

《室内空气污染检测的实用技术》

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Table II. GB / T 18883—2002 < [室内空气质量标准](#)>

S.N.	Parameters	Unit	Standards		
1	Physical	Temperature	℃	22—28 夏季空调	
a			16—24 冬季采暖		
2			Humidity	%	40—80 夏季空调
a	30—60 冬季采暖				
3	Air velocity	M/s	0.3 夏季空调		
a			0.2 冬季采暖		
4	New air flow	M3 / h.p	300 a		
5	Chemicals	SO2	mg / NM3	0.50 1 小时均值	
6		NO2	mg / NM3	0.24 1 小时均值	
7		CO	mg / NM3	10 1 小时均值	
8		CO2	%	0.10 日平均值	
9		NH3	mg / NM3	0.20 1 小时均值	
10		O3	mg / NM3	0.16 1 小时均值	
11		HCHO	mg / NM3	0.10 1 小时均值	
12		C6H6	mg / NM3	0.11 1 小时均值	
13		C7H8	mg / NM3	0.20 1 小时均值	
14		C8H10	mg / NM3	0.20 1 小时均值	
15		B(a)P	mg / NM3	1.0 日平均值	
16		PM10	mg / NM3	0.15 日平均值	
17		TVOC	mg / NM3	0.60 8 小时均值	
18		Microbial Contamination	TNB()	cfu / NM3	2500 依据仪器定
19		Radioactivity	Radon 222Rn	Bq / NM3	400 年平均

<http://www.sepa.gov.cn/image20010518/5295.pdf>

Table III-1. - Emissions From Building Materials or Interior Furnishings

常见室内装修污染物

Material Typical Pollutants Emitted	
Adhesives 胶,黏结剂	Alcohols 醇类
	Amines 胺类
	Benzene 苯
	Decane 十碳烷 (不要忽视己烷的毒性)
	Dimethylbenzene 二甲苯
	Formaldehyde 甲醛
	Terpenes 萜烯系
	Toluene 甲苯
	Xylenes 二甲苯
Caulking Compounds 堵缝材料	Alcohols
	Alkanes 烷烃
	Amines 胺
	Benzene 苯

	Diethylbenzene 二甲苯
	Formaldehyde 甲醛
	Methylethylketone 甲基乙基酮
	Xylenes 二甲苯
Carpeting 地毯	Alcohols 醇类
	Formaldehyde 甲醛
	4-Methyl ethyl-benzene 甲基乙基苯
	4-Phenyl cyclohexene 酚基环己烯
	Styrene 苯乙烯
Ceiling Tiles 天花板	Formaldehyde 甲醛
Clipboard/Particle Board 剪贴板等学生用具,	Alcohols 醇类
	Alkanes 烃类
	Amines 胺类
	Benzene 苯类
	3-Carene (3,7,7-Trimethylbicyclo[4.1.0]hept-3-ene)
	Formaldehyde 甲醛
	Terpenes 萜烯类
	Toluene 甲苯
Floor and Wall Coverings 地板和墙面装饰物	Acetates 醋酸酯
	Alcohols 醇类
	Alkanes 烷烃类
	Amines 胺
	Benzenes 苯类
	Formaldehyde 甲醛
	Methyl styrene 甲基苯乙烯
	Xylenes 二甲苯
Paints, Stains & Varnishes 油漆,污染及清漆等上光物质	Acetates
	Acrylates 丙烯酸酯
	Alcohols
	Alkanes
	Amines
	Benzenes
	Formaldehyde
	Limonene 柠檬油精
	Polyurethane 聚亚胺酯
	Toluene 甲苯

Table III-2. - Emissions From Appliances, Office Equipment and Supplies(1)

办公室用具，办公设备等污染物

祸源	污染物
Appliances	Carbon Monoxide

用具	Nitrogen Dioxide
	Sulfur Dioxide
	Polyaromatic hydrocarbons
Carbonless Copy Paper . 无碳复印纸	Chlorobiphenyl
	Cyclohexane
	Dibutylphthalate
	Formaldehyde
Computers/Video Display Terminals 计算机及显示器	n-Butanol
	2-Butanole
	2-Butoxyethanol
	Butyl-2-Methylpropyl phthalate
Computer/Video Display Terminals 计算机及显示器	Caprolactam
	Cresol
	Diisooctyl phthalate
	Dodecamethyl cyclosiloxane
	2-Ethoxyethyl acetate
	Ethylbenzene
	Hexanedioic acid
	3-Methylene-2-pentanone
	Ozone
	Phenol
	Phosphoric Acid
	Toluene
	Xylene
Duplicating Machines 复印机	Ethanol
	Methanol
	1,1,1-Trichloroethane
	Trichloroethylene
Electrophotographic Printers, Photocopiers & Related Supplies 影印机等	Ammonia
	Benzaldehyde
	Benzene
	Butyl methacrylate
	Carbon black
	Cyclotrisiloxane
	Ethylbenzene
	Isopropanol
	Methylmethacrylate
	Nonanal
	Ozone
	Styrene
	Terpene
Toluene	
1,1,1-Trichloroethane	

	Trichloroethylene
	Xylenes
	Zinc stearate combustion Products
Microfiche Developers/Blueprint Machines 摄影,制图设备	Ammonia
Preprinted Paper Forms. 印刷品	Acetaldehyde
	Acetic Acid
	Acetone
	Acrolein
	Benzaldehyde
	Butanal
	1,5-Dimethylcyclopentene
	2-Ethyl furan
	Heptane
	Hexamethyl cyclosiloxane
	Hexanal
	4-Hydroxy-4-methyl pentanone
	Isopropanol
	Paper dust
	Propionaldehyde
1,1,1-Trichloroethane	
Typewriter Corrections Fluid. 改错液	Acetone
	1,1,1-Trichloroethane
Footnote(1) Source [Ex. 4-33]	

Table III-3. - Examples of Biologicals Found in Indoor Environments(1)

室内微生物和细菌污染物

Class	Agent or Component	Origin
Arthropods and Insects	Whole organism, Body parts, feces	Furnishings, building materials, food
Microbes:		
Algae	Whole organism, cellular components	Outdoor air, HVAC (rare)
Bacteria	Whole organism, spores and cell walls, endotoxin	Stagnant water, floods, cooling towers, industrial processes
Fungi	Whole organism spores and hyphae toxins and volatiles	Moist surfaces, HVAC system, bird droppings, outdoor air
Protozoa	Whole organism cellular components	Water reservoirs, pets (rare)
Viruses	Whole organism	humans and pets (rare)
Pets	Skin, scales danders, urine, saliva, feces	Pets, pet litter, pet Cages, pet toys, pet bedding
Plants	Stems, leaves and pollens	Outdoor and indoor air
Footnote(1) Adapted from Ex. 4-33		

Table III-4. - Indoor Air Allergens Associated With Asthma(1)

与哮喘有关的室内污染物质

Class	Typical examples
Animal:	
Avian	High and low molecular weight proteins from feathers and droppings
Canine and Feline	High and low molecular weight proteins from dander, saliva, and feces
Arthropods:	
Mites, Cockroaches,	Structural proteins, carbohydrates
Crickets and Moths	and metabolites
Dusts, Particulates and Fibers:	
Household	Pollens, fungi, danders and mites
Metal	Chromium, cobalt, nickel, platinum, and vanadium
Plant	Castor bean, coffee, cotton, flour, and grain
Wood	Oak, mahogany, redwood, red cedar
Chemical Volatiles and Dusts	Acrylates, amines, anhydrides, colophony, enzymes, epoxy resins, freon, furfuryl alcohol, resins, isocyanates, latex, organophosphates, polyvinyl chloride, vegetable gums
Microbes and Microbial Products:	
Bacteria \ Bacillus spp	
Fungi	Alternaria spp., Aspergillus spp., Botrytis spp., Cladosporium spp., Penicillium spp., Pullularia spp
Pollens	Agrostis spp., Alopecurus spp., Anthoxanthum spp. Cynosurus spp., Dactylis spp., Holcus spp., Lolium spp., Secale spp
Footnote(1) Source: [Ex. 4-33]	

Table III-5. Indoor Air Contaminants Associated With Hypersensitivity Pneumonitis(1)

肺, 气管过敏性污染物质

Class	Typical Examples
Animals:	
Avian	High and low molecular weight proteins from feathers and droppings
Rodent	Low molecular weight proteins from urine and feces
Arthropods:	
Weevils	Sitophilus spp
Mites	Ascaris spp
Altered Host Proteins or Chemical Hapten-Carrier Conjugates	Amines, anhydrides, epoxy resins vegetable gums, and isocyanates
Microbes:	
Bacteria	Thermoactinomyces spp., Bacillus spp
Fungi	Aspergillus spp., Auerobasillium spp., Cephalosporium spp., Penicillium spp
Organic Dusts & Particulates:	
Wood	Bark, Sawdust and Pollen
Grain	Arthropod- and microbially-contaminated grains and flours

Cleaning Products	Dust residues from carpet cleaning agents
Footnote(1) Source: Ex. 4-33	

Table III-6. - Vapor Phase Constituents of Tobacco
Smoke and Related Health Effects

抽烟危害

Constituent	Amount in MS	Ratio in SS/MS	Health Effects
Carbon monoxide	10-23 mg	2.5-4.7	Nervous system, cardiovascular system.(1)
Carbon dioxide	20-40 mg	8-11	Nervous system, cardiovascular system.(1)
Carbonyl sulfide	12-42 ug	0.03-0.13	Irritant, cardiovascular, and nervous systems.(1)
Benzene	12-48 ug	5-10	Known human carcinogen.(3)
Toluene	100-200 ug	5.6-8.3	Irritant, nervous system.(1)
Formaldehyde	70-100 ug	0.1 --50	Probable human carcinogen.(3)
Acrolein	60-100 ug	8-15	Irritant, pulmonary.(1)
Acetone	100-250 ug	2-5	Irritant.(1)
Pyridine	16-40 ug	6.5-20	Irritant, nervous system, liver, kidney.(1)
3-methylpyridine	12-36 ug	3-13	Irritant.(2)
3-vinylpyridine	11-30 ug	20-40	Irritant.(2)
Hydrogen cyanide	400-500 ug	0.1-0.25	Irritant, nervous, cardiovascular and pulmonary system.(1)
Hydrazine	32 ng	3	Probable human carcinogen.(3)
Ammonia	50-130 ug	3.7-5.1	Irritant.(1)
Methylamine	11.5-28.7 ug	4.2-6.4	Irritant.(1)
Dimethylamine	7.8-10 ug	3.7-5.1	Irritant
Nitrogen oxides	100-600 ug	4-10	Pulmonary and cardiovascular system.(1)
N-nitrosodi-menthylamine	10-40 ng	20-100	Probable human carcinogen.(3)
N-nitrodiethylamine	ND-25 ng	< 40	Probable human carcinogen.(3)
N-nitrosopyrrolidine	6-30 ng	6-30	Probable human carcinogen.(3)
Formic acid	210-490 ug	1.4-1.6	Irritant, skin, kidney, liver.(1)
Acetic acid	330-810 ug	1.9-3.6	Irritant.(1)
Methyl chloride	150-600 ug	1.7-3.3	Nervous system.(1)
1,3-butadiene	69.2 ug	3-6	Probable human carcinogen.(3)

Footnote(1) NIOSH Pocket Guide to Chemical Hazards. U.S. Department of Health and Human Services. Public Health Services, 1990. Ex. 4-238

Footnote(2) Hazards in the Chemical Laboratory. Ed: L. Bretherick, The Royal Society of Chemistry, 1986. [Ex. 4-137]

Footnote(3) EPA: Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders, 1992. [Ex. 4-311]

Table III-7. - Particulate Phase Constituents of Tobacco Smoke and Related Health Effects

烟尘危害

Constituent	Amount in MS	Ratio in SS/MS	Health Effects
Particulate matter contains di- and polycyclic aromatic hydrocarbon	15-40 mg	1.3-1.9	Animal carcinogen.(4)
Nicotine	1-2.5 mg	2.6-3.3	Nervous and cardiovascular system.(1)
Anatabine	2-20 ug	< 0.01-0.5	N/A.(5)
Phenol	60-140 ug	1.6-3.0	Irritant.(1)
Catechol	100-360 ug	0.6-0.9	Irritant.(3)
Hydroquinone	110-300 ug	0.7-0.9	N/A.(5)
Aniline	360 ng	30	Probable human carcinogen.(4)
2-Toluidine	160 ng	19	Irritant, cardiovascular system.(1)
2-Naphthylamine	1.7 ng	30	Known human carcinogen.(4)
4-Aminobiphenyl	4.6	31	Known human carcinogen.(4)
Benz[a]anthracene	20-70 ng	2-4	Animal carcinogen.(4)
Benzo[a]pyrene	20-40 ng	2.5-3.5	Probable human carcinogen.(4)
Cholesterol	22 ug	0.9	N/A.(5)
gamma-butyrolactone	10-22 ug	3.6-5.0	Animal carcinogen.(4)
Quinoline	0.5-2 ug	3-11	Irritant.(3)
Harman [1-methyl-9H-pyrido[3,4-b]-indole	1.7-3.1 ug	0.7-1.7	N/A.(5)
N-nitrosornicotine	200-3000 ng	0.5-3	Animal carcinogen.(4)
NNK [4-(N-methyl-N- nitrosamino)-1-(3-pyridyl)-1-butanone]	100-1000 ng	1-4	N/A.(5)
N-nitrosodiethanolamine	20-70 ng	1.2	Probable human carcinogen.(4)
Cadmium	110 ng	7.2	Probable human carcinogen.(4)
Nickel	20-80 ng	13-30	Known human carcinogen.(4)
Zinc	60 ng	6.7	Irritant, nausea, vomiting.(2)

Polonium-210	0.04-0.1 pC	1.04.0	Known human carcinogen.(4)
Benzoic acid	14-28 ug	0.67-0.95	Irritant.
Lactic acid	63-174 ug	0.5-0.7	Irritant.(3)
Glycolic acid	37-126 ug	0.60.95	Irritant.(2)
Succinic acid	110-140 ug	0.43-0.62	N/A.(5)
PCDD's and PCDF's(6)	1 pg	2	N/A.(5)
Footnote(1) NIOSH Pocket Guide to Chemical Hazards. U.S. Department of Health and Human Services. Public Health Services, 1990. Ex. 4-238.			
Footnote(2) The Merck Index, 10th Edition, Merck & Co., Inc., 1983. Ex. 4-220.			
Footnote(3) Hazards in the Chemical Laboratory. Ed: L. Bretherick, The Royal Society of Chemistry, 1986. [Ex. 4-137]			
Footnote(4) EPA: Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders, 1992. [Ex. 4-311]			
Footnote(5) N/A-Relevant information not available.			
Footnote(6) PCDDs-Polychlorinated dibenzo-p-dioxins; PCDFs-Polychlorinated dibenzofurans.			

Table III-10. Mean Nicotine Levels in Home and Workplace Air: Area Monitors(1)

吸烟场所通常污染程度

Study and location	Sample	ug/m(3)	Comment
Leaderer and Hammond 1991, homes, NY State	47	2.17	7-day average smoking
Hammond [3-1096] Mass., industrial		24	9-hour average workshift (nonsmoker's air; smoking allowed on premises)
White collar	60	21.5	
Blue collar	123	8.9	
Food service	51	10.3	
Carson (1988), offices, Canada	31	11	Workday samples
Miesner (1989) workplaces, MA	11	6.6	Workweek average
Oldaker (1990), restaurants, NC	33	10.5	1-hour average (range)
Jenkins (1991), Knoxville, TN, metro			1-hour average
Restaurants	7	3.4	
Cocktail lounges	8	17.6	
Bowling alleys	4	10.7	
Gaming parlors	2	10.7	
Laundromats	3	2.0	
Airport gates	2	6.0	
Office	1	6.0	
Nagda (1989), U.S. Aircraft-in-flight average:			
All flights	69	13.4	Smoking section
Domestic	61	0.11	Nonsmoking section
International	8	0.33	Nonsmoking section.

Vaughn (1990), highrise office building	1	2.0	Nonsmoking air; 9-hour average
Footnote(1) Adapted from Repace and Lowrey 1993 [Ex. 4-263]			

Table III-11. - Nicotine in Nonsmokers' Air: Personal Monitors(1)

没有抽烟者的场所尼古丁污染情况

Study and Location	Sample	ug/m(3)	Comment
Schenker (1990), railroad clerks, NE	40	6.9	Workshift median
Coultas (1990), white collar, NM	15	20.4	Workshift mean +/- SD
Mattson (1989); flight attendants	4	4.7	4 flights, mean +/- SD
Footnote(1) Adapted from Repace and Lowrey 1993 [Ex. 4-263]			