	0.0679	72.15
R-610	ethyl ether				60-29-7	380.57	527.94	0.0609	74.12
R-611	methyl formate			B2	107-31-3	416.39	870.23	0.0459	60.05
R-630	methyl amine				74-89-5	314.4	1082.0	0.0714	31.06
R-631	ethyl amine				75-04-7	361.4	815.11	0.0632	45.08
R-702n	normal hydrogen			A3	1333-74-0	-399.93	190.75	0.5320	2.02
R-702p	para hydrogen					-400.3	187.50	0.5097	
R-704	helium			A1	7440-59-7	-450.31	32.99	0.2300	4.00
R-717	ammonia	A	Silver	B2	7664-41-7	269.99	1643.7	0.0682	17.03
R-718	water/steam			A1	7732-18-5	705.18	3199.2	0.0497	18.02
R-720	neon			A1	7440-01-9	-379.58	388.50	0.0332	20.18
R-728	nitrogen			A1	7727-37-9	-232.52	492.81	0.0510	28.01
R-729	air				---	-220.96	548.97	0.0529	28.97
R-732	oxygen				7782-44-7	-181.42	731.42	0.0367	32.00
R-740	argon			A1	7440-37-1	-188.48	704.88	0.0302	39.95
R-744	carbon dioxide			A1	124-38-9	87.76	1069.9	0.0342	44.01
R-744A	nitrous oxide				10024-97-2	97.61	1050.1	0.0353	44.01
R-764	sulfur dioxide			B1	7446-09-5	315.77	1142.9	0.0305	64.06
R-1112a	1,1-dichloro-2,2-difluoroethene				79-35-6				132.92
R-1113	1-chloro-1,2,2-trifluoroethene				79-38-9				116.47
R-1114	tetrafluoroethene				116-14-3				100.02
R-1120	trichloroethene (trielen)				79-01-6	568	712	0.0312	131.39
R-1130	trans-1,2-dichloroethene (dielene)				156-60-5	469.9	795		96.95
R-1132a	1,1-difluoroethene (vinylidene fluoride)				75-38-7	85.46	646.62	0.0385	64.04
R-1140	chloroethene (vinyl chloride)			B3	75-01-4	305.3	746.9		62.50
R-1141	fluoroethene (vinyl fluoride)				75-02-5				46.04
R-1150	ethene (ethylene)			A3	74-85-1	48.55	731.00	0.0748	28.05
R-1270	propene (propylene)			A3	115-07-1	198.36	676.54	0.0717	42.08

Refrigerant Blends

R-401A	R-22/R-152a/R-124 (53/13/34)	X	Pinkish-Red/Coral (177)	A1	MP39	221.48	669.03	0.0324	94.44
R-401B	R-22/R-152a/R-124 (61/11/28)	F	Yellow-Brown/Mustard (124)	A1	MP66	218.38	679.07	0.0322	92.84
R-402A	R-125/R-290/R-22 (60/2/38)	L	Light Brown/Sand (461)	A1	HP80	168.85	614.11	0.0294	101.55
R-402B	R-125/R-290/R-22 (38/2/60)	R	Green-Brown/Olive (385)	A1	HP81	181.45	656.35	0.0299	94.71
R-403A	R-290/R-22/R-218 (5/75/20)			A1	ISCEON 69-S	196.2	680		91.99

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R-403B	R-290/R-22/R-218 (5/56/39)			A1	ISCEON 69-L	191.7	638		103.26
R-404A	R-125/R-143a/R-134a (44/52/4)	S	Orange (021)	A1	HP62, FX-70	161.86	541.71	0.0328	97.60
R-405A	R-22/R-152a/R-142b/R-C318 (45/7/5.5/42.5)				GREENCOOL G2015	222.8	622		111.91
R-406A	R-22/R-600a/R-142b (55/4/41)			A2	GHG	241.7	708		89.86
R-406B	R-22/R-600a/R-142b (65/4/31)			--	GHG-HP				88.58
R-407A	R-32/R-125/R-134a (20/40/40)		Lime Green (368)	A1	Klea 60	179.44	650.77	0.0302	90.11
R-407B	R-32/R-125/R-134a (10/70/20)		Cream (156)	A1	Klea 61	165.88	592.21	0.0285	102.94
R-407C	R-32/R-125/R-134a (23/25/52)	N	Medium Brown (471)	A1	Klea 66, Suva 9000	186.89	672.11	0.0312	86.20
R-407D	R-32/R-125/R-134a (15/15/70)		Dark Brown/Chocolate (450)	A1		196.82	650.21	0.0315	90.96
R-407E	R-32/R-125/R-134a (25/15/60)			A1		191.78	686.59	0.0320	83.78
R-408A	R-125/R-143a/R-22 (7/46/47)	R	Medium Purple (248)	A1	FX-10	182.30	629.46	0.0325	87.02
R-409A	R-22/R-124/R-142b (60/25/15)		Medium Brown/Tan (465)	A1	FX-56	224.46	667.17	0.0316	97.43
R-409B	R-22/R-124/R-142b (65/25/10)			A1	FX-57	219.84	683.24	0.0313	96.67
R-410A	R-32/R-125 (50/50)	Z	Rose (507)	A1	AZ-20, Suva 9100, Puron	158.30	691.81	0.0290	72.59
R-411A	R-1270/R-22/R-152a (1.5/87.5/11)		Dark Purple/Violet (266)	A2	GREENCOOL G2018a	210.31	718.46	0.0329	82.36
R-411B	R-1270/R-22/R-152a (3/94/3)		Blue-Green/Teal (326)	A2	GREENCOOL G2018b	204.71	717.54	0.0322	83.07
R-411C +	R-1270/R-22/R-152a (3/95.5/1.5)				GREENCOOL G2018c	203.9	718		83.44
R-412A	R-22/R-218/R-142b (70/5/25)			A2	Arcton TP5R	225.5	708		92.17
R-413A	R-218/R-134a/R-600a (9/88/3)			A2	ISCEON 49	214.5	615		103.95
R-414A	R-22/R-124/R-142b/R-600a (51/28.5/16.5/4)			A1	GHG-X4, Autofrost, Chill-It	231.3	682		96.93
R-414B	R-22/R-124/R-142b/R-600a (50/39/9.5/1.5)		Medium Blue (2995)		Hot Shot, Kar Kool	226.4	666		101.59
R-416A	R-134a/R124/R-600 (59/39.5/1.5)		Yellow-Green/Lime (381)		FRIGC (FR-12)	226.8	583		111.92
R-417A	R-125/R-134a/R-600 (46.6/50/3.4)				ISCEON 59, NU-22	193.8	595		106.75
---	R-22/R-124/R-600 (50/47/3)				DI-36	216.7	661		102.64
---	R-23/R-22/R-152a (5/65/30)				NARM-12	213.4	718		78.29
---	R-23/R-22/R-152a (5/80/15)				NARM-22	207.0	731		81.72
---	R-23/R-22/R-152a (5/90/5)				NARM-502	201.9	740		84.18
---	R-23/R-32/R-134a (4.5/21.5/74)				FX-220	192.2	711		83.14
---	R-32/R-125/R-143a (10/45/45)				FX-40	189.0	683		90.69
---	R-32/R-125/R-143a/R-134a (2/41/50/7)				FX-48B	163.2	553		95.82
---	R-32/R-125/R-143a/R-134a (10/33/36/21)				HX4	171.5	582		90.80
---	R-125/R-22 (70/30)				FX-20	164.7	586		107.51
---	R-125/R-134a/R-152a (35/40/25)				GHG-X8	203.9	600		94.15
---	R-125/R-290/R-218 (86/5/9)				ISCEON 89	158	529.3		113.9
---	R-125/R-143a/R-290/R-22 (42/6/2/50)				DI-44	177.8	645		95.70
---	R-125/R-152a/R-227ea (40/5/55)				GHG-X7	189.0	519		136.53
---	R-134a/R-142b (80.6/19.4)				RB276	225.1	598		101.73
R-500	R-12/R-152a (73.8/26.2)	D	Yellow (109)	A1	Carrene #7	215.87	605.25	0.0326	99.30
R-501	R-22/R-12 (75/25)			A1		205.15	690.97	0.0304	93.10
R-502	R-22/R-115 (48.8/51.2)	R	Light Purple/Lavender (251)	A1		177.31	582.84	0.0282	111.63
R-503	R-23/R-13 (40.1/59.9)	W	Blue-Green/Aqua (3268)			65.17	618.54	0.0290	87.25
R-504	R-32/R-115 (48.2/51.8)					143.84	643.80	0.0317	79.25
R-505	R-12/R-31 (78/22)					244.0	686		103.48
R-506	R-31/R-114 (55.1/44.9)					288.0	748		93.69
R-507A (R-507)	R-125/R-143a (50/50)	P	Blue-Green/Teal (326)	A1	AZ-50	159.34	538.78	0.0325	98.86

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R-508A (R-508)	R-23/R-116 (39/61)			A1	Klea 5R3	51.81	536.72	0.0279	100.10
R-508B	R-23/R-116 (46/54)	W	Dark Blue/Navy (302)	A1	Suva 95	53.70	556.11	0.0281	95.39
R-509A (R-509)	R-22/R-218 (44/56)			A1	Arcton TP5R2	189.0	585		123.96

revised: 03/03/02

¹Refrigerant color designations per ARI Guideline N

²Data obtained from various sources, including: ASHRAE, NIST, and refrigerant manufacturers

+ preliminary ASHRAE No.

ASHRAE 34 refrigerant designation system:

first digit on the right: number of fluorine atoms

second digit on the right: number of hydrogen atoms plus one

third digit on the right: number of carbon atoms minus one (not used when equal to zero)

fourth digit on the right: number of bonds in the compound (not used when equal to zero)

The lower-case letter that follows the refrigeration designation refers to the form of the molecule when different forms (isomers) are possible, with the most symmetrical form indicated by the number alone. As the form becomes more and more unsymmetrical, the letters a, b, and c (lower case) are appended