

40 CFR Part 98 Subpart A, Table A-1 - Global Warming Potentials

As amended in 79 FR 73779, December 11, 2014. Effective date January 1, 2015

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Please refer to the most current version of [40 Code of Federal Regulations Part 98 Subpart A](#)

Global Warming Potentials (GWP) [100-Year Time Horizon]

Chemical-Specific GWPs			
Carbon dioxide	124-38-9	CO2	1
Methane	74-82-8	CH4	25
Nitrous oxide	10024-97-2	N2O	298

Fully Fluorinated GHGs			
Sulfur hexafluoride	2551-62-4	SF6	22,800
Trifluoromethyl sulphur pentafluoride	373-80-8	SF5CF3	17,700
Nitrogen trifluoride	7783-54-2	NF3	17,200
PFC-14 (Perfluoromethane)	75-73-0	CF4	7,390
PFC-116 (Perfluoroethane)	76-16-4	C2F6	12,200
PFC-218 (Perfluoropropane)	76-19-7	C3F8	8,830
Perfluorocyclopropane	931-91-9	C-C3F6	17,340
PFC-3-1-10 (Perfluorobutane)	355-25-9	C4F10	8,860
PFC-318 (Perfluorocyclobutane)	115-25-3	C-C4F8	10,300
PFC-4-1-12 (Perfluoropentane)	678-26-2	C5F12	9,160
PFC-5-1-14 (Perfluorohexane, FC-72)	355-42-0	C6F14	9,300
PFC-6-1-12	335-57-9	C7F16; CF3(CF2)5CF3	7,820
PFC-7-1-18	307-34-6	C8F18; CF3(CF2)6CF3	7,620
PFC-9-1-18	306-94-5	C10F18	7,500
PfPMIE (HT-70)	NA	CF3OCF(CF3)CF2OCF2OCF3	10,300
Perfluorodecalin (cis)	60433-11-6	Z-C10F18	7,236
Perfluorodecalin (trans)	60433-12-7	E-C10F18	6,288

Saturated Hydrofluorocarbons (HFCs) With Two or Fewer Carbon-Hydrogen Bonds			
HFC-23	75-46-7	CHF3	14,800
HFC-32	75-10-5	CH2F2	675
HFC-125	354-33-6	C2HF5	3,500
HFC-134	359-35-3	C2H2F4	1,100
HFC-134a	811-97-2	CH2FCF3	1,430
HFC-227ca	2252-84-8	CF3CF2CHF2	2640
HFC-227ea	431-89-0	C3HF7	3,220
HFC-236cb	677-56-5	CH2FCF2CF3	1,340
HFC-236ea	431-63-0	CHF2CHF2CF3	1,370
HFC-236fa	690-39-1	C3H2F6	9,810
HFC-329p	375-17-7	CHF2CF2CF2CF3	2360
HFC-43-10mee	138495-42-8	CF3CFHCFHCF2CF3	1,640

Saturated Hydrofluorocarbons (HFCs) With Three or More Carbon-Hydrogen Bonds			
HFC-41	593-53-3	CH3F	92
HFC-143	430-66-0	C2H3F3	353
HFC-143a	420-46-2	C2H3F3	4,470
HFC-152	624-72-6	CH2FCH2F	53
HFC-152a	75-37-6	CH3CHF2	124
HFC-161	353-36-6	CH3CH2F	12
HFC-245ca	679-86-7	C3H3F5	693
HFC-245cb	1814-88-6	CF3CF2CH3	4620
HFC-245ea	24270-66-4	CHF2CHFCHF2	235
HFC-245eb	431-31-2	CH2FCHF2CF3	290
HFC-245fa	460-73-1	CHF2CH2CF3	1,030
HFC-263fb	421-07-8	CH3CH2CF3	76
HFC-272ca	420-45-1	CH3CF2CH3	144
HFC-365mfc	406-58-6	CH3CF2CH2CF3	794

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Global Warming Potentials (GWP) [100-Year Time Horizon]

Saturated Hydrofluoroethers (HFEs) and Hydrochlorofluoroethers (HCFEs) With One Carbon-Hydrogen Bond			
HFE-125	3822-68-2	CHF2OCF3	14,900
HFE-227ea	2356-62-9	CF3CHFOCF3	1,540
HFE-329mcc2	134769-21-4	CF3CF2OCF2CHF2	919
HFE-329me3	428454-68-6	CF3CFHCF2OCF3	4,550
1,1,1,2,2,3,3-Heptafluoro-3-(1,2,2,2-tetrafluoroethoxy)-propane	3330-15-2	CF3CF2CF2OCHF3	6,490

Saturated HFEs and HCFEs With Two Carbon-Hydrogen Bonds			
HFE-134 (HG-00)	1691-17-4	CHF2OCHF2	6,320
HFE-236ca	32778-11-3	CHF2OCF2CHF2	4,240
HFE-236ca12 (HG-10)	78522-47-1	CHF2OCF2OCHF2	2,800
HFE-236ea2 (Desflurane)	57041-67-5	CHF2OCHF3	989
HFE-236fa	20193-67-3	CF3CH2OCF3	487
HFE-338mcf2	156053-88-2	CF3CF2OCH2CF3	552
HFE-338mmz1	26103-08-2	CHF2OCH(CF3)2	380
HFE-338pcc13 (HG-01)	188690-78-0	CHF2OCF2CF2OCHF2	1,500
HFE-43-10pccc (H-Galden 1040x, HG-11)	E1730133	CHF2OCF2OC2F4OCHF2	1,870
HCFE-235ca2 (Enflurane)	13838-16-9	CHF2OCF2CHFCl	583
HCFE-235da2 (Isoflurane)	26675-46-7	CHF2OCHClCF3	350
HG-02	205367-61-9	HF2C-(OCF2CF2)2-OCF2H	3,825
HG-03	173350-37-3	HF2C-(OCF2CF2)3-OCF2H	3,670
HG-20	249932-25-0	HF2C-(OCF2)2-OCF2H	5,300
HG-21	249932-26-1	HF2C-OCF2CF2OCF2OCF2O-CF2H	3,890
HG-30	188690-77-9	HF2C-(OCF2)3-OCF2H	7,330
1,1,3,3,4,4,6,6,7,7,9,9,10,10,12,12,13,13,15,15-eicosafuoro-2,5,8,11,14-Pentaoxapentadecane	173350-38-4	HCF2O(CF2CF2O)4CF2H	3,630
1,1,2-Trifluoro-2-(trifluoromethoxy)-ethane	84011-06-3	CHF2CHFOCF3	1,240
Trifluoro(fluoromethoxy)methane	2261-01-0	CH2FOCF3	751

Saturated HFEs and HCFEs With Three or More Carbon-Hydrogen Bonds			
HFE-143a	421-14-7	CH3OCF3	756
HFE-245cb2	22410-44-2	CH3OCF2CF3	708
HFE-245fa1	84011-15-4	CHF2CH2OCF3	286
HFE-245fa2	1885-48-9	CHF2OCH2CF3	659
HFE-254cb2	425-88-7	CH3OCF2CHF2	359
HFE-263fb2	460-43-5	CF3CH2OCH3	11
HFE-263m1; R-E-143a	690-22-2	CF3OCH2CH3	29
HFE-347mcc3 (HFE-7000)	375-03-1	CH3OCF2CF2CF3	575
HFE-347mcf2	171182-95-9	CF3CF2OCH2CHF2	374
HFE-347mmy1	22052-84-2	CH3OCF(CF3)2	343
HFE-347mmz1 (Sevoflurane)	28523-86-6	(CF3)2CHOCH2F	216
HFE-347pcf2	406-78-0	CHF2CF2OCH2CF3	580
HFE-356mec3	382-34-3	CH3OCF2CHF3	101
HFE-356mff2	333-36-8	CF3CH2OCH2CF3	17
HFE-356mmz1	13171-18-1	(CF3)2CHOCH3	27
HFE-356pcc3	160620-20-2	CH3OCF2CF2CHF2	110
HFE-356pcf2	50807-77-7	CHF2CH2OCF2CHF2	265
HFE-356pcf3	35042-99-0	CHF2OCH2CF2CHF2	502
HFE-365mcf2	22052-81-9	CF3CF2OCH2CH3	58
HFE-365mcf3	378-16-5	CF3CF2CH2OCH3	11
HFE-374pc2	512-51-6	CH3CH2OCF2CHF2	557
HFE-449s1 (HFE-7100) Chemical blend	163702-07-6	C4F9OCH3	297
	163702-08-7	(CF3)2CF2OCH3	

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HFE-569sf2 (HFE-7200) Chemical blend	163702-05-4	C4F9OC2H5	59
	163702-06-5	(CF3)2CF2OC2H5	
HG'-01	73287-23-7	CH3OCF2CF2OCH3	222
HG'-02	485399-46-0	CH3O(CF2CF2O)2CH3	236
HG'-03	485399-48-2	CH3O(CF2CF2O)3CH3	221
Difluoro(methoxy)methane	359-15-9	CH3OCHF2	144
2-Chloro-1,1,2-trifluoro-1-methoxyethane	425-87-6	CH3OCF2CHFCI	122
1-Ethoxy-1,1,2,2,3,3,3-heptafluoropropane	22052-86-4	CF3CF2CF2OCH2CH3	61
2-Ethoxy-3,3,4,4,5-pentafluorotetrahydro-2,5-bis[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-furan	920979-28-8	C12H5F19O2	56
1-Ethoxy-1,1,2,3,3,3-hexafluoropropane	380-34-7	CF3CHFCF2OCH2CH3	23
Fluoro(methoxy)methane	460-22-0	CH3OCH2F	13
1,1,2,2-Tetrafluoro-3-methoxy-propane; Methyl 2,2,3,3-tetrafluoropropyl ether	60598-17-6	CHF2CF2CH2OCH3	5
1,1,2,2-Tetrafluoro-1-(fluoromethoxy)ethane	37031-31-5	CH2FOCF2CF2H	871
Difluoro(fluoromethoxy)methane	461-63-2	CH2FOCHF2	617
Fluoro(fluoromethoxy)methane	462-51-1	CH2FOCH2F	130

Fluorinated Formates

Trifluoromethyl formate	85358-65-2	HCOOCF3	588
Perfluoroethyl formate	313064-40-3	HCOOCF2CF3	580
1,2,2,2-Tetrafluoroethyl formate	481631-19-0	HCOOCHFCF3	470
Perfluorobutyl formate	197218-56-7	HCOOCF2CF2CF2CF3	392
Perfluoropropyl formate	271257-42-2	HCOOCF2CF2CF3	376
1,1,1,3,3,3-Hexafluoropropan-2-yl formate	856766-70-6	HCOOCH(CF3)2	333
2,2,2-Trifluoroethyl formate	32042-38-9	HCOOCH2CF3	33
3,3,3-Trifluoropropyl formate	1344118-09-7	HCOOCH2CH2CF3	17

Fluorinated Acetates

Methyl 2,2,2-trifluoroacetate	431-47-0	CF3COOCH3	52
1,1-Difluoroethyl 2,2,2-trifluoroacetate	1344118-13-3	CF3COOCF2CH3	31
Difluoromethyl 2,2,2-trifluoroacetate	2024-86-4	CF3COOCHF2	27
2,2,2-Trifluoroethyl 2,2,2-trifluoroacetate	407-38-5	CF3COOCH2CF3	7
Methyl 2,2-difluoroacetate	433-53-4	HCF2COOCH3	3
Perfluoroethyl acetate	343269-97-6	CH3COOCF2CF3	21
Trifluoromethyl acetate	74123-20-9	CH3COOCF3	20
Perfluoropropyl acetate	1344118-10-0	CH3COOCF2CF2CF3	18
Perfluorobutyl acetate	209597-28-4	CH3COOCF2CF2CF2CF3	16
Ethyl 2,2,2-trifluoroacetate	383-63-1	CF3COOCH2CH3	13

Carbonofluoridates

Methyl carbonofluoridate	1538-06-3	FCOOCH3	95
1,1-Difluoroethyl carbonofluoridate	1344118-11-1	FCOOCF2CH3	27

Fluorinated Alcohols Other Than Fluorotelomer Alcohols

Bis(trifluoromethyl)-methanol	920-66-1	(CF3)2CHOH	195
(Octafluorotetramethyl-ene) hydroxymethyl group	NA	X-(CF2)4CH(OH)-X	73
2,2,3,3,3-Pentafluoropropanol	422-05-9	CF3CF2CH2OH	42
2,2,3,3,4,4,4-Heptafluorobutan-1-ol	375-01-9	C3F7CH2OH	25
2,2,2-Trifluoroethanol	75-89-8	CF3CH2OH	20
2,2,3,4,4,4-Hexafluoro-1-butanol	382-31-0	CF3CHFCF2CH2OH	17
2,2,3,3-Tetrafluoro-1-propanol	76-37-9	CHF2CF2CH2OH	13
2,2-Difluoroethanol	359-13-7	CHF2CH2OH	3
2-Fluoroethanol	371-62-0	CH2FCH2OH	11
4,4,4-Trifluorobutan-1-ol	461-18-7	CF3(CH2)2CH2OH	5

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Unsaturated Perfluorocarbons (PFCs)			
PFC-1114; TFE	116-14-3	CF ₂ =CF ₂ ; C ₂ F ₄	4
PFC-1216; Dyneon HFP	116-15-4	C ₃ F ₆ ; CF ₃ CF=CF ₂	5
PFC C-1418	559-40-0	c-C ₅ F ₈	197
Perfluorobut-2-ene	360-89-4	CF ₃ CF=CF ₂	182
Perfluorobut-1-ene	357-26-6	CF ₃ CF ₂ CF=CF ₂	10
Perfluorobuta-1,3-diene	685-63-2	CF ₂ =CF ₂ CF=CF ₂	3

Unsaturated Hydrofluorocarbons (HFCs) and Hydrochlorofluorocarbons (HCFCs)			
HFC-1132a; VF ₂	75-38-7	C ₂ H ₂ F ₂ , CF ₂ =CH ₂	4
HFC-1141; VF	75-02-5	C ₂ H ₃ F, CH ₂ =CHF	2
(E)-HFC-1225ye	10/8/5595	CF ₃ CF=CHF(E)	6
(Z)-HFC-1225ye	5528-43-8	CF ₃ CF=CHF(Z)	22
Solstice 1233zd(E)	102687-65-0	C ₃ H ₂ ClF ₃ ; CHCl=CHCF ₃	134
HFC-1234yf; HFO-1234yf	754-12-1	C ₃ H ₂ F ₄ ; CF ₃ CF=CH ₂	31
HFC-1234ze(E)	1645-83-6	C ₃ H ₂ F ₄ ; trans-CF ₃ CH=CHF	97
HFC-1234ze(Z)	29118-25-0	C ₃ H ₂ F ₄ cis-CF ₃ CH=CHF; CF ₃ CH=CHF	29
HFC-1243zf; TFP	677-21-4	C ₃ H ₃ F ₃ , CF ₃ CH=CH ₂	12
(Z)-HFC-1336	692-49-9	CF ₃ CH=CHCF ₃ (Z)	158
HFC-1345zfc	374-27-6	C ₂ F ₅ CH=CH ₂	9
Capstone 42-U	19430-93-4	C ₆ H ₃ F ₉ , CF ₃ (CF ₂) ₃ CH=CH ₂	16
Capstone 62-U	25291-17-2	C ₈ H ₃ F ₁₃ , CF ₃ (CF ₂) ₅ CH=CH ₂	11
Capstone 82-U	21652-58-4	C ₁₀ H ₃ F ₁₇ , CF ₃ (CF ₂) ₇ CH=CH ₂	9

Unsaturated Halogenated Ethers			
PMVE; HFE-216	1187-93-5	CF ₃ OCF=CF ₂	17
Fluoroxene	406-90-6	CF ₃ CH ₂ OCH=CH ₂	5

Fluorinated Aldehydes			
3,3,3-Trifluoro-propanal	460-40-2	CF ₃ CH ₂ CHO	1

Fluorinated Ketones			
Novec 1230 (perfluoro (2-methyl-3-pentanone))	756-13-8	CF ₃ CF ₂ C(O)CF (CF ₃) ₂	1

Fluorotelomer Alcohols			
3,3,4,4,5,5,6,6,7,7,7-Undecafluoroheptan-1-ol	185689-57-0	CF ₃ (CF ₂) ₄ CH ₂ CH ₂ OH	43
3,3,3-Trifluoropropan-1-ol	2240-88-2	CF ₃ CH ₂ CH ₂ OH	35
3,3,4,4,5,5,6,6,7,7,8,8,9,9,9-Pentadecafluorononan-1-ol	755-02-2	CF ₃ (CF ₂) ₆ CH ₂ CH ₂ OH	33
3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11,11-Nonadecafluoroundecan-1-ol	87017-97-8	CF ₃ (CF ₂) ₈ CH ₂ CH ₂ OH	19

Fluorinated GHGs With Carbon-Iodine Bond(s)			
Trifluoroiodomethane	2314-97-8	CF ₃ I	4

Other Fluorinated Compounds			
Dibromodifluoromethane (Halon 1202)	75-61-6	CF ₂ Br ₂	231
2-Bromo-2-chloro-1,1,1-trifluoroethane (Halon-2311/Halothane)	151-67-7	CF ₃ CHClBr	41

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Fluorinated GHG Group	GWP
Default GWPs for Compounds for Which Chemical-Specific GWPs Are Not Listed Above	
Fully fluorinated GHGs	10,000
Saturated hydrofluorocarbons (HFCs) with 2 or fewer carbon-hydrogen bonds	3,700
Saturated HFCs with 3 or more carbon-hydrogen bonds	930
Saturated hydrofluoroethers (HFEs) and hydrochlorofluoroethers (HCFEs) with 1 carbon-hydrogen bond	5,700
Saturated HFEs and HCFEs with 2 carbon-hydrogen bonds	2,600
Saturated HFEs and HCFEs with 3 or more carbon-hydrogen bonds	270
Fluorinated formates	350
Fluorinated acetates, carbonofluoridates, and fluorinated alcohols other than fluorotelomer alcohols	30
Unsaturated perfluorocarbons (PFCs), unsaturated HFCs, unsaturated hydrochlorofluorocarbons (HCFCs), unsaturated halogenated ethers, unsaturated halogenated esters, fluorinated aldehydes, and fluorinated ketones	1
Fluorotelomer alcohols	1
Fluorinated GHGs with carbon-iodine bond(s)	1
Other fluorinated GHGs	2,000