



DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY
ACQUISITION LOGISTICS AND TECHNOLOGY
103 ARMY PENTAGON
WASHINGTON DC 20310-0103

SAAL-ESO

MAY 17 2018

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Ozone Depleting Substances and Their Alternatives

1. Reference Memorandum, ASA (ALT), SAAL-PE, 8 Apr 13, subject: Minimizing the Use of Ozone-Depleting Substances.
2. This memorandum updates the reference policy to minimize our dependency on ozone-depleting substances (ODS) in our weapon systems and industrial processes. It also addresses the use of hydrofluorocarbons (HFCs) as the primary alternatives to ODS. Enclosed are implementing instructions.
3. After more than 30 years, science and technology has still not found suitable substitutes for certain critical ODS applications, and the HFC substitutes we have incorporated in new systems and retrofits are themselves under increasing regulatory scrutiny as greenhouse gases. Additionally, mishaps, including loss of life, have occurred due to the use of flammable counterfeit gases and improper handling of compressed gas cylinders.
4. As we move beyond seeking drop-in replacements, and turn to finding more environmentally friendly solutions, we must remain vigilant in choosing systems that are both safe and effective. We must also address the logistics challenges associated in sustaining our aging fleets of legacy systems that remain dependent upon ODS, and in maintaining the stockpile of mission-critical ODS for decades to come.
5. The Environmental Support Office is my lead for all issues concerning ODS and HFCs. They manage the Army ODS Reserve and provide oversight of regulatory and technical developments for fire suppression agents, refrigerants and solvents. Their expertise is available to support Program Managers, Logistics Managers and System Coordinators in developing, producing and maintaining Army weapon systems.
6. The point of contact is Ms. Amy Borman, Director, Environment Support Office, 703-697-1328, amy.l.borman.civ@mail.mil.

Encl

A handwritten signature in black ink, reading "Timothy G. Goddette", is positioned above the printed name.

Timothy G. Goddette
Acting Deputy Assistant Secretary of the
Army 9Acquisition Policy and Logistics)

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SUBJECT: Ozone Depleting Substances and Their Alternatives

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Instructions for the Use of Ozone Depleting Substances (ODS) and Their Alternatives

1. Use. All Army units, CONUS and OCONUS, are authorized to continue to use ODS (Class I and Class II) until otherwise directed by their Army Command.

2. Prohibitions.

2.1 New weapon systems, including non-developmental systems, and major modifications to existing weapon systems, are prohibited from using ODS. Waiver authority for systems that are not Acquisition Category (ACAT) I or II is delegated to the applicable Program Executive Officer (PEO).

2.2 Requisition of ODS from the Army ODS Reserve in support of Foreign Military Sales (FMS) or non-Army weapon system applications is prohibited. Requisition of parts or equipment containing ODS supplied from the Army ODS Reserve in support of FMS is also prohibited.

2.3 Requiring, purchasing or using ODS solvents is prohibited.

2.4 Commercial procurement of all refrigerants is prohibited.

2.5 Venting of ODS or hydrofluorocarbons (HFCs) is prohibited.

3. Contract Approval. United States Code (10 USC 2302) requires that a Senior Acquisition Official approve all contracts that require the use of a Class I ODS.

3.1 Supporting guidance exists at Federal Acquisition Regulation (FAR) Subpart 23.8, Defense Supplement 223.8 and Army Supplement 5123.8.

3.2 Approval authority is delegated to the PEO or equivalent General Officer/ Senior Executive Service member. Further delegation is prohibited.

3.3 Contract approvals must be supported by a certification of need, stating that no suitable substitute is available. This certification must be signed by a Lead Approved Technical Representative, formally designated by the PEO. A copy of the approval and certification of need must be submitted to SAAL-ESO.

3.4 All contracts must be reviewed to identify any requirement for the use of Class I ODS, with the following exceptions:

- (1) Contracts for commercial items that do not cite a Military Specification or Standard and whose use will not require support from the ODS Reserve,
- (2) Small Business Innovative Research contracts,
- (3) Contracts for personnel services, and
- (4) Software contracts.

3.5 PEOs should carefully consider the continued availability of ODS supplies before approving the purchase of ODS, or parts and equipment containing ODS, to support FMS systems or equipment.

4. Hydrostatic Retest. Fully charged and serviceable fire suppression system cylinders may remain in service beyond the hydrostatic retest date, and should not be removed solely for hydrostatic retest. When a cylinder has an expired retest date, the cylinder cannot be returned to serviceable condition by recharging until it has passed inspection and completed hydrostatic retest as prescribed by 49 CFR 180.209 Table 1. A fully charged cylinder should not be installed if the hydrostatic retest date has expired.

5. Portable Extinguishers. Fire extinguishers must be serviced, maintained and inspected as prescribed by 29 CFR 1910.157, Table L1. A portable extinguisher must be removed from a vehicle once its service life has expired. Service lives are set by the vehicle Program Manager and/or extinguisher Logistics Manager. Expired or un-serviceable halon extinguishers must be turned in to the Army ODS Reserve (see paragraph 8.3).

6. Alternatives. SAAL-ESO must be consulted before the use of any refrigerant, fire suppressant or solvent not approved by the Environmental Protection Agency under the Significant New Alternatives Program. A Toxicity Clearance must be obtained from the Public Health Center before any chemical is added to the Army inventory. If the chemical will be used where worker exposure may occur, the Program Manager should request an update to the applicable Health Hazard Assessment.

7. Life Cycle Support. Program Managers of systems still dependent on ODS must report projected fleet densities, planned modifications and overall system service life to SAAL-ESO, through their Department of the Army System Coordinators, at the end of the first quarter of each fiscal year, beginning in 2019.

8. Recovery and Disposition. During system servicing and maintenance, including refurbishment or retrofit, all ODS and HFCs must be recovered.

8.1 ODS and HFCs used in vehicle fire suppression systems are in pressurized, compressed gas cylinders that can be extremely dangerous if mishandled. Follow proper equipment and safety procedures to remove, store and transport them.

8.2 The transfer or exchange of any recovered Class I ODS or the Class II ODS refrigerant R-22 is prohibited. All recovered Class I ODS and R-22 refrigerant must be turned in to the Army ODS Reserve. Turn-in instructions are available at: www.dla.mil/Aviation/Offers/Services/AviationEngineering/OzoneDepRsrv.aspx.

8.3 Recovered HFCs may be transferred or exchanged. Defense Logistics Agency (DLA) Disposition Services will accept recovered HFCs. The customer, however, is responsible to identify the cylinder contents.

9. Program Support. SAAL-ESO is available to support PEOs and Program Managers in preparing documentation related to this policy, including certifications of need, contract approvals, annual reports and requests for waivers. SAAL-ESO can also provide technical support, 10 USC 2302 training and clarification of this policy.

10. Policy Waivers. Unless otherwise stated, requests for waivers must be submitted through SAAL-ESO to the Army Acquisition Executive for approval.

TABLE 1: OZONE DEPLETING SUBSTANCES

CLASS I ODS				
Chemical Name	Symbol	CAS No.	Ref No.	Common Name
<u>Fire Suppressants</u>				
Bromochlorodifluoromethane	CF2ClBr	353-59-3	Halon 1211	
Bromotrifluoromethane	CF3Br	75-63-8	Halon 1301	
Dibromotetrafluoroethane	C2F4Br2	124-73-2	Halon 2402	
Chlorobromomethane	CH2BrCl	74-97-5	Halon 1011	CBM
Bromodifluoromethane	HBFC-12B1	1511-62-2		FM-100
<u>Refrigerants</u>				
Trichlorofluoromethane	CFC-11	75-69-4	R-11	Freon 11
Dichlorodifluoromethane	CFC-12	75-71-8	R-12	Freon 12
Chlorotrifluoromethane	CFC-13	75-72-9	R-13	Freon 13
Pentachlorofluoroethane	CFC-111	354-58-5	R-111	
Tetrachlorodifluoroethane	CFC-112	76-12-0	R-112	
Dichlorotetrafluoroethane	CFC-114	76-14-2	R-114	
Chloropentafluoroethane	CFC-115	76-15-3	R-115	
Heptachlorofluoropropane	CFC-211	422-78-6		
Hexachlorodifluoropropane	CFC-212	3182-26-1		
Pentachlorotrifluoropropane	CFC-213	2354-06-5		
Tetrachlorotetrafluoropropane	CFC-214	2268-45-4		
Trichloropentafluoropropane	CFC-215	76-17-5		
Dichlorohexafluoropropane	CFC-216	661-97-2		
Chloroheptafluoropropane	CFC-217	76-18-6		
R-12 (74%) and HFC-152a (26%)			R-500	
R-12 (25%) and R-22 (75%)			R-501	
R-115 (51%) and R-22 (49%)			R-502	
R-13 (59.9%) and HFC-23 (40.1%)			R-503	
<u>Solvents</u>				
Tetrachloromethane	CCL4	56-23-5		Carbon Tet
1,1,1 Trichloroethane		71-55-6	TCA	Methyl Chloroform
Trichlorotrifluoroethane	CFC-113	76-13-1		Freon 113
<u>Others</u>				
Bromomethane		74-83-9	MBX	Methyl Bromide

CLASS II ODS

Chemical Name	HCFC	Symbol	CAS No.	Ref No.	Some Common Names
Dichlorofluoromethane	HCFC-21	CHFCI ₂	75-43-4	R-21	Freon 21
Monochlorodifluoromethane	HCFC-22	CHF ₂ Cl	75-45-6	R-22	Freon 22, Genetron 22, Forane 22, Refron 22, Freeze Mist, Dust-Off
Monochlorofluoromethane	HCFC-31	CH ₂ FCI	593-70-4	R-31	Genetron 31
Tetrachlorofluoroethane	HCFC-121	C ₂ HFCI ₄	354-14-3		<lubricant>
Trichlorodifluoroethane	HCFC-122	C ₂ H ₂ FCI ₃	354-21-2		<lubricant>
Dichlorotrifluoroethane	HCFC-123	C ₂ HFCI ₃	306-83-2	R-123	Suva 123, Freon 123, Genetron 123, Halotron I
Monochlorotetrafluoroethane	HCFC-124	C ₂ HFCI ₄	2837-89-0	R-124	Suva 124, Freon 124, Genetron 124, FE-241
Trichlorofluoroethane	HCFC-131	C ₂ H ₂ FCI ₃	359-28-4		
Dichlorodifluoroethane	HCFC-132b	C ₂ H ₂ F ₂ CI	1649-08-7		
Monochlorotrifluoroethane	HCFC-133a	C ₂ H ₂ F ₃ CI	75-88-7		
Dichlorofluoroethane	HCFC-141b	C ₂ H ₃ FCI ₂	1717-00-6		Ecolink 2005, Superflux Remover FR-A
Monochlorodifluoroethane	HCFC-142b	C ₂ H ₃ F ₂ CI	75-68-3	R-142b	Genetron 142b
Hexachlorofluoropropane	HCFC-221	C ₃ HFCI ₆	422-26-4		
Pentachlorodifluoropropane	HCFC-222	C ₃ H ₂ F ₂ CI ₅	422-49-1		
Tetrachlorotrifluoropropane	HCFC-223	C ₃ H ₂ F ₃ CI ₄	422-52-6		
Trichlorotetrafluoropropane	HCFC-224	C ₃ H ₂ F ₄ CI ₃	422-54-8		
Dichloropentafluoropropane	HCFC-225ca	C ₃ H ₂ F ₅ CI ₂	422-56-0		Asahclin AK-225,
Dichloropentafluoropropane	HCFC-225cb	C ₃ H ₂ F ₅ CI ₂	507-55-1		1664 Kleen Air
Monochlorohexafluoropropane	HCFC-226	C ₃ H ₂ F ₆ CI	431-87-8		
Pentachlorofluoropropane	HCFC-231	C ₃ H ₂ F ₄ CI ₅	421-94-3		
Tetrachlorodifluoropropane	HCFC-232	C ₃ H ₂ F ₂ CI ₄	460-89-9		
Trichlorotrifluoropropane	HCFC-233	C ₃ H ₂ F ₃ CI ₃	7125-84-0		
Dichlorotetrafluoropropane	HCFC-234	C ₃ H ₂ F ₄ CI ₂	425-94-5		
Monochloropentafluoropropane	HCFC-235	C ₃ H ₂ F ₅ CI	460-92-4		
Tetrachlorofluoropropane	HCFC-241	C ₃ H ₃ FCI ₄	666-27-3		
Trichlorodifluoropropane	HCFC-242	C ₃ H ₃ F ₂ CI ₃	460-63-9		
Dichlorotrifluoropropane	HCFC-243	C ₃ H ₃ F ₃ CI ₂	460-69-5		
Monochlorotetrafluoropropane	HCFC-244	C ₃ H ₃ F ₄ CI			
Trichlorofluoropropane	HCFC-251	C ₃ H ₄ FCI ₃	421-41-0		
Dichlorodifluoropropane	HCFC-252	C ₃ H ₄ F ₂ CI ₂	819-00-1		
Monochlorotrifluoropropane	HCFC-253	C ₃ H ₄ F ₃ CI	460-35-5		
Dichlorofluoropropane	HCFC-261	C ₃ H ₅ FCI ₂	420-97-3		
Monochlorodifluoropropane	HCFC-262	C ₃ H ₅ F ₂ CI	421-02-03		
Monochlorofluoropropane	HCFC-271	C ₃ H ₆ FCI	430-55-7		

CLASS II ODS REFRIGERANT BLENDS

Refrigerant No.	HCFC	HCFC %	Ref. No. 2	Ref. No. 3	Ref No. 4	Some Common Names
R-401A	R-22	53	R-124*	R-152a	--	MP-39
R-401B	R-22	61	R-124*	R-152a	--	MP-66
R-402A	R-22	38	R-125	R-290	--	HP-80
R-402B	R-22	60	R-125	R-290	--	HP-81
R-403A	R-22	75	R-218	R-290	--	Isceon 69S
R-403B	R-22	56	R-218	R-290	--	Isceon 69L
R-405A	R-22	45	R-142b*	R-152a	R-C318	G2015
R-406A	R-22	55	R-142b*	R-600a	--	Autofrost GHG-X8
R-408A	R-22	47	R-143a	R-125	--	Forane FX-50
R-409A	R-22	60	R-124*	R-142b*	--	Forane FX-56
R-409B	R-22	65	R-124*	R-142b*	--	Forane FX-57
R-411A	R-22	87.5	R-152a	R-1270	--	
R-411B	R-22	94	R-152a	R-1270	--	
R-412A	R-22	70	R-142b*	R-218	--	Arcton TP-5R
R-414A	R-22	51	R-124*	R-142b	R-600A	Autofrost GHG-X4
R-414B	R-22	50	R-124*	R-142b	R-600A	Hot Shot
R-415A	R-22	82	R-152a	--	--	Mackfri-401a
R-415B	R-22	25	R-152a	--	--	Mackfri-401b
R-416A	R-124	39.5	R-134a	R-600	--	FR-12, FRG C
RB-276	R-142b	19	R-134a	Naptha	--	Free Zone

TABLE 2: HYDROFLUOROCARBONS**HFCs**

Chemical Name	HFC	Symbol	CAS No.	GWP	Common Names
Fluoroform	HFC-23	CHF3	75-46-7	12,400	R-23, FE-13, Freon 23
Difluoromethane	HFC-32	CH2F2	75-10-5	677	R-32, Freon 32, methylene fluoride
Fluoromethane	HFC-41	CH3F2	593-53-3	116	Freon 41, methyl fluoride
Pentafluoroethane	HFC-125	CHF2CFE	354-33-6	3,170	R-125, Genetron 125, Suva 125, FE-25
Tetrafluoroethane (1,1,2,2)	HFC-134	CHF2CHF2	359-35-3	1,120	R-134
Tetrafluoroethane (1,1,1,2)	HFC-134a	CH2FCF3	811-97-2	1,300	R-134a, Suva 134a, Genetron 134a
Trifluoroethane (1,1,2)	HFC-143	CH2FCHF2	420-46-2	328	R143, methylfluoroform
Trifluoroethane (1,1,1)	HFC-143a	CH3CF3	430-66-0	4,800	R-143a, Genetron 143a
Difluoroethane (1,2)	HFC-152	CH2FCH2F	624-72-6	16	R-152
Difluoroethane (1,1)	HFC-152a	CH3CHF2	75-37-6	138	R-152a, DFE
Fluoroethane	HFC-161	CH2CH2F	353-36-6	4	R-161
Heptafluoropropane	HFC-227ea	CF3CHFCF3	431-89-0	3,350	FM-200, HFP, R-227ea
Hexafluoropropane (1,1,1,2,2,3)	HFC-236cb	CH3FCF2CF3	677-56-5	11,210	R-236cb
Hexafluoropropane (1,1,1,2,3,3)	HFC-236ea	CHF2CHFCF3	431-63-0	1,330	R-236ea
Hexafluoropropane (1,1,1,3,3,3)	HFC-236fa	CF3CH2CF3	690-39-1	8,060	FE-36, R-236fa, Suva 236fa
Pentafluoropropane (1,1,2,2,3)	HFC-245ca	CH2FCF2CGF2	679-86-7	717	R-245ca
Pentafluoropropane (1,1,1,3,3)	HFC-245fa	CHF2CH2CF3	460-73-1	858	R-245fa, Genetron 245fa
Pentafluorobutane	HFC-365mfc	CH3CF2CH2CF3	406-58-6	804	R-365mfc, SOLKANE 365
Decafluoropentane	HFC-43-10mee	CF3CHFCHFCF2CF3	138495-42-8	1,650	Vertrel XF

Adapted from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), dated 2014

- No ethers (oxygenated compounds) are included

- Only HFCs with established Chemical Abstract Service (CAS) numbers are included

HFC Refrigerant Blends

Refrigerant No.	HFC	Ref #2	Ref #3	GWP	Some Common Names
R-404A	R-125	R-143a	R-134a	3,922	HP-62, FX-70
R-407A	R-32	R-125	R-134a	2,107	Klea 60
R-407B	R-32	R-125	R-134a	2,804	Klea 61
R-407C	R-32	R-125	R-134a	1,774	Klea 66, AC9000
R-407D	R-32	R-125	R-134a	1,627	
R-407E	R-32	R-125	R-134a	1,552	
R-407F	R-32	R-125	R-134a	1,825	Genetron Performax LT
R-410A	R-32	R-125	--	2,088	AZ-20, Puron, Suva 9100
R-410B	R-32	R-125	--	2,229	AC9100
R-413A	R-134a	R-218	R-600a	2,053	ISCEON 49
R-417A	R-125	R-134a	R-600	2,346	ISCEON 59, NU-22
R-417B	R-125	R-134a	R-600	3,027	
R-419A	R-125	R-134a	R-E170	2,967	
R-421A	R-125	R-134a	--	2,631	Choice 421A
R-421B	R-125	R-134a	--	3,190	Choice 421B
R-422A	R-125	R-134a	R-600a	3,143	ISCEON 79
R-422B	R-125	R-134a	R-600a	2,526	ICOR XAC1
R-422C	R-125	R-134a	R-600a	3,085	ICOR XLT1
R-422D	R-125	R-134a	R-600a	2,729	ISCEON MO29
R-423A	R-134a	R-227ea	--	2,280	
R-424A	R-125	R-134a	R-600a+	2,440	RS-44
R-425A	R-32	R-134a	R-227ea	1,505	
R-426A	R-125	R-134a	R-600+	1,508	RS-24
R-427A	R-32	R-125	R-143+	2,138	Forane 427A
R-428A	R-125	R-143a	R-290+	3,607	RS-52
R-429A	R-152a	R-E170	R-600a	14	
R-430A	R-152a	R-600	--	95	
R-431A	R-152a	R-290	--	38	
R-434A	R-125	R-143a	R-134a+	3,245	RS-45
R-435A	R-152a	R-E170	--	26	
R-437A	R-125	R-134a	R-600+	1,805	
R-438A	R-32	R-125	R-134a+	2,265	KDD5, ISCEON MO99
R-439A	R-32	R-125	R-600	1,983	
R-440A	R-134a	R-290	R-152a	144	
R-507A	R-125	R-143a	--	3,985	AZ-50
R-508A	R-23	R-116	--	13,214	Klea 5R3
R-508B	R-23	R-116	--	13,396	Suva 95