

Table Z-1-A Limits for Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	mg/m ³ ^b		ppm ^d	mg/m ³ ^b	ppm ^d	mg/m ³ ^b	ppm ^d	mg/m ³ ^b	
Acetaldehyde	75-07-0	200	360		100	180	150	270			
Acetic acid	64-19-7	10	25								
Acetic anhydride	108-24-7	5	20					5	20		
Acetone	67-64-1	1000	2400		750	1800	1000	2400			
Acetonitrile	75-05-8	40	70		40	70	60	105			
2-Acetylaminofluorene; see 1910.1014.	53-96-3										
Acetylene dichloride; see 1,2-Dichloroethylene											
Acetylene tetrabromide	79-27-6	1	14		1	14					
Acetylsalicylic acid (Aspirin)	50-78-2					5					
Acrolein	107-02-8	0.1	0.25		0.1	0.25	0.3	0.8			
Acrylamide	79-06-1		0.3	X		0.03					X
Acrylic acid	79-10-7				10	30					X
Acrylonitrile; see 1910.1045.	107-13-1										
Aldrin	309-00-2		0.25	X		0.25					X
Allyl alcohol	107-18-6	2	5	X	2	5	4	10			X
Allyl chloride	107-05-1	1	3		1	3	2	6			
Allyl glycidyl ether (AGE)	106-92-3	(C)10	(C)45		5	22	10	44			
Allyl propyl disulfide	2179-59-1	2	12		2	12	3	18			
alpha-Alumina	1344-28-1										
Total dust			15			10					
Respirable fraction			5			5					
Aluminum (as Al)	7429-90-5										
Metal											
Total dust			15			15					
Respirable fraction			5			5					
Pyro powders						5					
Welding fumes						5					
Soluble salts						2					
Alkyls						2					
4-Aminodiphenyl; see 1910.1011.	92-67-1										
2-Aminoethanol; see Ethanolamine											
2-Aminopyridine	504-29-0	0.5	2		0.5	2					
Amitrole	61-82-5					0.2					
Ammonia	7664-41-7	50	35				35	27			
Ammonium chloride fume	12125-02-9					10		20			
Ammonium sulfamate	7773-06-0										
Total dust			15			10					
Respirable fraction			5			5					
n-Amyl acetate..	628-63-7	100	525		100	525					
sec-Amyl acetate	626-38-0	125	650		125	650					
Aniline and homologs	62-53-3	5	19	X	2	8					X
Anisidine (o-,p-isomers)	29191-52-4		0.5			0.5					

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		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	mg/m ³ ^b		ppm ^d	mg/m ³ ^b	ppm ^d	mg/m ³ ^b	ppm ^d	mg/m ³ ^b	
Antimony and compounds (as Sb)	7440-36-0		0.5			0.5					
ANTU (alpha Naphthylthiourea)	86-88-4		0.3			0.3					
Arsenic, inorganic compounds (as As); see 1910.1018.	7440-38-2	Varies with compound			See 1910.1018(a) for applications excluded						
Arsenic, organic compounds (as As)	7440-38-2		0.5			0.5					
Arsine	7784-42-1	0.05	0.2		0.05	0.2					
Asbestos; see 1910.1001.	Varies##										
Atrazine	1912-24-9					5					
Azinphos-methyl.	86-50-0		0.2	X		0.2				X	
Barium, soluble compounds (as Ba)	7440-39-3		0.5			0.5					
Barium sulfate.. Total dust	7727-43-7		15			10					
Respirable fraction..			5			5					
Benomyl.. Total dust	17804-35-2		15			10					
Respirable fraction..			5			5					
Benzene; See 1910.1028.	71-43-2	See Table Z-2 for the limits applicable in the operations or sectors excluded in 1910.1028(d)									
Benzidine; See 1910.1010.	92-87-5										
p-Benzoquinone; see Quinone.											
Benzo(a)pyrene; see Coal tar pitch volatiles.											
Benzoyl peroxide	94-36-0		5			5					
Benzyl chloride.	100-44-7	1	5		1	5					
Beryllium and beryllium compounds (as Be)	7440-41-7	See Table Z-2			0.002	0.005 (30 min)		0.025			
Biphenyl; see Diphenyl.											
Bismuth telluride, Undoped	1304-82-1										
Total dust			15			15					
Respirable fraction..			5			5					
Bismuth telluride, Se-doped						5					
Borates, tetra, sodium salts Anhydrous	1330-43-4					10					
Decahydrate	1303-96-4					10					
Pentahydrate	12179-04-3					10					
Boron oxide. Total dust	1303-86-2		15			10					

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		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	mg/m ³ ^b		ppm ^d	mg/m ³ ^b	ppm ^d	mg/m ³ ^b	ppm ^d	mg/m ³ ^b	
Respirable fraction			5			5					
Boron tribromide	10294-33-4								1	10	
Boron trifluoride	7637-07-2	(C)1	(C)3						1	3	
Bromacil	314-40-9				1	10					
Bromine	7726-95-6	0.1	0.7		0.1	0.7	0.3	2			
Bromine pentafluoride	7789-30-2				0.1	0.7					
Bromoform	75-25-2	0.5	5	X	0.5	5					X
Butadiene (1,3-Butadiene)	106-99-0	1000	2200				See 1910.1051				
Butane	106-97-8				800	1900					
Butanethiol; see Butyl mercaptan.											
2-Butanone (Methyl ethyl ketone)	78-93-3	200	590		200	590	300	885			
2-Butoxyethanol.	111-76-2	50	240	X	25	120					X
n-Butyl-acetate.	123-86-4	150	710		150	710	200	950			
sec-Butyl acetate	105-46-4	200	950		200	950					
tert-Butyl-acetate	540-88-5	200	950		200	950					
Butyl acrylate	141-32-2				10	55					
n-Butyl alcohol	71-36-3	100	300						50	150	X
sec-Butyl alcohol	78-92-2	150	450		100	305					
tert-Butyl alcohol.	75-65-0	100	300		100	300	150	450			
Butylamine	109-73-9	(C)5	(C)15	X					5	15	X
tert-Butyl chromate (as CrO3)	1189-85-1		(C)0.1	X						0.1	X
n-Butyl glycidyl ether (BGE)	2426-08-6	50	270		25	135					
Butyl mercaptan.	109-79-5	10	35		0.5	1.5					
n-Butyl lactate	138-22-7				5	25					
o-sec-Butylphenol	89-72-5				5	30					X
p-tert-Butyltoluene	98-51-1	10	60		10	60	20	120			
Cadmium (as Cd)	7440-43-9		See Table Z-2				See 1910.1027				
Cadmium dust (as Cd)	7440-43-9		See Table Z-2				See 1910.1027				
Calcium Carbonate	1317-65-3										
Total dust			15			15					
Respirable fraction			5			5					
Calcium cyananide	156-62-7					0.5					
Calcium hydroxide	1305-62-0					5					
Calcium oxide	1305-78-8		5			5					
Calcium silicate	1344-95-2										
Total dust			15			15					
Respirable fraction			5			5					
Calcium sulfate	7778-18-9										
Total dust			15			15					
Respirable fraction			5			5					
Camphor, synthetic.	76-22-2		2			2					
Caprolactam	105-60-2										
Dust						1				3	
Vapor					5	20	10	40			
Captafol (Difolatan [®])	2425-06-1					0.1					

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		ppm ^d	mg/m ³		ppm ^d	mg/m ³	ppm ^d	mg/m ³	ppm ^d	mg/m ³	
Captan	133-06-2				5						
Carbaryl (Sevin [®])	63-25-2		5			5					
Carbon black	1333-86-4		3.5			3.5					
Carbon dioxide	124-38-9	5000	9000		10,000	18,000	30,000	54,000			
Carbon disulfide	75-15-0		See Table Z-2		4	12	12	36			X
Carbon monoxide	630-08-0	50	55		35	40			200	229	
Carbon tetrabromide	558-13-4				0.1	1.4	0.3	4			
Carbon tetrachloride	56-23-5		See Table Z-2		2	12.6					
Carbonyl fluoride	353-50-4				2	5	5	15			
Catechol (Pyrocatechol)	120-80-9				5	20					X
Cellulose	9004-34-6										
Total dust			15			15					
Respirable fraction			5			5					
Chlordane	57-74-9		0.5	X		0.5					X
Chlorinated camphene	8001-35-2		0.5	X		0.5		1			X
Chlorinated diphenyl oxide	55720-99-5		0.5			0.5					
Chlorine	7782-50-5	(C)1	(C)3		0.5	1.5	1	3			
Chlorine dioxide	10049-04-4	0.1	0.3		0.1	0.3	0.3	0.9			
Chlorine trifluoride	7790-91-2	(C)0.1	(C)0.4						0.1	0.4	
Chloroacetaldehyde.	107-20-0	(C)1	(C)3						1	3	
a-Chloroacetophenone (Phenacyl chloride)	532-27-4	0.05	0.3		0.05	0.3					
Chloroacetyl chloride	79-04-9				0.05	0.2					
Chlorobenzene	108-90-7	75	350		75	350					
o-Chlorobenzylidene malonitrile	2698-41-1	0.05	0.4						0.05	0.4	X
Chlorobromomethane.	74-97-5	200	1050		200	1050					
2-Chloro-1,3-butadiene; See b-Chloroprene.											
Chlorodifluoromethane	75-45-6				1000	3500					
Chlorodiphenyl (42% Chlorine)(PCB)	53469-21-9		1	X		1					X
Chlorodiphenyl (54% Chlorine)(PCB)	11097-69-1		0.5	X		0.5					X
1-Chloro-2, 3-epoxypropane; See Epichlorohydrin.											
2-Chloroethanol; See Ethylene chlorohydrin											
Chloroethylene; See Vinyl chloride.											
Chloroform (Trichloromethane)	67-66-3	(C)50	(C)240		2	9.78					
bis(Chloromethyl) ether; see 1910.1008.	542-88-1										
Chloromethyl methyl ether; see 1910.1006.	107-30-2										
1-Chloro-1-nitropropane	600-25-9	20	100		2	10					
Chloropentafluoroethane	76-15-3				1000	6320					

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		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	mg/m ³		ppm ^d	mg/m ³	ppm ^d	mg/m ³	ppm ^d	mg/m ³	
Chloropicrin	76-06-2	0.1	0.7		0.1	0.7					
beta-Chloroprene	126-99-8	25	90	X	10	35					X
o-Chlorostyrene	2039-87-4				50	285	75	430			
o-Chlorotoluene	95-49-8				50	250					
2-Chloro-6-trichloromethyl-pyridine	1929-82-4										
Total dust			15			15					
Respirable fraction			5			5					
Chlorpyrifos	2921-88-2					0.2					X
Chromic acid and chromates (as CrO ₃)	Varies##		See Table Z-2						0.1		
Chromium (II) compounds (as Cr)	Varies##		0.5			0.5					
Chromium (III) compounds (as Cr)	Varies##		0.5			0.5					
Chromium metal and insol. salts (as Cr)	7440-47-3		1			1					
Chrysene; see Coal tar pitch volatiles	218-01-9										
Clopidol	2971-90-6										
Total dust			15			15					
Respirable fraction			5			5					
Coal dust (less than 5% SiO ₂) respirable fraction				See Table Z-3		2					
Coal dust (greater than or equal to 5% SiO ₂), respirable fraction				See Table Z-3		0.1					
Coal tar pitch volatiles (benzene soluble fraction), anthracene, BaP, phenanthrene, acridine, chrysene, pyrene.	8007-45-2		0.2			0.2					
Cobalt metal, dust, and fume (as Co)	7440-48-4		0.1			0.05					
Coke oven emissions; see 1910.1029.											
Copper	7440-50-8										
Fume (as Cu)			0.1			0.1					
Dusts and mists (as Cu)			1			1					
Cotton dust (raw)		1			1						
This 8-hour TWA applies to respirable dust as measured by a vertical elutriator cotton dust sampler or equivalent instrument. The time-weight applies to the cotton waste processing operations of waste recycling (sorting, blending, cleaning, and willowing) and garretting. See also 1910 for cotton dust limits applicable to other sectors.											
Crag herbicide (Sesone)	136-78-7										
Total dust			15			10					
Respirable fraction			5			5					
Cresol, all isomers	1319-77-3	5	22	X	5	22					X
	95-48-7										
	108-39-4										
	106-44-5										
Crotonaldehyde	123-73-9	2	6		2	6					
	4170-30-3										
Crufomate	299-86-5					5					
Cumene	98-82-8	50	245	X	50	245					X
Cyanamide	420-04-2					2					
Cyanides (as CN)	151-50-8		5			5					
Cyanogen	460-19-5				10	20					
Cyanogen Chloride	506-77-4							0.3	0.6		

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		ppm ^a	mg/m ³ ^b		ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	ppm ^a	mg/m ³ ^b	
Cyclohexane	110-82-7	300	1050		300	1050					
Cyclohexanol	108-93-0	50	200		50	200					X
Cyclohexanone	108-94-1	50	200		25	100					X
Cyclohexene	110-83-8	300	1015		300	1015					
Cyclohexylamine	108-91-8				10	40					
Cyclonite	121-82-4					1.5					X
Cyclopentadiene	542-92-7	75	200		75	200					
Cyclopentane	287-92-3				600	1720					
Cyhexatin	13121-70-5					5					
2,4-D (Dichlorophen-oxyacetic acid)	94-75-7		10			10					
Decaborane	17702-41-9	0.05	0.3	X	0.05	0.3	0.15	0.9			X
Demeton (Systox [®])	8065-48-3		0.1	X		0.1					X
Dichlorodiphenyltri-chloroethane (DDT)	50-29-3		1	X		1					X
Dichlorvos (DDVP)	62-73-7		1	X		1					X
Diacetone alcohol (4-Hydroxy-4-methyl-2-pentanone)	123-42-2	50	240		50	240					
1,2-Diaminoethane; see Ethylenediamine											
Diazinon	333-41-5					0.1					X
Diazomethane	334-88-3	0.2	0.4		0.2	0.4					
Diborane	19287-45-7	0.1	0.1		0.1	0.1					
1,2-Dibromo-3-chloropropane (DBCP); see 1910.1044.	96-12-8										
2-N-Dibutylamino-ethanol	102-81-8				2	14					
1,2-Dibromoethane; see Ethylene dibromide											
Dibutyl phosphate	107-66-4	1	5		1	5	2	10			
Dibutyl phthalate	84-74-2		5			5					
Dichloroacetylene	7572-29-4							0.1	0.4		
o-Dichlorobenzene	95-50-1	(C)50	(C)300					50	300		
p-Dichlorobenzene..	106-46-7	75	450		75	450	110	675			
3,3'-Dichlorobenzidine; see 1910.1007	91-94-1										
Dichlorodifluoromethane	75-71-8	1000	4950		1000	4950					
1,3-Dichloro-5, 5-dimethyl hydantoin	118-52-5		0.2			0.2		0.4			
Dichlorodiphenyltri-chloroethane (DDT)	50-29-3										
1,1-Dichloroethane	75-34-3	100	400		100	400					
1,2-Dichloroethane; see Ethylene dichloride											
1,2-Dichloroethylene	540-59-0	200	790		200	790					
Dichloroethyl ether	111-44-4	(C)15	(C)90	X	5	30	10	60			X
Dichloromethane; see Methylene chloride											
Dichloromonofluoro-methane	75-43-4	1000	42000		10	40					
1,1-Dichloro-1-nitroethane	594-72-9	(C)10	(C)60		2	10					
1,2-Dichloropropane; see Propylene dichloride											
1,3-Dichloropropene	542-75-6				1	5					X
2,2-Dichloropropionic acid	75-99-0				1	6					

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		ppm ^a	mg/m ³		ppm ^a	mg/m ³	ppm ^a	mg/m ³	ppm ^a	mg/m ³	
Dichlorotetrafluoro-ethane	76-14-2	1000	7000		1000	7000					
Dicrotophos	141-66-2					0.25					X
Dicyclopentadiene	77-73-6				5	30					
Dichlorvos (DDVP)	62-73-7										
Dicyclopentadienyl iron	102-54-5										
Total dust			15			10					
Respirable fraction			5			5					
Dieldrin	60-57-1		0.25	X		0.25					X
Diethanolamine	111-42-2				3	15					
Diethylamine	109-89-7	25	75		10	30	25	75			
2-Diethylaminoethanol.	100-37-8	10	50	X	10	50					X
Diethylene triamine	111-40-0				1	4					
Diethyl ether; see Ethyl ether											
Diethyl ketone	96-22-0				200	705					
Diethyl phthalate	84-66-2					5					
Difluorodibromomethane	75-61-6	100	860		100	860					
Diglycidyl ether (DGE)	2238-07-5	(C)0.5	(C)2.8		0.1	0.5					
Dihydroxybenzene; see Hydroquinone											
Diisobutyl ketone	108-83-8	50	290		25	150					
Diisopropylamine	108-18-9	5	20	X	5	20					X
4-Dimethylaminoazobenzene; see 1910.1015.	60-11-7										
Dimethoxymethane; see Methylal											
Dimethyl acetamide	127-19-5	10	35	X	10	35					X
Dimethylamine	124-40-3	10	18		10	18					
Dimethylaminobenzene; see Xylidine											
Dimethylaniline (N-Dimethylaniline)	121-69-7	5	25	X	5	25	10	50			X
Dimethylbenzene; see Xylene											
Dimethyl-1,2-dibromo-2, 2-dichloroethyl phosphate	300-76-5		3			3					X
Dimethylformamide	68-12-2	10	30	X	10	30					X
2,6-Dimethyl-4-heptanone; see Diisobutyl ketone											
1,1-Dimethylhydrazine	57-14-7	0.5	1	X	0.5	1					X
Dimethylphthalate	131-11-3		5			5					
Dimethyl sulfate	77-78-1	1	5	X	0.1	0.5					X
Dinitolmide (3,5-Dinitro-o-toluamide)	148-01-6					5					
Dinitrobenzene (all isomers)											
(ortho)	528-29-0		1	X		1					X
(meta).	99-65-0										
(para).	100-25-4										
Dinitro-o-cresol	534-52-1		0.2	X		0.2					X
Dinitrotoluene	121-14-2		1.5	X		1.5					X
Dioxane (Diethylene dioxide)	123-91-1	100	360	X	25	90					X
Dioxathion (Delnav)	78-34-2					0.2					X
Diphenyl (Biphenyl)	92-52-4	0.2	1		0.2	1					

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		ppm ^d	mg/m ³ ^b		ppm ^d	mg/m ³ ^b	ppm ^d	mg/m ³ ^b	ppm ^d	mg/m ³ ^b	
cellosolve acetate											
Ethyleneimine; see 1910.1012	151-56-4										
Ethylene oxide; see 1910.1047	75-21-8										
Ethylidene chloride; see 1,1-Dichlorethane											
Ethylidene norbornene	16219-75-3							5	25		
N-Ethylmorpholine..	100-74-3	20	94	X	5	23					X
Fenamiphos	22224-92-6					0.1					X
Fensulfothion (Dasanit)	115-90-2					0.1					
Fenthion	55-38-9					0.2					X
Ferbam	14484-64-1										
Total dust			15			10					
Respirable fraction			5			5					
Ferrovandium dust	12604-58-9		1			1					
Fluorides (as F)	Varies##		See Table Z-2		2.5						
Fluorine	7782-41-4	0.1	0.2		0.1	0.2					
Fluorotrchloromethane (Trichloro- fluoromethane)	75-69-4	1000	5600					1000	5600		
Fonofos	944-22-9					0.1					X
Formaldehyde; see 1910.1048	50-00-0										
Formamide	75-12-7				20	30	30	45			
Formic acid	64-18-6	5	9		5	9					
Furfural	98-01-1	5	20	X	2	8					X
Furfuryl alcohol	98-00-0	50	200		10	40	15	60			X
Gasoline	8006-61-9				300	900	500	1500			
Germanium tetra-hydride	7782-65-2				0.2	0.6					
Glutaraldehyde	111-30-8							0.2	0.8		
Glycerin (mist)	56-81-5										
Total dust			15			10					
Respirable fraction			5			5					
Glycidol	556-52-5	50	150		25	75					
Glycol monoethyl ether; see 2-Ethoxyethanol											
Grain dust (oat, wheat, barley)						10					
Graphite, natural respirable dust	7782-42-5		See Table Z-3			2.5					
Graphite, synthetic											
Total dust			15			10					
Respirable Fraction			5			5					
Guthion [®] ; see Azinphos methyl											
Gypsum	7778-18-9										
Total dust			15			15					
Respirable fraction			5			5					
Hafnium	7440-58-6		0.5			0.5					
Heptachlor	76-44-8		0.5	X		0.5					X
Heptane (n-Heptane)	142-82-5	500	2000		400	1600	500	2000			
Hexachlorobutadiene	87-68-3				0.02	0.24					
Hexachlorocyclo-pentadiene	77-47-4				0.01	0.1					
Hexachloroethane	67-72-1	1	10	X	1	10					X
Hexachloronaphthalene	1335-87-1		0.2	X		0.2					X

Table Z-1-A Limits for Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³		ppm ^a	mg/m ³	ppm ^a	mg/m ³	ppm ^a	mg/m ³	
Hexafluoroacetone	684-16-2				0.1	0.7					X
n-Hexane.	110-54-3	500	1800		50	180					
Hexane isomers	Varies##				500	1800	1000	3600			
2-Hexanone (Methyl n-butyl ketone)	591-78-6	100	410		5	20					
Hexone (Methyl isobutyl ketone)	108-10-1	100	410		50	205	75	300			
sec-Hexyl acetate	108-84-9	50	300		50	300					
Hexylene glycol	107-41-5								25	125	
Hydrazine	302-01-2	1	1.3	X	0.1	0.1					X
Hydrogenated terphenyls	61788-32-7				0.5	5					
Hydrogen bromide	10035-10-6	3	10						3	10	
Hydrogen chloride	7647-01-0	(C)5	(C)7						5	7	
Hydrogen cyanide	74-90-8	10	11	X			4.7	5			X
Hydrogen fluoride (as F)	7664-39-3		See Table Z-2		3		6				
Hydrogen peroxide	7722-84-1	1	1.4		1	1.4					
Hydrogen selenide (as Se)	7783-07-5	0.05	0.2		0.05	0.2					
Hydrogen sulfide	7783-06-4		See Table Z-2		10	14	15	21			
Hydroquinone	123-31-9		2			2					
2-Hydroxypropyl acrylate	999-61-1				0.5	3					X
Indene	95-13-6				10	45					
Indium and compounds (as In)	7440-74-6					0.1					
Iodine	7553-56-2	(C)0.1	(C)1						0.1	1	
Iodoform	75-47-8				0.6	10					
Iron oxide dust and fume (as Fe)	1309-37-1										
Total particulate			10			10					
Iron pentacarbonyl (as Fe)	13463-40-6				0.1	0.8	0.2	1.6			
Iron salts (soluble) (as Fe)	Varies##					1					
Isomyl acetate	123-92-2	100	525		100	525					
Isomyl alcohol (primary and secondary)	123-51-3	100	360		100	360	125	450			
Isobutyl acetate	110-19-0	150	700		150	700					
Isobutyl alcohol	78-83-1	100	300		50	150					
Isooctyl alcohol	26952-21-6				50	270					X
Isophorone	78-59-1	25	140		4	23					
Isophorone diisocyanate	4098-71-9				0.005		0.02				X
2-Isopropoxyethanol	109-59-1				25	105					
Isopropyl acetate	108-21-4	250	950		250	950	310	1185			
Isopropyl alcohol	67-63-0	400	980		400	980	500	1225			
Isopropylamine	75-31-0	5	12		5	12	10	24			
N-Isopropylaniline	768-52-5				2	10					X
Isopropyl ether	108-20-3	500	2100		500	2100					
Isopropyl glycidyl ether (IGE)	4016-14-2	50	240		50	240	75	360			
Kaolin											
Total dust			15			10					
Respirable fraction			5			5					
Ketene	463-51-4	0.5	0.9		0.5	0.9	1.5	3			
Lead inorganic (as Pb); see 1910.1025.	7439-92-1										

For independent battery breaking, non-ferrous foundries, secondary copper, lead pigments, lead chemical, ship building, stevedoring, and brass and bronze ingot

Table Z-1-A Limits for Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	mg/m ³		ppm ^d	mg/m ³	ppm ^d	mg/m ³	ppm ^d	mg/m ³	
manufacturing, paragraph (e)(1) is under court remand											
Limestone	1317-65-3										
Total dust			15			15					
Respirable fraction			5			5					
Lindane	58-89-9		0.5	X		0.5				X	
Lithium hydride	7580-67-8		0.025			0.025					
L.P.G. (Liquified petroleum gas)	68476-85-7	1000	1800		1000	1800					
Magnesite	546-93-0										
Total dust			15			15					
Respirable fraction			5			5					
Magnesium oxide fume	1309-48-4										
Total dust			15			10					
Respirable fraction			5			5					
Malathion	121-75-5										
Total dust			15	X		10				X	
Respirable fraction			5	X		5				X	
Maleic anhydride	108-31-6	0.25	1		0.25	1					
Manganese compounds (as Mn)	7439-96-5		(C)5						5		
Manganese fume (as Mn)	7439-96-5		(C)5			1	3				
Manganese cyclopentadienyl tricarbonyl (as Mn)	12079-65-1					0.1				X	
Manganese tetroxide (as MN)	1317-35-7					1					
Marble	1317-65-3										
Total dust			15			15					
Respirable fraction			5			5					
Mercury (aryl and inorganic)(as Hg)	7439-97-6		See Table Z-2						0.1	X	
Mercury (organo) alkyl compounds (as Hg)	7439-97-6		See Table Z-2			0.01	0.03			X	
Mercury (vapor) (as Hg)	7439-97-6		See Table Z-2			0.05				X	
Mesityl oxide	141-79-7	25	100		15	60	25	100			
Methacrylic acid	79-41-4				20	70				X	
Methanethiol; see Methyl mercaptan											
Methonyl (Lannate)	16752-77-5					2.5					
Methoxychlor	72-43-5										
Total dust			15			10					
Respirable fraction			5			5					
2-Methoxyethanol; see Methyl cellosolve	109-86-4										
4-Methoxyphenol	150-76-5					5					
2-Methoxyethyl acetate see Methyl cellosolve acetate	110-49-6										
Methyl acetate	79-20-9	200	610		200	610	250	760			
Methyl acetylene (Propyne)	74-99-7	1000	1650		1000	1650					
Methyl acetylene propadiene mixture (MAPP)		1000	1800		1000	1800	1250	2250			
Methyl acrylate	96-33-3	10	35	X	10	35				X	
Methylacrylonitrile	126-98-7				1	3				X	
Methylal (Dimethoxy-methane)	109-87-5	1000	3100		1000	3100					
Methyl alcohol	67-56-1	200	260		200	260	250	310		X	
Methylamine	74-89-5	10	12		10	12					

Table Z-1-A Limits for Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	mg/m ³		ppm ^d	mg/m ³	ppm ^d	mg/m ³	ppm ^d	mg/m ³	
Methyl amyl alcohol; see Methyl Isobutyl carbinol											
Methyl n-amyl ketone	110-43-0	100	465		100	465					
Methyl bromide	74-83-9	(C)20	(C)80	X	5	20					X
Methyl butyl ketone; see 2-Hexanone											
Methyl cellosolve; (2-Methoxyethanol)	109-86-4	25	80	X	In process of 6(b) rulemaking						
Methyl cellosolve acetate; (2-Methoxyethyl acetate)	110-49-6	25	120	X	In process of 6(b) rulemaking						
Methyl chloride	74-87-3		See Table Z-2		50	105	100	205			
Methyl chloroform (1,1,1-Trichloro-ethane)	71-55-6	350	1900		350	1900	450	2450			
Methyl 2-cyanoacrylate	137-05-3				2	8	4	16			
Methylcyclohexane	108-87-2	500	2000		400	1600					
Methylcyclohexanol	25639-42-3	100	470		50	235					
o-Methylcyclohexanone	583-60-8	100	460	X	50	230	75	345			X
Methylcyclopentadienyl manganese tricarbonyl (as Mn)	12108-13-3					0.2					X
Methyl demeton	8022-00-2					0.5					X
4,4'-Methylene bis (2-chloroaniline) (MBOCA)	101-14-4				0.02	0.22					X
Methylene bix(4-cyclo-hexylisocyanate)	5124-30-1								0.01	0.11	
Methylene chloride	75-09-2		See Table Z-2				See 1910.1052				
Methyl ethyl ketone (MEK); see 2-Butanone											
methyl ethyl ketone peroxide (MEKP)	1338-23-4								0.7	5	
Methyl formate	107-31-3	100	250		100	250	150	375			
Methyl hydrazine (Monomethyl hydrazine)	60-34-4	(C)0.2	(C)0.35	X					0.2	0.35	X
Methyl iodide	74-88-4	5	28	X	2	10					X
Methyl isoamyl ketone	110-12-3				50	240					
Methyl isobutyl carbinol	108-11-2	25	100	X	25	100	40	165			X
Methyl isobutyl ketone; see Hexone											
Methyl isocyanate	624-83-9	0.02	0.05	X	0.02	0.05					X
Methyl isopropyl ketone	563-80-4				200	705					
Methyl mercaptan	74-93-1	(C)10	(C)20		0.5	1					
Methyl methacrylate	80-62-6	100	410		100	410					
Methyl parathion	298-00-0					0.2					X
Methyl propyl ketone; see 2-Pentanone											
Methyl silicate	681-84-5				1	6					
alpha-Methyl styrene	98-83-9	(C)100	(C)480		50	240	100	485			
Methylene bisphenyl isocyanate (MDI)	101-68-8	(C)0.02	(C)0.2						0.02	0.2	
Metribuzin	21087-64-9					5					
Mica; see Silicates											
Molybdenum (as Mo)	7439-98-7										
Soluble compounds			5			5					
Insoluble Compounds											
Total dust			15			10					
Respirable fraction			5			5					
Monocrotophos (Azodrin ^K)	6923-22-4					0.25					
Monomethyl aniline	100-61-8	2	9	X	0.5	2					X
Monomethyl hydrazine; see Methyl hydrazine											
Morpholine	110-91-8	20	70	X	20	70	30	105			X

Table Z-1-A Limits for Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL*			TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	mg/m ³	b Skin Designation	ppm ^d	mg/m ³	ppm ^d	mg/m ³	ppm ^d	mg/m ³	
Total dust			See Table Z-3		10						
Respirable fraction			See Table Z-3		5						
Potassium hydroxide	1310-58-3								2		
Propane	74-98-6	1000	1800		1000	1800					
Propargyl alcohol	107-19-7				1	2				X	
beta-Propiolactone; see 1910.1013	57-57-8										
Propionic acid	79-09-4				10	30					
Propoxur (Baygon)	114-26-1					0.5					
n-Propyl acetate	109-60-4	200	840		200	840	250	1050			
n-Propyl alcohol	71-23-8	200	500		200	500	250	625			
n-Propyl nitrate	627-13-4	25	110		25	105	40	170			
Propylene dichloride	78-87-5	75	350		75	350	110	510			
Propylene glycol dinitrate	6423-43-4				0.05	0.3					
Propylene glycol monomethyl ether	107-98-2				100	360	150	540			
Propylene imine	75-55-8	2	5	X	2	5				X	
Propylene oxide	75-56-9	100	240		20	50					
Propyne; see Methyl acetylene											
Pyrethrum	8003-34-7		5			5					
Pyridine	110-86-1	5	15		5	15					
Quinone	106-51-4	0.1	0.4		0.1	0.4					
Resorcinol	108-46-3				10	45	20	90			
RDX; see Cyclonite.											
Rhodium (as Rh), metal fume and insoluble compounds	7440-16-6		0.1			0.1					
Rhodium (as Rh), soluble compounds	7440-16-6		0.001			0.001					
Ronnel	299-84-3		15			10					
Rosin core solder pyrolysis products as formaldehyde						0.1					
Rotenone	83-79-4		5			5					
Rouge											
Total dust			15			10					
Respirable fraction			5			5					
Selenium compounds (as Se)	7782-49-2		0.2			0.2					
Selenium hexafluoride (as Se)	7783-79-1	0.05	0.4		0.05	0.4					
Silica, amorphous, precipitated and gel			See Table Z-3			6					
Silica, amorphous, diatomaceous earth, containing less than 1% crystalline silica	68855-54-9		See Table Z-3			6					
Silica, crystalline cristobalite (as quartz), respirable dust	14464-46-1		See Table Z-3			0.05					
Silica, crystalline quartz (as quartz), respirable dust	14808-60-7		See Table Z-3			0.1					
Silica, crystalline tripoli (as quartz), respirable dust	1317-95-9		See Table Z-3			0.1					
Silica, crystalline tridymite (as quartz), respirable dust	15468-32-3		See Table Z-3			0.05					
Silica, fused, respirable dust	60676-86-0		See Table Z-3			0.1					
Silicates (less than 1% crystalline silica)											
Mica (respirable dust)	12001-26-2		See Table Z-3			3					

Table Z-1-A Limits for Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL*			TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	b mg/m ³	Skin Designation	ppm ^d	b mg/m ³	ppm ^d	b mg/m ³	ppm ^d	b mg/m ³	
Soapstone, total dust			See Table Z-3		6						
Soapstone, respirable dust			See Table Z-3		3						
Talc (containing asbestos): use asbestos limit			See Table Z-3			See 29 CFR 1910.1001					
Talc (containing no asbestos), respirable dust	14807-96-6		See Table Z-3		2						
Tremolite			See Table Z-3			See 29 CFR 1910.1001					
Silicon	7440-21-3										
Total dust			15						10		
Respirable fraction			5						5		
Silicon carbide	409-21-2										
Total dust			15						10		
Respirable fraction			5						5		
Silicon tetrahydride	7803-62-5				5				7		
Silver, metal and soluble compounds (as Ag)	7440-22-4		0.01						0.01		
Soapstone; see Silicates											
Sodium azide	26628-22-8										
(as HN ₃)								0.1		X	
(as NaN ₃)									0.3	X	
Sodium bisulfite	7631-90-5								5		
Sodium fluoroacetate	62-74-8		0.05	X				0.15		X	
Sodium hydroxide	1310-73-2		2							2	
Sodium metabisulfite	7681-57-4								5		
Starch	9005-25-8										
Total dust			15						15		
Respirable fraction			5						5		
Stibine	7803-52-3	0.1	0.5		0.1	0.5					
Stoddard solvent	8052-41-3	500	2900		100	525					
Strychnine	57-24-9		0.15						0.15		
Styrene	100-42-5		See Table Z-2		50	215	100	425			
Subtilisins (Proteolytic enzymes)	1395-21-7									0.00006	
Sucrose	57-50-1										
Total dust			15						15		
Respirable fraction			5						5		
Sulfur dioxide	7446-09-5	5	13		2	5	5	10			
Sulfur hexafluoride	2551-62-4	1000	6000		1000	6000					
Sulfuric acid	7664-93-9		1						1		
Sulfur monochloride	10025-67-9	1	6						1	6	
Sulfur pentafluoride	5714-22-7	0.025	0.25						0.01	0.1	
Sulfur tetrafluoride	7783-60-0								0.1	0.4	
Sulfuryl fluoride	2699-79-8	5	20		5	20	10	40			
Systox ^R ; see Demeton											
2,4,5-T (2,4,5-tri-chlorophenoxyacetic acid)	93-76-5		10						10		
Talc; see Silicates											
Tantalum, metal and oxide dust	7440-25-7		5						5		
TEDP (Sulfotep)	3689-24-5		0.2	X					0.2		
Tellurium and compounds (as Te)	13494-80-9		0.1						0.1		
Tellurium hexafluoride (as Te)	7783-80-4	0.02	0.2		0.02	0.2					

Table Z-1-A Limits for Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	mg/m ³		ppm ^d	mg/m ³	ppm ^d	mg/m ³	ppm ^d	mg/m ³	
Temephos	3383-96-8										
Total dust			15			10					
Respirable fraction			5			5					
TEPP (Tetraethyl pyrophosphaate)	107-49-3		0.05	X		0.05				X	
Terphenylis.	26140-60-3	(C)1	(C)9					0.5	5		
1,1,1,2-Tetrachloro-2, 2-difluoroethane	76-11-9	500	4170		500	4170					
1,1,2,2-Tetrachloro-1, 2-difluoroethane	76-12-0	500	4170		500	4170					
1,1,2,2-Tetrachloro- ethane	79-34-5	5	35	X	1	7				X	
Tetrachoroethylene; see Perchloroethylene											
Tetrachloromethane; see Carbon tetrachloride											
Tetrachloronaphthalene	1335-88-2		2	X		2				X	
Tetraethyl lead (as Pb)	78-00-2		0.075	X		0.075				X	
Tetrahydrofuran	109-99-9	200	590		200	590	250	735			
Tetramethyl lead, (as Pb)	75-74-1		0.075	X		0.075				X	
Tetramethyl succinonitrile	3333-52-6	0.5	3	X	0.5	3				X	
Tetranitromethane	509-14-8	1	8		1	8					
Tetrasodium pyrophosphate	7722-88-5					5					
Tetryl (2,4,6-Trinitro-phenylmethyl- nitramine)	479-45-8		1.5	X		0.1				X	
Thallium, soluble compounds (as Tl)	7440-28-0		0.1	X		0.1				X	
4,4'-Thiobis(6-tert, Butyl-m-cresol)	96-69-5										
Total dust			15			10					
Respirable fraction			5			5					
Thioglycolic acid	68-11-1				1	4				X	
Thionyl chloride	7719-09-7							1	5		
Thiram	137-26-8		5			5					
Tin, inorganic compounds (except oxides) (as Sn)	7440-31-5		2			2					
Tin, organic compounds (as Sn)	7440-31-5		0.1			0.1				X	
Tin oxide (as SN)	7440-31-5					2					
Titanium dioxide	13463-67-7										
Total dust			15			10					
Respirable fraction			5			5					
Toluene	108-88-3		See Table Z-2		100	375	150	560			
Toluene-2, 4-diisocyanate (TDI)	584-84-9	(C)0.02	(C)0.14		0.005	0.04	0.02	0.15			
m-Toluidine	108-44-1				2	9				X	
o-Toluidine	95-53-4	5	22	X	5	22				X	
p-Toluidine	106-49-0				2	9				X	
Toxaphene; see Chlorinated camphene											
Tremolite; see Silicates											
Tributyl phosphate	126-73-8		5		0.2	2.5					
Trichloroacetic acid	76-03-9				1	7					
1,1,1-Trichloroethane; see Methyl chloroform											
1,1,2-Trichloroethane	79-00-5	10	45	X	10	45				X	
Trichloroethylene	79-01-6		See Table Z-2		50	270	200	1080			
Trichloromethane; see Chloroform											
Trichloronaphthalene	1321-65-9		5	X		5				X	
1,2,3-Trichloropropane	96-18-4	50	300		10	60					

Table Z-1-A Limits for Air Contaminants

Substance	CAS No.	Transitional Limits			Final Rule Limits**						
		PEL*		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^d	mg/m ³		ppm ^d	mg/m ³	ppm ^d	mg/m ³	ppm ^d	mg/m ³	
1,1,2-Trichloro-1,2, 2-trifluoroethane	76-13-1	1000	7600		1000	7600	1250	9500			
Triethylamine	121-44-8	25	100		10	40	15	60			
Trifluorobromomethane	75-63-8	1000	6100		1000	6100					
Trimellitic anhydride	552-30-7				0.005	0.04					
Trimethylamine	75-50-3				10	24	15	36			
Trimethyl benzene	25551-13-7				25	125					
Trimethyl phosphite	121-45-9				2	10					
2,4,6-Trinitrophenol; see Picric acid											
2,4,6-Trinitrophenyl-methyl nitramine; see Tetryl											
2,4,6-Trinitrotoluene (TNT)	118-96-7		1.5	X		0.5					X
Triorthocresyl phosphate	78-30-8		0.1			0.1					X
Triphenyl amine	603-34-9					5					
Triphenyl phosphate	115-86-6		3			3					
Tungsten (as W)	7440-33-7										
Insoluble compounds						5		10			
Soluble compounds						1		3			
Turpentine	8006-64-2	100	560		100	560					
Uranium (as U)	7440-61-1										
Soluble compounds			0.05			0.05					
Insoluble compounds			0.25			0.2		0.6			
n-Valeraldehyde	110-61-3				50	175					
Vanadium	1314-62-1										
Respirable dust (as V ₂ O ₅)			(C)0.5			0.05					
Fume (as V ₂ O ₅)			(C)0.1			0.05					
Vegetable oil mist											
Total dust			15			15					
Respirable fraction			5			5					
Vinyl acetate	108-05-4				10	30	20	60			
Vinyl benzene; see Styrene											
Vinyl bromide	593-60-2				5	20					
Vinyl chloride; see 1910.1017	75-01-4										
Vinyl cyanide; see Acrylonitrile											
Vinyl cyclohexene dioxide	106-87-6				10	60					X
Vinylidene chloride (1,1-Dichloro-ethylene)	75-35-4				1	4					
Vinyl toluene	25013-15-4	100	480		100	480					
VM & P Naphtha	8032-32-4				300	1350	400	1800			
Warfarin	81-81-2		0.1			0.1					
Welding fumes (total particulate)***						5					
Wood dust, all soft and hard woods, except											
Western red cedar						5		10			
Wood dust, Western red cedar						2.5					
Xylenes (o-, m-, p-isomers)	1330-20-7	100	435		100	435	150	655			
m-Xylene alpha, alpha-diamine	1477-55-0								0.1		X
Xylidine	1300-73-8	5	25	X	2	10					X
Yttrium	7440-65-5		1			1					
Zinc chloride fume	7646-85-7		1			1		2			

Table Z-1-A Limits for Air Contaminants

Substance	CAS No.	Transitional Limits PEL*			Final Rule Limits**						
		b		Skin Designation	TWA		STEL ^c		CEILING		Skin Designation
		ppm ^a	mg/m ³		ppm ^a	mg/m ³	ppm ^a	mg/m ³	ppm ^a	mg/m ³	
Zinc chromate (as CrO ₃)	Varies##		See Table Z-2						0.1		
Zinc oxide fume	1314-13-2		5		5		10				
Zinc oxide	1314-13-2										
Total dust			15		10						
Respirable fraction			5		5						
Zinc stearate	557-05-1										
Total dust			15		10						
Respirable fraction			5		5						
Zirconium compounds (as Zr)	7440-67-7		5		5		10				

NOTE: Exhaust systems used to comply with the Permissible Exposure Limits commonly discharge air contaminants to ambient air outside the workplace.

Employers are advised to confer with the Vermont Agency of Natural Resources - Air Pollution Control Division to ensure that all relevant air pollution control requirements are met.

* The transitional PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit.

** Unless otherwise noted, employers in General Industry (i.e., those covered by 29 CFR 1910) may use any combination of controls to achieve these limits for a period not to exceed 4 years from the effective date of this standard; for employers operating Marine terminals (i.e., those covered by 29 CFR 1918), any combination of controls may be used until further notice.

*** As determined from breathing zone air samples.

Varies## Varies with compound

^a Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 torr.

^b Approximate milligrams of substance per cubic meter of air.

^c Duration is for 15 minutes, unless otherwise noted.

^d The final benzene standard in 1910.1028 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers and pipelines, cake production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsequents, the benzene limits in Table Z-2 apply.