

Ozone Depleting Substances ODS

Name/Group	Chemical name	Formula	ASHRAE # for refrigerants only	ASHRAE ¹ safety group	CAS ² #	UN ³ #	HS code
Annex A, Group I (CFCs)							--2903.40
CFC-11	Trichlorofluoromethane	CFCl ₃	R-11	A1	75-69-4	1017	--2903.41
CFC-12	Dichlorodifluoromethane	CF ₂ Cl ₂	R-12	A1	75-71-8	1028	--2903.42
CFC-113	Trichlorotrifluoroethanes	C ₂ F ₃ Cl ₃	R-113	A1	76-13-1		--2903.43
CFC-114	Dichlorotetrafluoroethanes	C ₂ F ₄ Cl ₂	R-114	A1	76-14-2	1958	--2903.44
CFC-115	Chloropentafluoroethane	CClF ₂ CF ₃	R-115	A1	76-15-3	1020	--2903.44
Annex A, Group II (Halons)							--2903.40
Halon-1211	Bromochlorodifluoromethane	CF ₂ BrCl	R-12B1		353-59-3	1974	--2903.46
Halon-1301	Bromotrifluoromethane	CF ₃ Br	R-13B1		75-63-8	1009	--2903.46
Halon-2402	Dibromotetrafluoroethane	C ₂ F ₄ Br ₂	R-114B2		124-73-2		--2903.46
Annex B, Group I (Other CFCs)							--2903.45
CFC-13	Chlorotrifluoromethane	CF ₃ Cl	R-13	A1	75-72-9		--2903.45
CFC-111	Pentachlorofluoroethane	C ₂ FCl ₅	R-111		354-56-3		--2903.45
CFC-112	Tetrachlorodifluoroethane	C ₂ F ₂ Cl ₄	R-112		76-12-0		--2903.45
Annex B, Group II							--2903.10
Tetrachloromethane or carbon tetrachloride		CCl ₄		B1	56-23-5	1864	--2903.14
Annex B, Group III							--2903.19
1,1,1-trichloroethane or methyl chloroform		C ₂ H ₃ Cl ₃	R-140a		71-55-6	2831	--2903.19
Annex C, Group I (HCFCs)							--2903.49
HCFC-22	Chlorodifluoromethane	CHF ₂ Cl	R-22 ✓		75-45-6	1018	--2903.49
HCFC-123	Dichlorotrifluoroethanes	C ₂ HF ₃ Cl ₂	R-123		306-83-2		--2903.49
HCFC-124	Chlorotetrafluoroethanes	C ₂ HF ₄ Cl	R-124		2837-89-0		--2903.49
HCFC-141	Dichlorofluoroethanes	C ₂ H ₃ FCl ₂			1717-00-6		--2903.49
HCFC-141b	1,1-dichloro-1-fluoroethane	CH ₃ CFCl ₂	R-141b		1717-00-6		--2903.49
HCFC-142	Chlorodifluoroethanes	C ₂ H ₃ F ₂ Cl			75-68-3		--2903.49
HCFC-142b	1-chloro-1,1-difluoroethane	CH ₃ CF ₂ Cl	R-142b		75-68-3		--2903.49
Annex C, Group II (HBFCs)							--2903.49
HBFC-22B1	Bromodifluoromethane	CHF ₂ Br					--2903.49
Annex C, Group III							--2903.49
Bromochloromethane		CH ₂ BrCl					--2903.49
Annex E, Group I							--2903.30
Methyl bromide (or Bromomethane) ✓		CH ₃ Br			74-83-9	1062	--2903.30
ODS containing blends (Refrigerants)							
R-500	CFC-12 / HFC-152a		R-500		**		--3824.71
R-502	HCFC-22 / CFC-115		R-502		**	1973	--3824.71

Non-Ozone Depleting Substances

Name/Group	Chemical name	Formula	ASHRAE # for refrigerants only	ASHRAE ¹ safety group	CAS ² #	UN ³ #	HS code
Hydrofluorocarbons (HFCs)							--2903.30
HFC-134a	1,1,1,2-Tetrafluoroethane	CF ₃ CH ₂ F	R-134a	A1	811-97-2	3159	--2903.30
HFC-152a	1,1-Difluoroethane	CHF ₂ CH ₃	R-152a	A2	75-37-6		--2903.30
HFC-125	Pentafluoroethane	CF ₃ CHF ₂	R-125	A1	354-33-6		--2903.30
HFC-143a	1,1,1-trifluoroethane	CF ₃ CH ₃	R-143a	A2	420-46-2		--2903.30
HFC-32	Difluoromethane	CH ₂ F ₂	R-32	A2	75-10-5		--2903.30
HFC-23	Trifluoromethane	CHF ₃	R-23	A1	75-46-7		--2903.30

Name/Group	Chemical name	Formula	ASHRAE # for refrigerants only	ASHRAE ¹ safety group	CAS ² #	UN ³ #	HS code
Hydrofluorocarbons blends (HFCs)							--2903.30
R-404A	R143a/125/134a		R-404A	A1/A1	**		--3824.90
R-507A	R143a/125		R-507A	A1	**		--3824.90
R-407A	R32/125/134a		R-407A	A1/A1	**		--3824.90
R-407B	R32/125/134a		R-407B	A1/A1	**		--3824.90
R-407C	R32/125/134a		R-407C	A1/A1	**		--3824.90
R-410A	R32/125		R-410A	A1/A1	**		--3824.90
R-508A	R23/116		R-508A	A1/A1	**		--3824.90
R-508B	R23/116		R-508B	A1/A1	**		--3824.90
Halogen-free Refrigerants							
R-717	Ammonia	NH ₃	R-717	B2	7664-41-7	1005	--2814.10
R-600a	Iso-Butane	C ₄ H ₁₀	R-600a	A3	75-28-5	1969	--2901.10
R-290	Propane	C ₃ H ₈	R-290	A3	74-98-6	1978	--2901.10

1- ASHRAE Safety Groups (ASHRAE: American Society for Heating Refrigeration & Air-conditioning)

A1 Lower Toxicity & No Flammability
A2 Lower Toxicity & Lower Flammability
A3 Lower Toxicity & Higher Flammability
B1 Higher Toxicity & No Flammability
B2 Higher Toxicity & Lower Flammability
B3 Higher Toxicity & Higher Flammability

A1
A2
A3
B1
B2
B3

2- CAS #: Chemical Abstract Service Number

3- UN #: United Nations Number for some Chemicals

** CAS # for blend is combined of the CAS # of its components

(Example: R-500 CAS # is: 75-71-8 / 75-37-6 which CAS # for both CFC-12 & HFC-152a)

Most popular refrigerants trade names

ARCTON - ASAHIFRON - ASAHIKLIN - FORANE - FREON - GENETRON - ISCEON - SOLKANE - SUVA - FLORON

List of main producing countries for ODS



Toxic substances



Flammable substances



Explosive substances



Oxidizing substances



Corrosive substances



Irritating substances



Environmentally dangerous substances

Group	Producing Countries
Chlorofluorocarbons (CFCs)	CHINA, INDIA, NETHERLANDS, BRAZIL, REP. OF KOREA, ITALY, SPAIN, MEXICO & VENEZUELA
Halons	CHINA, & REP. OF KOREA
Carbon tetrachloride (CCl ₄)	INDIA, BRAZIL, UKRAINE & ROMANIA
Methylchloroform (CH ₃ CL ₃)	JAPAN, USA, FRANCE & CHINA
Hydrochlorofluorocarbon (HCFCs)	USA, FRANCE, JAPAN, CHINA, NETHERLANDS, UK, SPAIN, INDIA & RUSSIAN FEDERATION
Methyl Bromide	USA, ISRAEL, JAPAN, FRANCE, CHINA

Classification of ODS containing products with accordance to HS

Product	HS code/codes
A/C Systems	8415.10, 8415.20, 8415.81, 8415.83
AC components	8415.9
Refrigerators & Freezers	84.18, 84.19, 85.09
Compressors	8414.2
Vehicles	CHAPTER 87
Fire Extinguishers	8424.1
Ins. boards & pipe covers	3917, 3920, 3921, 3925, 3926
PRE-POLYMERS	3901 - 3911



United Nations Environment Programme

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CFCs

NATIONAL REFRIGERANTS R11 •100 lb •200 lb •500 lb •1,100 lb •2,200 lb •40,000 lb bulk OIL: •Mineral •Alkylbenzene APPLICATION: •Centrifugal Chillers	NATIONAL REFRIGERANTS R12 •12 oz •30 lb •50 lb •145 lb •1,000 lb •2,000 lb •40,000 lb bulk OIL: •Mineral •Alkylbenzene APPLICATION: •Auto Air Conditioning •Med. Temp. Refrig. •High Temp. Refrig.	NATIONAL REFRIGERANTS R13 •5 lb •8 lb •23 lb •80 lb OIL: •Mineral •Alkylbenzene APPLICATION: •Very Low Temp. Refrig.	NATIONAL REFRIGERANTS R13b1 •16 lb •28 lb OIL: •Mineral •Alkylbenzene APPLICATION: •Very Low Temp. Refrig.	NATIONAL REFRIGERANTS R113 •100 lb •200 lb •600 lb OIL: •Mineral •Alkylbenzene APPLICATION: •Commercial & Industrial Air Conditioning	NATIONAL REFRIGERANTS R114 •30 lb •150 lb •875 lb OIL: •Mineral •Alkylbenzene APPLICATION: •Industrial Process Cooling •Centrifugal Chillers	NATIONAL REFRIGERANTS R500 •30 lb •50 lb •125 lb •875 lb •1,760 lb OIL: •Mineral •Alkylbenzene APPLICATION: •Commercial Air Conditioning	NATIONAL REFRIGERANTS R502 •30 lb •50 lb •125 lb •875 lb •1,760 lb OIL: •Mineral •Alkylbenzene APPLICATION: •Med. Temp. Refrig. •Low Temp. Refrig.	NATIONAL REFRIGERANTS R503 •5 lb •8 lb •20 lb •80 lb OIL: •Mineral •Alkylbenzene APPLICATION: •Very Low Temp. Refrig.
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HCFCs

NATIONAL REFRIGERANTS R22 •12 oz •30 lb •50 lb •125 lb •875 lb •1,760 lb •40,000 lb bulk OIL: •Mineral •Alkylbenzene •Polyol Ester APPLICATION: •Low Temp. Refrig. •Med. Temp. Refrig. •Air Conditioning	NATIONAL REFRIGERANTS R123 •100 lb •200 lb •850 lb •40,000 lb bulk OIL: •Mineral •Alkylbenzene APPLICATION: •Low Pressure Centrifugal Chillers Replacement For: R11	NATIONAL REFRIGERANTS R124 •30 lb •50 lb •2,000 lb OIL: •Mineral •Alkylbenzene APPLICATION: •High Ambient Refrig. Replacement For: R114	NATIONAL REFRIGERANTS R401A (MP66) R22/152a/124 (63/13/24%) •30 lb •125 lb OIL: •Alkylbenzene •Polyol Ester APPLICATION: •Med. Temp. Refrig. Replacement For: R12	NATIONAL REFRIGERANTS R401B (MP66) R22/152a/124 (61/11/28%) •30 lb •125 lb OIL: •Alkylbenzene •Polyol Ester APPLICATION: •Low Temp. Refrig. Replacement For: R12	NATIONAL REFRIGERANTS R402A (MP60) R125/290/22 (60/2/38%) •27 lb •110 lb OIL: •Alkylbenzene •Polyol Ester APPLICATION: •Low Temp. Refrig. •Med. Temp. Refrig. Replacement For: R502
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HCFCs

NATIONAL REFRIGERANTS R402B (MP61) R125/290/22 (58/2/60%) •18 lb OIL: •Mineral •Alkylbenzene •Polyol Ester APPLICATION: •Ice Machines Replacement For: R502	NATIONAL REFRIGERANTS R403B (SCENR GIL) R290/22/218 (5/50/44%) •30 lb •125 lb •875 lb OIL: •Mineral •Alkylbenzene •Polyol Ester APPLICATION: •Low Temp. Refrig. Replacement For: R13 & R503	NATIONAL REFRIGERANTS R408A* (GH612) R22/600a/142a (86/4/41%) •25 lb OIL: •Mineral •Alkylbenzene APPLICATION: •Stationary R12 Refrig. Replacement For: R12	NATIONAL REFRIGERANTS R408A (FX10) R125/143a/22 (7/48/47%) •24 lb •100 lb OIL: •Mineral •Alkylbenzene •Polyol Ester APPLICATION: •Low Temp. Refrig. •Med. Temp. Refrig. Replacement For: R502	NATIONAL REFRIGERANTS R409A (FX06) R22/124/142a (60/26/16%) •30 lb •125 lb OIL: •Mineral •Alkylbenzene •Polyol Ester APPLICATION: •Low Temp. Refrig. •Med. Temp. Refrig. Replacement For: R12
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HFCs

NATIONAL REFRIGERANTS R23 •5 lb •8 lb •20 lb •70 lb OIL: •Polyol Ester APPLICATION: •Very Low Temp. Refrig. Replacement For: R13 & R503	NATIONAL REFRIGERANTS R134a •12 oz •30 lb •125 lb •875 lb •40,000 lb bulk OIL: •Polyol Ester APPLICATION: •Med. Temp. Refrig. •Air Conditioning Replacement For: R12	NATIONAL REFRIGERANTS R404A (FX70/MP62) R125/143a/134a (44/52/4%) •24 lb •100 lb •1,300 lb OIL: •Polyol Ester APPLICATION: •Low Temp. Refrig. •Med. Temp. Refrig. Replacement For: R502	NATIONAL REFRIGERANTS R407A (Klea 60) R32/125/134a (20/40/40%) •25 lb •100 lb OIL: •Polyol Ester APPLICATION: •Low Temp. Refrig. •Med. Temp. Refrig. Replacement For: R502	NATIONAL REFRIGERANTS R407B (Klea G1) R32/125/134a (10/70/20%) •25 lb •100 lb OIL: •Polyol Ester APPLICATION: •Low Temp. Refrig. •Med. Temp. Refrig. Replacement For: R502	NATIONAL REFRIGERANTS R407C (Klea 60) R32/125/134a (23/25/52%) •25 lb •100 lb OIL: •Polyol Ester APPLICATION: •Air Conditioning Replacement For: R22	NATIONAL REFRIGERANTS R410A (AZ 20) R32/125 (50/50%) •25 lb •100 lb •1,450 lb OIL: •Polyol Ester APPLICATION: •Air Conditioning Replacement For: R22	NATIONAL REFRIGERANTS R507 (AZ 50) R125/143a (50/50%) •25 lb •100 lb •1,300 lb OIL: •Polyol Ester APPLICATION: •Low Temp. Refrig. •Med. Temp. Refrig. Replacement For: R502	NATIONAL REFRIGERANTS R508B R23/116 (46/54%) •10 lb •20 lb •70 lb OIL: •Polyalpha Olefin •Alkylbenzene •Mineral APPLICATION: •Very Low Temp. Refrig. Replacement For: R503 & R13
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*Specifically color coded for refrigerants that are not produced in sufficient quantities to qualify for their own individual color.