



**Environmental Protection Agency
Air and Radiation Stratospheric Protection Division
6205J**

Substitute Refrigerants Under SNAP as of August 10, 2012

SNAP Information: <http://www.epa.gov/ozone/snap>

EPA has created the Significant New Alternatives Policy (SNAP) Program under section 612 of the Clean Air Act Amendments. SNAP evaluates alternatives to ozone-depleting substances. Substitutes are reviewed on the basis of ozone depletion potential, global warming potential, toxicity, flammability, and exposure potential as described in the March 18, 1994, final SNAP rule (59 FR 13044). Lists of acceptable and unacceptable substitutes will be updated periodically in the Federal Register. The following SNAP notices and subsequent final rules are included in this list: August 26, 1994 (59 FR 44240), January 13, 1995 (60 FR 3318), June 13, 1995 (60 FR 31092), July 28, 1995 (60 FR 38729), February 8, 1996 (61 FR 4736), May 22, 1996 (61 FR 25585), September 5, 1996 (61 FR 47012), October 16, 1996 (61 FR 54030), March 10, 1997 (62 FR 10700), June 3, 1997 (62 FR 30275), February 24, 1998 (63 FR 9151), May 22, 1998 (63 FR 28251), January 26, 1999 (64 FR 3861), March 3, 1999 (64 FR 10374), April 28, 1999 (64 FR 22982), June 8, 1999 (64 FR 30410), December 6, 1999 (64 FR 68039), April 11, 2000 (65 FR 19327), June 19, 2000 (65 FR 37900), December 18, 2000 (65 FR 78977), May 23, 2001 (66 FR 28379), March 22, 2002 (67 FR 13272), December 20, 2002 (67 FR 77927), August 21, 2003 (68 FR 50533), and October 1, 2004 (69 FR 58903), March 29, 2006 (71 FR 15589), September 28, 2006 (71 FR 55884), October 4, 2007 (72 FR 56628), June 12, 2008 (73 FR 33304), January 2, 2009 (74 FR 21), September 30, 2009 (74 FR 50129), June 16, 2010 (75 FR 34017), March 29, 2011 (76 FR 17488), October 4, 2011 (76 FR 61269), December 20, 2011 (76 FR 78832), June 6, 2012 (77 FR 33315), and August 10, 2012 (77 FR 47768).

Acceptable Substitutes for Class I (CFCs) Substances in Air Conditioning under the Significant New Alternatives Policy (SNAP) Program as of August 10, 2012

Substitutes (Name Used in Federal Register)	Trade Name	CFC-11 Centrifugal Chillers	CFC-12, CFC-114, R-500 Centrifugal Chillers	CFC-12, R-500 Reciprocating and Screw Chillers	CFC-12 Motor Vehicle AC ¹	CFC-12 Industrial Process AC	CFC-114 Industrial Process AC	CFC-12, R-500 Residential Dehumidifiers
HCFC-123	123	R, N	N					
HCFC-22 ²	22	N	N	N	R, N ¹ (buses only)		N (only <115F)	R, N
HCFC-124	124		R, N (CFC-114 only)				R, N	
HFC-134a	134a	N	R, N	R, N	R, N ¹		N (only <125F)	R, N
HFC-152a	152a				N ⁴ (no R)			
HFC-227ea		N	N	N				
HFC-236fa			R, N (CFC-114 only)					
HFC-245fa	Genetron® 245fa	R,N	R,N (CFC-114 only)				R,N	
R-401A, R-401B ³	MP-39, MP-66			R, N			R, N	R, N
R-406A ³	GHG-12, GHG-X3		R, N (R-500 only)		R, N ^{1,2}			R

Key: R = Retrofit Uses, N = New Uses

¹These refrigerants are actually "acceptable subject to use conditions." The conditions include 1)the use of unique fittings, 2)the use of descriptive labels, and 3) a prohibition against topping off one refrigerant with another. Details may be found in EPA's fact sheet titled "Choosing and Using Alternative Refrigerants for Motor Vehicle Air Conditioning."

² In addition to the use conditions listed under (1), these refrigerants must be used with barrier hoses.

³As of January 1, 2010, virgin HCFC-22, HCFC-142b and blends containing HCFC-22 or HCFC-142b may only be used to service existing appliances. Consequently, virgin HCFC-22, HCFC-142b and blends containing HCFC-22 or HCFC-142b may not be used to manufacture new pre-charged appliances or appliance components or to charge new appliances assembled onsite.

⁴See use conditions in Appendix B to Subpart G, 40 CFR Part 82 and 73 FR 33303 (June 12, 2008 final rule).



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**Acceptable Substitutes for Class I (CFCs) Substances in Air Conditioning under the
Significant New Alternatives Policy (SNAP) Program as of August 10, 2012 (continued)**

Substitutes (Name Used in Federal Register)	Trade Name	CFC-11 Centrifugal Chillers	CFC-12, CFC-114, R-500 Centrifugal Chillers	CFC-12, R-500 Reciprocating and Screw Chillers	CFC-12 Motor Vehicle AC ¹	CFC-12 Industrial Process AC	CFC-114 Industrial Process AC	CFC-12, R-500 Residential Dehumidifiers
R-409A (HCFC Blend Gamma) ³	409A							R
R-411A, R-411B ³	411A, 411B			R, N				
FRIGC (HCFC Blend Beta)	FRIGC FR-12, 416A		R, N (CFC-12, R-500 only)	R, N	R, N ¹			R, N
Free Zone (HCFC Blend Delta) ³	Freezone / RB-276		R, N (CFC-12, R-500 only)	R, N	R, N ¹			R, N
Hot Shot (HCFC Blend Omicron) ³	Hot Shot, KarKool, 414B		R, N (CFC-12, R-500 only)	R, N	R, N ^{1,2}	R,N	R,N	R, N
GHG-X4 (HCFC Blend Xi) ³	GHG-X4, Autofrost, McCool Chill-it, 414A		R, N (CFC-12, R-500 only)	R, N	R, N ^{1,2}			R, N
GHG-X5 ³	GHG-X5		R, N (CFC-12, R-500 only)	R, N	R, N ^{1,2}			R, N
GHG-HP (HCFC Blend Lambda) ³	GHG-HP				R, N ^{1,2}			R, N
Freeze 12 ³	Freeze 12		R, N (CFC-12, R-500 only)	R, N	R, N ¹			R, N
G2018C ³	G2018C		R, N (CFC-12, R-500 only)	R, N				
THR-02	THR-02		N (CFC-12 only)	N (CFC-12 only)		R, N		
Ikon A, Ikon-12 (Blend Zeta)	Ikon A, Ikon-12		R, N (CFC-12 only)		R, N ¹	R, N		
Ikon B	Ikon B		R, N (CFC-12 only)	N (CFC-12 only)		R, N		R, N (CFC-12 only)
FOR12A, FOR12B	FOR12A, FOR12B		R, N (CFC-12 only)	R, N (CFC-12 only)		R, N		
SP34E	SP34E			R, N (CFC-12 only)	R, N ¹			
HCFC-22/HCFC-142b ³	ICOR		R, N (CFC-12 only)	R, N (CFC-12 only)				R, N (CFC-12 only)
R-420A ³	Choice R-420A		R, N (CFC-12, R-500 only)	R, N	R ^{1,2}	R,N		R, N
ISCEON 39TC	ISCEON 39TC		R, N (CFC-12 only)			R,N		
RS-24 (2002 formulation)						R,N		R, N (CFC-12 only)
R-407C	SUVA 407C, KLEA 407C			R, N (R-502)		R, N (R- 502)		R, N (R-502)

Key: R = Retrofit Uses, N = New Uses
¹These refrigerants are actually "acceptable subject to use conditions." The conditions include 1) the use of unique fittings, 2) the use of descriptive labels, and 3) a prohibition against topping off one refrigerant with another. Details may be found in EPA's fact sheet titled "Choosing and Using Alternative Refrigerants for Motor Vehicle Air Conditioning."
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**Acceptable Substitutes for Class I (CFCs) Substances in Air Conditioning under the
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Substitutes (Name Used in Federal Register)	Trade Name	CFC-11 Centrifugal Chillers	CFC-12, CFC-114, R-500 Centrifugal Chillers	CFC-12, R-500 Reciprocating and Screw Chillers	CFC-12 Motor Vehicle AC ¹	CFC-12 Industrial Process AC	CFC-114 Industrial Process AC	CFC-12, R-500 Residential Dehumidifiers
R-422C	ICOR XLT1			R,N (R-502 only)		R, N (R-502)		R, N (R-502)
R-426A	RS-24 (new formulation)				R,N ¹	R,N		R,N
KDD6	KDD6			R, N		R,N		R, N
Hot Shot 2	Hot Shot 2	R	R	R (also R-502)				R
HFO-1234yf	HFO-1234yf, Opteon yf				N ² (no R)			
Ammonia Vapor Compression		N	N					
Evaporative Cooling		N	N	N	N			
HFO-1234ze	Solstice™ 1234ze	N		N				
Trans-1-chloro-3,3,3-trifluoroprop-1-ene	Solstice™ 1233zd(E), Solstice™ N12 Refrigerant	N						
Desiccant Cooling		N	N	N				
Ammonia / Water Absorption		N	N					
Carbon dioxide (R-744)					N ³			
Water / Lithium Bromide Absorption		N	N					
Small Auxiliary Power Units in Tractor Trailers					R, N			

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²See use conditions in Appendix B to Subpart G, 40 CFR Part 82 and 76 FR 17488 (March 29, 2011 final rule).

³See use conditions in Appendix B to Subpart G, 40 CFR Part 82 and 77 FR 33315 (June 6, 2012 final rule).



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Acceptable Substitutes for Class I (CFCs) Substances in Commercial Refrigeration under the Significant New Alternatives Policy (SNAP) Program as of August 10, 2012

Substitutes (Name Used in Federal Register)	Trade Name	ODS Being Replaced	Cold Storage Ware-houses	Ref. Transport	Retail Food Ref.	Ice Machines	Vending Machines	Water Coolers	Non-Mechanical Heat Transfer	Very Low Temp. Ref.
HCFC-22 ¹	22	12, 502	R, N	R, N	R, N	N	R, N	N		
HFC-23	23	12, 13, 13B1, 503								R, N
HFC-134a	134a	12	R, N	R, N	R, N	N	R, N	R, N		
HFC-227ea		12	N		N					
HFC-236fa		114							R, N	
HFC-245fa	Genetron® 245fa	11, 113, 114							R,N (11, 113)	,N (11, 114)
HFE-4310mee		all CFCs							R, N	
C6 perfluoroketone	Novec 649	113							R, N	
C7 fluoroketone	Novec 774	113							R, N	
R-401A, R-401B ¹	MP39, MP66	12	R, N	R, N	R, N	R, N	R, N	R, N		
R-402A, R-402B ¹	HP80, HP81	502	R, N	R, N	R, N	R, N				
R-404A	HP62, 404A	502	R, N	R, N	R, N	R, N	R, N			
R-406A ¹	GHG-12, GHG-X3	12, 500	R	R	R	R	R	R		
R-407A, R-407B	Klea 407A, 407B	502	R, N	R, N	R, N	R, N				
R-408A (HCFC Blend Epsilon) ¹	408A	502	R	R	R	R				
R-409A (HCFC Blend Gamma) ¹	409A	12		R	R	R	R	R		
R-411A, R-411B ¹	411A, 411B	12, 500, 502	R, N	R, N	R, N	R, N	R, N	R, N		
R-428A	RS-52	502	R,N	R,N	R,N	R,N				
R-507 (R-507A)	AZ-50	502, 13B	R, N	R, N	R, N	R, N	R, N			R (13B only)
R-508A (PFC Blend Alpha)	KLEA 5R3	13, 13B1, 503								R, N
R-508B	SUVA 95	13, 13B1, 503								R, N
FRIGC (HCFC Blend Beta)	FRIGC FR-12, 416A	12, 500	R, N	R, N	R, N	R, N	R, N	R, N		
Free Zone (HCFC Blend Delta) ¹	Free Zone / RB-276	12	R, N	R, N	R, N	R, N	R, N	R, N		
Hot Shot (HCFC Blend Omicron) ¹	Hot Shot, KarKool, 414B	12, 500	R, N	R, N	R, N	R, N	R, N	R, N		

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**Acceptable Substitutes for Class I (CFCs) Substances in Commercial Refrigeration under the
Significant New Alternatives Policy (SNAP) Program as of August 10, 2012 (continued)**

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Substitutes (Name Used in the Federal Register)	Trade Name	ODS Being Replaced	Cold Storage Ware- houses	Ref. Transport	Retail Food Ref.	Ice Machines	Vending Machines	Water Coolers	Non-Mecha- nical Heat Transfer	Very Low Temp. Ref.
GHG-X4 (HCFC Blend Xi) ¹	GHG-X4, Autofrost, McCool Chill-it, 414A	12, 500	R, N	R, N	R, N	R, N	R, N	R, N		
GHG-X5 ¹	GHG-X5	12, 500	R, N	R, N	R, N	R, N	R, N	R, N		
(HCFC Blend Lambda) ¹	GHG-HP	12	R, N	R, N	R, N	R, N	R, N	R, N		
FREEZE 12 ¹	FREEZE 12	12	R, N	R, N	R, N	R, N	R, N	R, N		
G2018C ¹	G2018C	12, 500, 502	R, N	R, N	R, N	R, N	R, N	R, N		
HCFC-22/HCFC-142b ¹	ICOR	12	R, N	R, N	R, N	R, N	R, N	R, N		
R-420A ¹	Choice R-420A	12, 500	R, N		R, N	R, N	R, N	R, N		
R-421B	Choice R-421B	12, 502	R, N	R, N	R, N	R, N				
R-422C	ICOR XLT1	502			R, N				R, N	R, N
R-426A	RS-24 (new formulation)	12	R, N	R, N	R, N	R, N	R, N	R, N		
Ammonia Vapor Compression		all	N		N	N				
Golden Fluids		11, 12, 113, 114, 115							R	
Evaporative/Desiccant Cooling		all	N							
Stirling Cycle		all		N						
Direct Nitrogen Expansion		all		N						
Pressure Stepdown		all	N							
CO ₂ (R-744)		11, 12, 13, 113, 114, 115, 13B1, 503	N		N		N		R, N	R, N
Cryogenic System Using Recaptured Liquid CO ₂ or Liquid Nitrogen	Cryo-Mechanical	12, 500		N						
Propane (R-290)		12, 502			N ² (stand- alone units)					
Self-chilling cans using CO ₂		12, 502	R, N	R, N	R, N		R, N			

Key: R = Retrofit Uses, N = New Uses

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² See use conditions in Appendix R to Subpart G, 40 CFR Part 82 and 76 FR 78832 (December 20, 2011 final rule). Decision is for new stand-alone refrigerators and freezers only.



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Acceptable Substitutes for Class I (CFCs) Substances in Commercial Refrigeration under the Significant New Alternatives Policy (SNAP) Program as of August 10, 2012 (continued)

Substitutes (Name Used in Federal Register)	Trade Name	ODS Being Replaced	Cold Storage Warehouses	Ref. Transport	Retail Food Ref.	Ice Machines	Vending Machines	Water Coolers	Non-Mechanical Heat Transfer	Very Low Temp. Ref.
Volatile Methyl Siloxanes, Water, Mineral Oil		11, 12, 113, 114, 115							R, N	
C ₂ F ₈ , C ₂ F ₁₀ , C ₂ F ₁₂ , C ₂ F ₁₂ NO, C ₂ F ₁₄ , C ₂ F ₁₀ NO, C ₂ F ₁₆ , C ₂ F ₁₂ NO, C ₂ F ₁₈ , C ₂ F ₁₆ O, and C ₂ F ₂₂ N									R, N ²	
NARM-502 ¹	NARM-502	13,13B1,503								R, N
THR-02	THR-02	12	R, N	R, N	R, N	R, N	R, N	R, N		
THR-04	THR-04	502	R, N	R, N	R, N	R, N	R, N	R, N		
HFE-7100 (HFE-449s1), HFE-7200 (HFE-569sf2)		11, 12, 113, 114, 115							R, N	
HFE-7100 (HFE-449s1), HFE-7200 (HFE-569sf2) as a secondary heat transfer fluid in not-in-kind systems		12, 502, 13, 13B1, 503			N (12, 502)					N (13, 13B1, 503)
Ikon A, Ikon-12 (Blend Zeta)	Ikon A, Ikon-12	12	R, N	R, N	R, N	R, N	R, N	R, N		
Ikon B	Ikon B	12	R, N	R, N	R, N	R, N	R, N	R, N		
FOR12A, FOR12B	FOR12A, FOR12B	12	R, N	R, N	R, N	N	R, N	R, N		
SP34E	SP34E	12	R, N	R, N	R, N		R, N	R, N		
HFC-134a/HBr (92/8)		12, 502		N						
HFC-134a/HBr (92/8) as the primary heat transfer fluid in secondary-loop equipment		12, 502	N		N					
PFC-330ST, PFC-550HC, PFC-660HC, PFC-1100HC, PFC-1100LT, PGC-100, PGC-150, PFC-331ST, PFC-551HC, PFC-661HC, PFC-1101HC, PGC-151	PFC-330ST, PFC-550HC, PFC-660HC, PFC-1100HC, PFC-1100LT, PGC-100, PGC-150, PFC-331ST, PFC-551HC, PFC-661HC, PFC-1101HC, PGC-151	13, 113, 114, blends thereof								R, N
PFC-1102HC, PFC-662HC, PFC-552HC and FLC-15	PFC-1102HC, PFC-662HC, PFC-552HC and FLC-15	13, 113, 114, blends thereof								N

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²Acceptable only where no other alternatives are technically feasible due to safety or performance requirements

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Acceptable Substitutes for Class I (CFCs) Substances in Commercial Refrigeration under the
Significant New Alternatives Policy (SNAP) Program as of August 10, 2012 (continued)

Substitutes (Name Used in Federal Register)	Trade Name	ODS Being Replaced	Cold Storage Ware- houses	Ref. Transport	Retail Food Ref.	Ice Machines	Vending Machines	Water Coolers	Non-Mecha- nical Heat Transfer	Very Low Temp. Ref.
Hydrofluoroether 7000	HFE-7000	CFC-11, CFC-113							R, N	
ISCEON 39TC	ISCEON 39TC	12	R, N							
RS-24 (2002 formulation)		12	R,N	R,N	R,N	R,N	R,N	R,N		
NU-22 [R-125/134a/600 (46.6/50.0/3.4)]	NU-22	502	R,N	R,N	R,N	R,N	R,N	R,N		
ISCEON 89	ISCEON 89	R-13B1								R,N
Hot Shot 2	Hot Shot 2	12, 500, 502	R	R	R	R	R			
R-407C	SUVA 407C, KLEA 407C	502	R,N	R,N	R,N	R,N	R,N	R,N	R,N	
R-407D		12		R,N						
KDD6	KDD6	12	R, N	R, N	R, N	R, N	R, N	R, N	R, N	
HFO-1234ze	HFO-1234ze	113							R, N	

Key: R = Retrofit Uses, N = New Uses



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Acceptable Substitutes for Class I (CFCs) Substances in Non-Commercial Refrigeration under the Significant New Alternatives Policy (SNAP) Program as of August 10, 2012

Substitutes (Name Used in Federal Register)	Trade Name	ODS Being Replaced	Industrial Process Refrigeration	Ice Skating Rinks	Household Refrigerators	Household Freezers
HCFC-123	123	11	R, N			
HCFC-22 ¹	22	12, 502	R, N	R, N	R, N	R, N
HFC-23		13, 13B1, 503	R, N			
HFC-134a	134a	12	R, N		R, N	R, N
HFC-152a		12			N	N
HFC-227ea		12	N			
HFC-236fa		114	R,N			
HFC-245fa	Genetron® 245fa	114	R,N			
R-401A, R-401B ¹	MP-39, MP-66	12	R, N	R	R, N	R, N
R-402A, R-402B ¹	HP-80, HP-81	502	R, N			R, N
R-403B	Isceon 69-L	13, 13B1, 503	R, N ²			
R-404A	HP-62, 404A	502	R, N			R, N
R-406A ¹	GHG-12, GHG-X3	12, 500	R		R	R
R-407A, R-407B	Klea 407A, 407B	502	R, N	R, N		
R-408A (HCFC Blend Epsilon) ¹	408A	502	R			
R-409A (HCFC Blend Gamma) ¹	409A	12			R	R
R-411A, R-411B ¹	411A, 411B	12, 500, 502	R, N			
R-428A	RS-52	502		R,N	R,N	R,N
R-507	AZ-50	502	R, N			
R-508A (PFC Blend Alpha)	KLEA 5R3	13, 13B1, 503	R, N			
R-508B	Suva 95	13, 13B1, 503	R, N			
FRIGC (HCFC Blend Beta)	FRIGC FR-12, 416A	12, 500	R, N		R, N	R, N
Free Zone (HCFC Blend Delta) ¹	Free Zone / RB-276	12	R, N	R, N	R, N	R, N

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²Prohibited for other end-uses. See the list of unacceptable refrigerants below.

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Substitutes (Name Used in Federal Register)	Trade Name	ODS Being Replaced	Industrial Process Refrigeration	Ice Skating Rinks	Household Refrigerators	Household Freezers
Hot Shot (HCFC Blend Omicron) ¹	Hot Shot, KarKool, 414B	12, 500	R, N	R, N	R, N	R, N
GHG-X4 (HCFC Blend Xi) ¹	GHG-X4, Autofrost, McCool Chill-it, 414A	12, 500	R, N	R, N	R, N	R, N
GHG-X5 ¹	GHG-X5	12, 500	R, N		R, N	R, N
R-420A ¹	Choice R-420A	12, 500	R, N	R, N	R, N	R, N
(HCFC Blend Lambda) ¹	GHG-HP	12	R, N		R, N	R, N
FREEZE 12 ¹	FREEZE 12	12	R, N	R, N	R, N	R, N
G2018C ¹	G2018C	12, 500, 502	R, N	R, N		
NARM-502 ¹	NARM-502	13, 503	R, N			
THR-01 ¹	THR-01	12			N	N
THR-02	THR-02	12	R, N		N	N
THR-04	THR-04	502	R, N	R, N	R, N	
HCFC-22/HCFC-142b ¹	ICOR	12	R, N		R, N	R, N
Ikon A, Ikon-12 (Blend Zeta)	Ikon A, Ikon-12	12	R, N		N	N
Ikon B	Ikon B	12	R, N		N	N
FOR12A, FOR12B	FOR12A, FOR12B	12	R, N		R, N	R, N
SP34E	SP34E	12			R, N	R, N
HFE-7100, HFE-7200 as a secondary heat transfer fluid in not-in-kind systems		11, 12, 114, 115, 502	R, N			
HFC-134a/HBr (92/8)		12, 502	N			
Hydrofluoroether-7000	HFE-7000	11,113	R,N			
ISCEON 39TC	ISCEON 39TC	12	R,N			
RS-24 (2002 formulation)		12	R,N	R,N	R,N	R,N

Key: R = Retrofit Uses, N = New Uses

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Acceptable Substitutes for Class I (CFCs) Substances in Non-Commercial Refrigeration under the Significant New Alternatives Policy (SNAP) Program as of August 10, 2012 (continued)

Substitutes (Name Used in Federal Register)	Trade Name	ODS Being Replaced	Industrial Process Refrigeration	Ice Skating Rinks	Household Refrigerators	Household Freezers
<u>R-407C</u>	<u>SUVA 407C, KLEA 407C</u>	<u>502</u>	<u>R, N</u>	<u>R, N</u>	<u>R, N</u>	<u>R, N</u>
R-421B	Choice R-421B	12, 502	R, N	R, N	R, N	R, N
R-422C	ICOR XLT1	502	R,N			
R-426A	RS-24 (new formulation)	12	R,N	R,N	R,N	R,N
R-441A	HCR-188C	12			N ²	N ²
Hot Shot 2	Hot Shot 2	11, 12, 13B1, 113, 114, 500, 502	R	R (12, 500, 502 only)		
KDD6	KDD6	12	R, N	R, N	R,N	R,N
CO ₂		13, 13B1, 503	R, N			
Ammonia Vapor Compression		12, 502	R, N	R, N		
Ammonia Absorption		12			N	N
Isobutane (R-600a)		12			N ²	N ²
Propane (R-290), Propylene (R-1270), Butane (R-600)		12	R, N			
HC Blend A, B	HC-12a, OZ-12	all	R, N ¹			
Self-chilling cans using CO ₂		12, 502			R, N	
Evaporative/Desiccant Cooling		all	N			

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Key: R = Retrofit Uses, N = New Uses

¹ Prohibited for other end-uses. See the list of unacceptable refrigerants below.

² See use conditions in Appendix R to Subpart G, 40 CFR Part 82 and 76 FR 78832 (December 20, 2011 final rule).



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Unacceptable Substitute Refrigerants Significant New Alternatives Policy (SNAP) Program as of August 10, 2012				
Substitutes (Name Used in Federal Register)	Trade Name	ODS Being Replaced	End-Uses where Unacceptable	Reason
All flammable refrigerants, including OZ-12 (Hydrocarbon Blend A) and HC-12a (Hydrocarbon Blend B), except for HFC-152a in new MVAC equipment		CFC-12	Motor Vehicle Air Conditioning, retrofit and new	lack of adequate risk assessment that characterizes incremental flammability risk
OZ-12 (Hydrocarbon Blend A) and HC-12a (Hydrocarbon Blend B)	OZ-12, HC-12a	CFC-12	All end-uses other than Industrial Process Refrigeration, retrofit and new	lack of adequate risk assessment that characterizes incremental flammability risk
R-141b		CFC-11	Centrifugal Chillers, new	high ODP, other substitutes with lower overall risk have been identified
R-176 ¹		CFC-12	All end-uses, retrofit and new	contains CFC-12
R-403B		R-502	All end-uses other than Industrial Process Refrigeration, retrofit and new	contains a perfluorocarbon that exhibits extremely high GWP and very long lifetime
R-405A		CFC-12	All end-uses, retrofit and new	contains a perfluorocarbon that exhibits extremely high GWP and very long lifetime
MT-31		all CFCs and HCFCs	All end-uses, retrofit and new	a chemical contained in this blend presents an unacceptable toxicity risk
Hexafluoropropylene (HFP) and all HFP-containing blends		all CFCs and HCFCs	All end-uses, retrofit and new	presents an unacceptable toxicity risk
Self-Chilling Cans using HFC-134a or HFC-152a		CFC-12, HCFC-22, R-502	Household Refrigeration, Transport Refrigeration, Vending Machines, Cold Storage Warehouses and Retail Food Refrigeration; retrofit and new	unacceptably high greenhouse gas emissions from direct release of refrigerant to the atmosphere
NARM-22		HCFC-22	All end-uses, retrofit and new	contains HCFC-22

¹R-176 contains CFC-12, HCFC-22, and HCFC-142b. It is a different product from RB-276, typically sold under the name "Freezone."



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**Acceptable Substitutes for Class II (HCFCs) Substances in Air Conditioning and Refrigeration
under the Significant New Alternatives Policy (SNAP) Program as of August 10, 2012**

Substitutes (Name Used in Federal Register)	Trade Name	Household and Light Commercial AC	Commercial Comfort AC	Industrial Process Refriger- ation	Industrial Process AC	Bus and Passenger Train AC	Cold Storage Warehouse Systems	Ice Skating Rinks	Refriger- ated Transport	Retail Food Refriger- ation	Ice Machines	Very Low Temp Refriger- ation	Household Refriger- ators and Freezers	Other Refriger- ated Appliances
R-407A	KLEA 60	R,N					R,N	R, N	R,N	R,N	R, N			
R-410A	AZ-20	N	N	N	N	N	N	N	N	N	N	N	N	N
R-410B	Suva 9100	N	N	N	N		N	N	N	N	N		N	N
R-404A	HP62	R,N	R,N	R, N	R,N		R,N	R,N	R,N	R,N	R,N	R,N	R, N	R,N
R-407C	Suva 407C, KLEA 407C	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R,N	R, N	R, N
R-421A	Choice R421A	R,N	R,N	R,N	R,N		R,N	R,N	R,N	R,N	R,N		R,N	R, N
R-421B	Choice R421B			R,N			R,N	R,N	R,N	R,N	R,N		R, N	R, N (Water coolers)
R-422B	ICOR XAC1	R, N	R, N	R, N	R, N	R,N	R, N	R, N	R, N	R, N	R, N	R,N	R, N	R, N
R-422C	ICOR XLT1	R, N	R, N	R, N	R, N		R, N	R, N	R, N	R, N	R, N	R,N	R, N	R, N
R-422D	ISCEON MO29	R,N	R,N	R,N	R,N	R,N	R,N	R,N	R,N	R,N	R,N		R,N	R, N
R-424A	RS-44 (new formulation)	R,N	R,N	R,N	R,N	R, N	R,N	R,N	R,N	R,N	R,N		R,N	R, N (Residential Dehumidi- fiers)
R-428A	RS-52			N			R,N	R,N	R,N	R,N	R,N		R,N	-
R-134a	HFC-134a	N	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N	N		R, N	R, N
R-245fa	Genetron- 245fa		R, N ¹									N (141b)		
R-507A	AZ-50	R, N	R, N	R, N	R, N		R, N	-	R, N	R, N	R, N		R, N	R, N
R-417A	Isceon 59, NU-22	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N		R, N	R, N
R-427A	Forane 427A	R	R		R	R				R			R	-
R-125/134a/600a (28.1/70.0/1.9)		R, N	R, N	R, N	R, N	R, N			R, N					
Hydrofluoroether- 7000	HFE-7000			R, N								R, N		
HFO-1234ze	Solstice 1234ze		N											
RS-44 (2003 formulation)		R, N	R, N	R, N	R, N		R, N	R, N	R, N	R, N	R, N		R, N	R, N (Residential Dehumidi- fiers)

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**Acceptable Substitutes for Class II (HCFCs) Substances in Air Conditioning and Refrigeration
under the Significant New Alternatives Policy (SNAP) Program as of August 10, 2012**

Substitutes (Name Used in Federal Register)	Trade Name	Household and Light Commercial AC	Commercial Comfort AC	Industrial Process Refriger- ation	Industrial Process AC	Bus and Passenger Train AC	Cold Storage Warehouse Systems	Ice Skating Rinks	Refriger- ated Transport	Retail Food Refriger- ation	Ice Machines	Very Low Temp Refriger- ation	Household Refriger- ators and Freezers	Other Refriger- ated Appliances
R-434A	RS-45	R,N	R,N	R,N	R,N	R, N	R,N	R,N	R,N	R,N	R,N		R,N	R, N (Residential Dehumidi- fiers, Water Coolers)
R- 125/290/134a/600a (55.0/1.0/42.5/1.5)	ICOR AT-22	R, N	R, N	R, N	R, N		R, N	R, N	R, N	R, N	R, N	R,N	R, N	R, N
ISCEON 79, R-422A	ISCEON 79			R, N			R, N	R, N	R, N	R, N	R, N		R, N	-
R-438A (KDD5)	ISCEON@ MO99	R,N	R,N	R,N	R,N	R,N	R,N	R,N	R,N	R,N	R,N		R,N	R, N
<i>Trans</i> -1-chloro- 3,3,3- trifluoroprop-1- ene	Solstice 1233zd(E), Solstice N12 Refrigerant		N (centrifugal chillers)											
Self-chilling cans using recycled CO ₂		-	-	-	-		R, N	-	R, N	R, N	-		R, N	-
Ammonia		N ²	N ³	N ⁴	N ⁴		N ⁴	N ⁴	-	N ⁵	N ⁴		N ²	-
R-744 (Carbon dioxide, CO ₂)				R, N			N			N		N		N (Vending machines)
Evaporative Cooling		N	N	N	N	N	N	-	-	-	-	-		-
Desiccant Cooling		N	N	N	N		N	-	-	-	-	-		-
Water/Lithium bromide		-	N	-	-		-	-	-	-	-	-		-
THR-03	THR-03	N ⁶	N	R, N	N		N	N	R, N	N	N		N	-
HFE-7100 (HFE- 449s1), HFE-7200 (HFE-569s12) for secondary heat transfer in NIK systems				N						N		N		
HFC-227ea			N	N			N							
R-423A	ISCEON 39TC		R,N ⁷	R, N	R, N		R, N	R, N						

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under the Significant New Alternatives Policy (SNAP) Program as of August 10, 2012**

Substitutes (Name Used in Federal Register)	Trade Name	Household and Light Commercial AC	Commercial Comfort AC	Industrial Process Refriger- ation	Industrial Process AC	Bus and Passenger Train AC	Cold Storage Warehouse Systems	Ice Skating Rinks	Refriger- ated Transport	Retail Food Refriger- ation	Ice Machines	Very Low Temp Refriger- ation	Household Refriger- ators and Freezers	Other Refriger- ated Appliances
R-426A	RS-24 (new formulation)				R, N	R, N	R, N	R, N	R, N	R, N	R, N		R, N	R, N
R-437A		R, N											R, N	R, N (Residential Dehumidi- fiers)
R-441A	HCR-188C												N ⁸	
SP34E	SP34E		R, N ⁹			R, N	R, N		R, N	R, N			N	N (Vending machines, water coolers)
Stirling cycle			N	N		N	N		N		N		N	N (Vending machines)
RS-24 (2002 formulation)				R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N		R, N	R, N
HC Blend A	OZ-12			R, N										
HC Blend B	Original formulation of HC-12a			R, N										
Nitrogen direct gas expansion				N					N					
Pressure stepdown							N							
R-290 (Propane)				R, N						N ⁸				
R-407B				R, N			R, N	R, N	R, N	R, N	R, N			
R-407D									R, N					
R-407F	Genetron Performax LT	R, N		R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N		R, N	R, N
R-600 (Butane)				R, N										
R-600a (Isobutane)													N ⁸	
R-1270 (Propene, Propylene)				R, N										
Cryogenic system using recaptured liquid CO2 or liquid nitrogen									N					
Hot Shot 2	Hot Shot 2	R	R	R			R	R	R	R	R			R (dehumidi- fiers, vending machines)

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Key: R = Retrofit Uses, N = New Uses, (-) = Not submitted for review against this end use or not practical to use the substitute refrigerant in this end use.
 1. Only approved for centrifugal chillers; 2. Absorption systems; 3. Absorption chillers or vapor compression with secondary loop; 4. Vapor compression or absorption systems; 5. Vapor compression with a secondary loop;
 6. Only approved for window air conditioning units; 7. Only approved for centrifugal chillers; 8. See used conditions in Appendix R to Subpart G, 40 CFR Part 82 and 76 FR 78832 (December 20, 2011 final rule) 9. Only approved for reciprocating and screw chillers.



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Description of Class II End Uses		
End Use	Air Conditioning and Refrigeration Systems or Applications	Ozone Depleting Substance
Household and Light Commercial Air Conditioning	Heat pumps, central air conditioning, direct-expansion commercial air conditioners, packaged terminal air conditioners, room air conditioners, and split system air conditioners	HCFC-22
Commercial Comfort Air Conditioning	Reciprocating, centrifugal and screw chillers	HCFC-22, CFC-12, R-500, and CFC-11
Industrial Process Refrigeration	Refrigeration applications within the chemical, pharmaceutical and petrochemical industries, the oil and gas industry, the metallurgical industry, civil engineering, sports and leisure facilities, and food processing.	HCFC-22, CFC-12, R-500, and R-502
Industrial Process Air Conditioning	Air conditioning systems that perform a critical mission in a high-temperature industrial environment, such as cooling a control cab on a crane in a foundry or protecting a computer room in a steel mill.	HCFC-22, CFC-12, and CFC-114
Cold Storage Warehouse Systems	Public and private facilities used to store meat, produce, dairy products, frozen food, and other perishable goods.	HCFC-22, R-502 and CFC-12
Bus and Passenger Train Air Conditioning	Motor vehicle air conditioning systems for buses and passenger trains.	HCFC-22
Ice Skating Rinks	Ice Skating Rinks	HCFC-22, CFC-12, and R-502
Refrigerated Transport	Refrigeration systems in trucks, trailers, railcars, ships, intermodal containers, on board ships, and air conditioning systems in buses and passenger trains.	CFC-12, R-500 and R-502
Retail Food Refrigeration	Stand alone refrigeration cases found in small markets, convenience stores, restaurants and other food establishments, large systems found in supermarkets, and HCFC-22 systems found in a wide variety of retail and service establishments.	HCFC-22, CFC-12, and R-502
Ice Machines	Small, medium, and large ice makers used by a number of entities including restaurants and hotels.	HCFC-22 and CFC-12
Household Refrigerators and Freezers	Refrigerators and freezers	HCFC-22, CFC-12 and R-502
Other Refrigerated Appliances	Vending machines, residential dehumidifiers, and water coolers	HCFC-22, CFC-12 and R-502

1. Substitution through retrofit is only applicable to HCFC-22 systems.
Refrigerant blends that contain Class II Ozone Depleting Substances include, but are not limited to, R-401A, R-401B, R-402A, R-402B, R-403B, R-406A, R-408A, R-409A, R-411A, R-411B, R-414A, R-414B, and R-416A.



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Alternative Refrigerant Manufacturers																		
Refrigerant	3M	Arkema	Com-star	Dupont	Green-cool	Honey-well	ICI	ICO R	IKON	CFC Refi-max	Peoples Welding Supply	Refrigerant Solutions LTD	RMS of Georgia	Rhodia Ltd.	Sol-power	Technical Chemical	Techno Chem Co., ¹ Ltd. ¹	Tsinghua University of Beijing ²
		800-343-7940	800-328-0142	800-235-7882	703-643-2376	800-522-8001	800-275-5532	800-357-4062	505-345-2707	800-406-2292	800-382-9006		800-347-5872		888-289-8866	800-527-0885		
C6-perfluoroketone	No-vec 649																	
C7 fluoroketone	Novec 774																	
HCFC-123		Forane 123		Suva 123		Genetron 123												
HCFC-22		Forane 22		Freon 22		Genetron 22	Arcton-22											
HFC-134a		Forane 134a		Suva 134a		Genetron 134a	Klea 134a											
HCFC-124		Forane 124		HCFC-124		Genetron 124												
HFO-1234ze						Solstice 1234ze												
R-438A (KDD5)				ISCEON® MO99														
KDD6				KDD6														
R-401A, R-401B		Forane 401A, 401B		Suva MP39, MP66		MP39, MP66												
R-402A, R-402B		Forane 402A, 402B		Suva HP80, HP81		HP80, HP81												
R-404A		Forane 404A		Suva HP62		Genetron 404A												
R-406A											GHG-12, GHG-X3							
R407A, R-407B							Klea 407A 407B											
R-407C		Forane 407C		Suva 407C (Suva 9000)			Klea 407C (Klea 66)											
R-407F						Genetron Performax LT												

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Alternative Refrigerant Manufacturers																		
Refrigerant	3M	Arkema	Com-star	Dupont	Green-cool	Honey-well	ICI	ICO R	IKON	CFC Refi-max	Peoples Welding Supply	Refrigerant Solutions LTD	RMS of Georgia	Rho-dia Ltd.	Sol-power	Technical Chemical	Techno Chem Co., ¹ Ltd.	Tsinghua University of Beijing ²
R-408A		Forane 408A		Suva 408A		Genetron 408A												
R-409A		Forane 409A		Suva 409A		Genetron 409A												
R-411A, R-411B					R-411A, B													
R-420A													Choice R-420A					
R-424A												RS-44						
R-427A		Forane 427A																
R-428A													RS-52					
R-434A													RS-45					
R-441A			HCR-188C															
R-507				Suva 507		AZ-50												
R-508A (PFC Blend Alpha)								Klea 5R3										
R-508B				Suva 95														
HCFC Blend Beta										FRIG C FR-12								
HCFC Blend Delta													Free Zone / RB-276					
GHG-X4											Autofrost Chill-It							
GHG-X5											GHG-X5							
GHG-HP											GHG-HP							
Hot Shot								Hot Shot										
Blend Zeta									Ikon-12, Ikon A									

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Alternative Refrigerant Manufacturers																		
Refrigerant	3M	Arkema	Com-star	Dupont	Green-cool	Honey-well	ICI	ICO R	IKON	CFC Refi-max	Peoples Welding Supply	Refrigerant Solutions LTD	RMS of Georgia	Rho-dia Ltd.	Sol-power	Technical Chemical	Techno Chem Co., ¹ Ltd.	Tsinghua University of Beijing ²
Ikon B									Ikon B									
Freeze 12																Freeze 12		
G2018C					R-G2018 C													
THR-01, THR-02, THR-03, THR-04																		THR-01, THR-02, THR-03, THR-04
Isceon 59/NU-22				Isceon 59				NU-22						Isceon 59				
Isceon 79				Isceon 79										Isceon 79				
Isceon 89				Isceon 89										Isceon 89				
FOR12A, FOR12B																	FOR12 A, FOR12B	
SP34E														SP34E				
Hot Shot 2								Hot Shot 2										

¹ and Inha University
² and the Beijing Inoue Qinghua Refrigeration Technology Company LTD