ANSI/ASHRAE Addendum *c* to
ANSI/ASHRAE Standard 34-2001

ASHRAE® STANDARD

Designation and Safety Classification of Refrigerants

Approved by the ASHRAE Standards Committee on January 29, 2003; by the ASHRAE Board of Directors on January 30, 2003; and by the American National Standards Institute on September 25, 2003.

This standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. The change submittal form, instructions, and deadlines are given at the back of this document and may be obtained in electronic form from ASHRAE's Internet Home Page, *http://www.ashrae.org*, or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard and printed copies of a public review draft may be purchased from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2305. E-mail: *orders@ashrae.org*. Fax: 404-321-5478. Telephone: 404-636-8400 (worldwide), or toll free 1-800-527-4723 (for orders in U.S. and Canada).

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SPECIAL NOTE

This American National Standard (ANS) is a national voluntary consensus standard developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Consensus is defined by the American National Standards Institute (ANSI), of which ASHRAE is a member and which has approved this standard as an ANS, as "substantial agreement reached by directly and materially affected interest categories. This signifies the concurrence of more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that an effort be made toward their resolution." Compliance with this standard is voluntary until and unless a legal jurisdiction makes compliance mandatory through legislation.

ASHRAE obtains consensus through participation of its national and international members, associated societies, and public review.

ASHRAE Standards are prepared by a Project Committee appointed specifically for the purpose of writing the Standard. The Project Committee Chair and Vice-Chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Standard. Every effort is made to balance the concerned interests on all Project Committees.

The Manager of Standards of ASHRAE should be contacted for:

a. interpretation of the contents of this Standard,
b. participation in the next review of the Standard,
c. offering constructive criticism for improving the Standard,
d. permission to reprint portions of the Standard.

(This foreword is not part of this addendum but is included for information only.)

FOREWORD

This addendum adds a designation of R-418A to the blend R-290/22/152a (1.5/96.0/2.5) with tolerances of (±0.5/±1.0/±0.5) and a safety classification of A2. Revised Table 2 and Appendix B incorporate editorial changes identified in the February 7, 2002, Errata Sheet and additional changes from Addendum a and Addendum b to ANSI/ASHRAE Standard 34-2001.

ADDENDUM *C* TO ANSI/ASHRAE STANDARD 34-2001

Add to Table 2 the following entries for R-418A:

TABLE 2
Data and Safety Classifications for Refrigerant Blends

Refrigerant Number	Composition (Mass %)	Composition Tolerances	Azeotropic Temperature (°C)	Azeotropic Temperature (°F)	Molecular Mass[a]	Normal Boiling Point[a] (°C)	Normal Boiling Point[a] (°F)	Safety Group
418A	R-290/22/152a (1.5/96.0/2.5)	(±0.5/±1.0/±0.5)						A2

Add to Table B1 the following entries for R-418A:

TABLE B-1
Comparison of Safety Group Classifications to Those Under ASHRAE Standard 34-1989

Refrigerant Number	Chemical Formula	Safety Group 1989	Safety Group 2001
418A	R-290/22/152a (1.5/96.0/2.5)	–	A2

TABLE 2
Data and Safety Classification for Refrigerant Blends

Refrigerant Number	Composition (Mass%)	Composition Tolerances	Azeotropic Temperature (°C)	Azeotropic Temperature (°F)	Molecular Mass[a]	Normal Boiling Point[a] (°C)	Normal Boiling Point[a] (°F)	Safety Group
	Zeotropes							
400	R-12/114 (must be specified)		none	none				A1
401A	R-22/152a/124 (53/13/34)	(±2/+0.5,-1.5/±1)						A1
401B	R-22/152a/124 (61/11/28)	(±2/+0.5,-1.5/±1)						A1
401C	R-22/152a/124 (33/15/52)	(±2/+0.5,-1.5/±1)						A1
402A	R-125/290/22 (60.0/2.0/38.0)	(±2.0/+0.1,-1.0/±2.0)						A1
402B	R-125/290/22 (38.0/2.0/60.0)	(±2.0/+0.1,-1.0/±2.0)						A1
403A	R-290/22/218 (5/75/20)	(+0.2,-2/±2/±2)						A1
403B	R-290/22/218 (5/56/39)	(+0.2,-2/±2/±2)						A1
404A	R-125/143a/134a (44/52/4)	(±2/±1/±2)						A1
405A	R-22/152a/142b/C318 (45/7/5.5/42.5)	(±2/±1/±1/±2)						
406A	R-22/600a/142b (55/4/41)	(±2/±1/±1)						A2
407A	R-32/125/134a (20/40/40)	(±2/±2/±2)						A1
407B	R-32/125/134a (10/70/20)	(±2/±2/±2)						A1
407C	R-32/125/134a (23/25/52)	(±2/±2/±2)						A1
407D	R-32/125/134a (15/15/70)	(±2/±2/±2)						A1
407E	R-32/125/134a (25/15/60)	(±2/±2/±2)						A1
408A	R-125/143a/22 (7/46/47)	(±2/±1/±2)						A1
409A	R-22/124/142b (60/25/15)	(±2/±2/±1)						A1
409B	R-22/124/142b (65/25/10)	(±2/±2/±1)						A1
410A	R-32/125 (50/50)	(+0.5,-1.5/+1.5,-0.5)						A1
410B	R-32/125 (45/55)	(±1/±1)						A1
411A	R-1270/22/152a (1.5/87.5/11.0)	(+0,-1/+2,-0/+0,-1)						A2
411B	R-1270/22/152a (3/94/3)	(+0,-1/+2,-0/+0,-1)						A2
412A	R-22/218/142b (70/5/25)	(±2/±2/±1)						A2
413A	R-218/134a/600a (9/88/3)	(±1/±2/+0,-1)						A2
414A	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	(±2.0/±2.0/±0.5/+0.5,-1.0)						A1
414B	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	(±2.0/±2.0/±0.5/+0.5,-1.0)						A1
415A	R-22/152a (82.0/18.0)	(±1.0/±1.0)						A2
416A	R-134a/124/600 (59.0/39.5/1.5)	(+0.5,-1.0/+1.0,-0.5/+0.1,-0.2)						A1
417A	R-125/134a/600 (46.6/50.0/3.4)	(±1.0/±1.0/+0.1,-0.4)						A1
418A	R-290/22/152a (1.5/96.0/2.5)	(±0.5/±1.0/±0.5)						A2
	Azeotropes [b]							
500	R-12/152a (73.8/26.2)		0	32	99.3	-33	-27	A1
501	R-22/12 (75.0/25.0) [c]		-41	-42	93.1	-41	-42	A1
502	R-22/115 (48.8/51.2)		19	66	112.0	-45	-49	A1

[a] The molecular mass and normal boiling point are not part of this standard.

[b] Azeotropic refrigerants exhibit some segregation of components at conditions of temperature and pressure other than those at which they were formulated. The extent of segregation depends on the particular azeotrope and hardware system configuration.

[c] The exact composition of this azeotrope is in question, and additional experimental studies are needed.

[d] R-507, R-508, and R-509 are allowed alternative designations for R-507A, R-508A, and R-509A due to a change in designations after assignment of R-500 through R-509. Corresponding changes were not made for R-500 through R-506.

TABLE 2 (Continued)
Data and Safety Classification for Refrigerant Blends

503	R-23/13 (40.1/59.9)	88	126	87.5	-88	-126	
504	R-32/115 (48.2/51.8)	17	63	79.2	-57	-71	
505	R-12/31 (78.0/22.0) [c]	115	239	103.5	-30	-22	
506	R-31/114 (55.1/44.9)	18	64	93.7	-12	10	
507A [d]	R-125/143a (50/50)	-40	-40	98.9	-46.7	-52.1	A1
508A [d]	R-23/116 (39/61)	-86	-122	100.1	-86	-122	A1
508B	R-23/116 (46/54)	-45.6	-50.1	95.4	-88.3	-126.9	A1
509A [d]	R-22/218 (44/56)	0	32	124.0	-47	-53	A1

[a] The molecular mass and normal boiling point are not part of this standard.
[b] Azeotropic refrigerants exhibit some segregation of components at conditions of temperature and pressure other than those at which they were formulated. The extent of segregation depends on the particular azeotrope and hardware system configuration.
[c] The exact composition of this azeotrope is in question, and additional experimental studies are needed.
[d] R-507, R-508, and R-509 are allowed alternative designations for R-507A, R-508A, and R-509A due to a change in designations after assignment of R-500 through R-509. Corresponding changes were not made for R-500 through R-506.

(This appendix is not part of this standard but is included for information only.)

APPENDIX B

Composition of Previous and Current Safety Classifications

A comparison of the current refrigerant classification system with its predecessor is summarized in Table B1.

TABLE B1
Comparison of Safety Group Classifications to Those Under ASHRAE Standard 34-1989

Refrigerant Number	Chemical Formula	Safety Group 1989	Safety Group 2001
10	CCl_4	2	-
11	CCl_3F	1	A1
12	CCl_2F_2	1	A1
13	$CClF_3$	1	A1
13B1	$CBrF_3$	1	A1
14	CF_4	1	A1
21	$CHCl_2F$	2	B1
22	$CHClF_2$	1	A1
23	CHF3	-	A1
30	CH_2Cl_2	2	B2
32	CH_2F_2	-	A2
40	CH_3Cl	2	B2
50	CH_4	3a	A3
113	CCl_2FCClF_2	1	A1
114	$CClF_2CClF_2$	1	A1
115	$CClF_2CF_3$	1	A1
116	CF_3CF_3	-	A1
123	$CHCl_2CF_3$	-	B1
124	$CHClFCF_3$	-	A1
125	CHF_2CF_3	-	A1
134a	CH_2FCF_3	-	A1
142b	CH_3CClF_2	3b	A2

- Not listed in standard.
NC Listed, but with no safety classification

TABLE B1 (Continued)
Comparison of Safety Group Classifications to Those Under ASHRAE Standard 34-1989

143a	CH_3CF_3	-	A2
152a	CH_3CHF_2	3b	A2
170	CH_3CH_3	3a	A3
218	$CF_3CF_2CF_3$	-	A1
245fa	$CHF_2CH_2CF_3$	-	B1
290	$CH_3CH_2CH_3$	3a	A3
C318	$-(CF_2)_4-$	1	A1
400	R-12/114	1	A1
401A	R-22/152a/124	-	A1
401B	R-22/152a/124	-	A1
401C	R-22/152a/124	-	A1
402A	R-125/290/22	-	A1
402B	R-125/290/22	-	A1
403A	R-290/22/218	-	A1
403B	R-290/22/218	-	A1
404A	R-125/143a/134a	-	A1
405A	R-22/152a/142b/C318	-	NC
406A	R-22/600a/142b	-	A2
407A	R-32/125/134a	-	A1
407B	R-32/125/134a	-	A1
407C	R-32/125/134a	-	A1
407D	R-32/125/134a	-	A1
407E	R-32/125/134a	-	A1
408A	R125/143a/22	-	A1
409A	R-22/124/142b	-	A1
410A	R-32/125	-	A1
410B	R-32/125	-	A1
411A	R-1270/22/152a	-	A2
411B	R-1270/22/152a	-	A2
412A	R-22/218/142b	-	A2
413A	R-218/134a/600a	-	A2
414A	R-22/124/600a/142b	-	A1
414B	R-22/124/600a/142b	-	A1
415A	R-22/152a (82.0/18.0)	-	A2
416A	R-134a/124/600	-	A1
417A	R-125/134a/600	-	A1
418A	R-290/22/152a	-	A2
500	R-12/152a	1	A1
501	R-22/12	1	A1
502	R-22/115	1	A1
507A	R-125/143a	-	A1
508A	R-23/116	-	A1
508B	R-23/116	-	A1
509A	R-22/218	-	A1
600	$CH_3CH_2CH_2CH_3$	3a	A3
600a	$CH(CH_3)_2CH_3$	3a	A3
611	$CHOOCH_3$	2	B2

- Not listed in standard.
NC Listed, but with no safety classification

TABLE B1 (Continued)
Comparison of Safety Group Classifications to Those Under ASHRAE Standard 34-1989

702	H_2	-	A3
704	He	-	A1
717	NH_3	2	B2
718	H_2O	-	A1
720	Ne	-	A1
728	N_2	-	A1
740	Ar	-	A1
744	CO_2	1	A1
764	SO_2	2	B1
1140	CH_2=CHCl	-	NC
1150	CH_2= CH_2	3a	A3
1270	$CH_3CH=CH_2$	3a	A3

- Not listed in standard.
NC Listed, but with no safety classification

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.