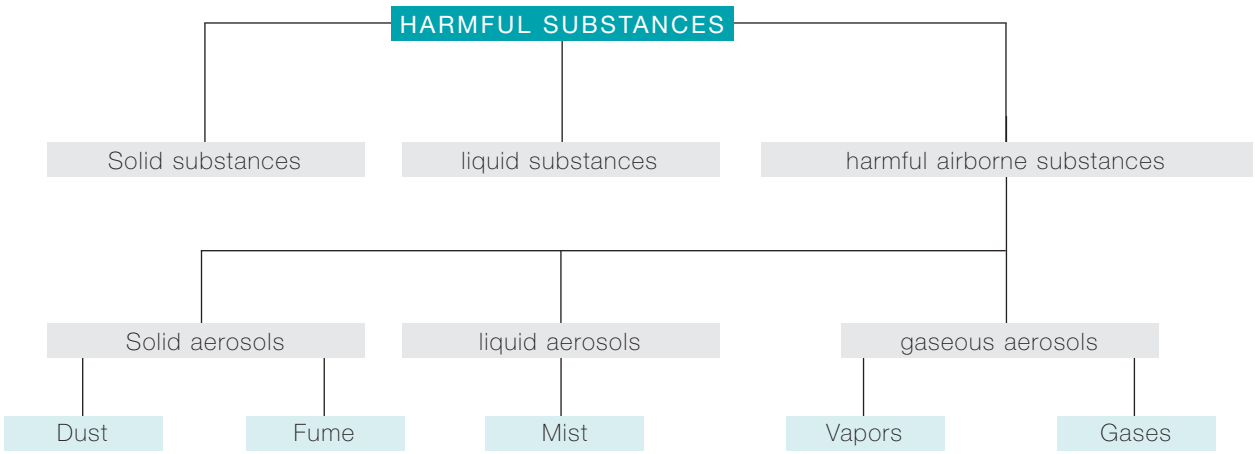
Classification of harmful substances by manufacturing processes

CLASSIFICATION OF HARMFUL SUBSTANCES

The classification of harmful substances at workplaces can be defined as follows:



ATTENTION: SIDE EFFECTS ARE OFTEN UNKNOWN

The substances used in an operating process cannot be known in many cases and we can only guess at the hazard. By supply of energy (for example flying sparks) or at combination with further substances it can form other substances that can for their part develop a detrimental effect.

DATABASES FOR HARMFUL SUBSTANCES

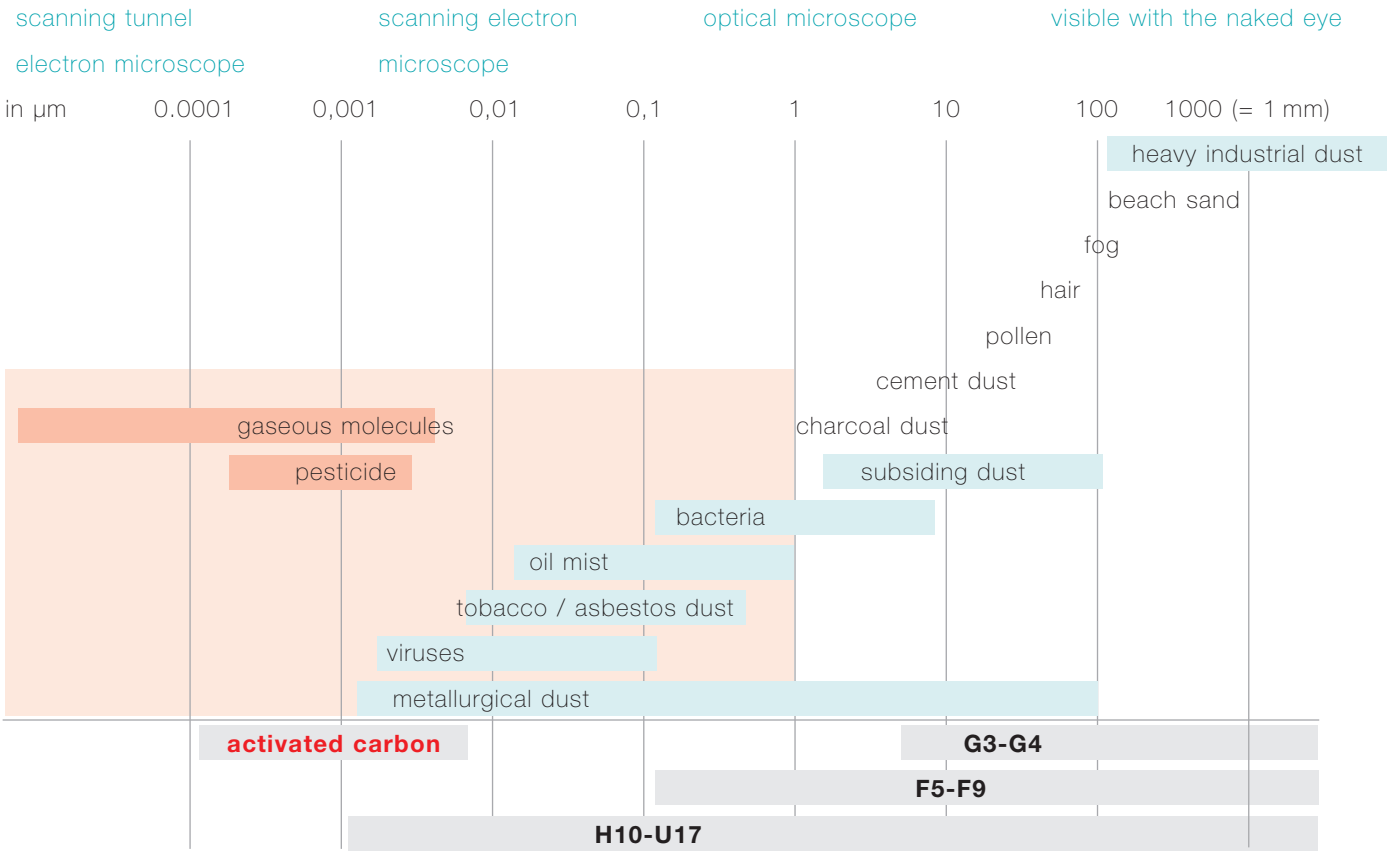
Analyses and long-standing examinations have led to a knowledge which is documented in the corresponding databases and today available over the Internet. We inform you about corresponding links at our Internet page www.tbh.eu

Overview of the common filter classifications / standards

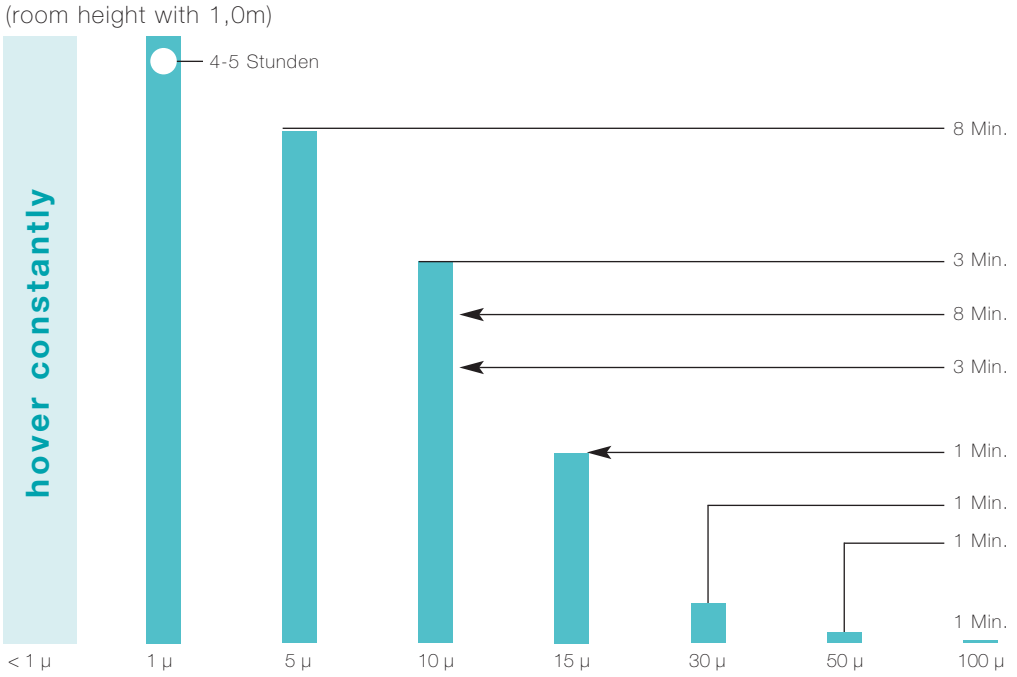
If we are talking in Europe about the classification of dust- and particular matter the norm EN779 is almost exclusively consulted. Particle filters, however, are evaluated by another procedure, this is described in the EN1822.
Depending on the standards the primary separation rate or the separation rate as a performance criterion is consulted at standard load. Following table sheet will show you the most common standards with their comparable classifications.

ACTUAL VALID STANDARDS			ALIED OR OTHER STANDARDS			
DIN EN 779 Coarse dust filter Medium arrestance A Final pressure difference 250 [PA]	**DIN EN 779** Fine dust filter Average efficency E 0,4 [µm], Final pressure difference 450 [PA]	**DIN EN 1822** HEPA- und ULPA-Filter initial arrestance DEHS, MPPS, approx. 0,1-0,3 [µm]	**ZH 1/487** Average passing rate D Quartz dust 90% 0,2 [µm]	**US-MIL.-STD.** Particlefilter initial arrestance A DOP 0,3 [µm]	**BS 3928** Particle filter initial arrestance A NaCl 0,3 (0,6) [µm]	**DIN EN 60335** Particle filter passing rate D Paraffin oil 61% < 1 [µm]
A > 50 % **G1** A < 65 %			The specified values may vary strongly depending on the material			
A > 65 % **G2**						
A > 80 % **G3**						
A > 90 % **G4**						
	E > 40 % **F5**		D < 5 % **U**			
	E > 60 % **F6**		D < 1 % **S**			D < 1 % **L**
	E > 80 % **F7**		D < 0,5 % **G**			
	E > 90 % **F8**					
	E > 95 % **F9**	A (intergr.) > 85 % **H 10**	D < 0,1 % **C**		A > 95 % **EU 10**	D < 0,1 % **M**
		A (intergr.) > 95 % **H 11**		**95 %**	A > 99,9 % **EU 11**	
		A (intergr.) > 99,5 % **H 12**	D<0,05 % Paraffin oil 90% < 1 EM **K 1, K 2**	**99,97 %**	A > 99,97 % **EU 12**	
		A (intergr.) > 99,95 % **H 13** A (local) > 99,75 %		**99,99 %**	A > 99,99 % **EU 13**	
		A (intergr.) > 99,995 % **H 14** A (local) > 99,975 %		**99,999 %**	A > 99,999 % **EU 14**	D < 0,005 % **H**
		A (intergr.) > 99,9995 % **U 15** A (local) > 99,9975 %				
		A (intergr.) > 99,99995 % **U 16** A (local) > 99,999975 %				
		A (intergr.) > 99,999995 % **U 17** A (local) > 99,9999 %				

Diagram of the particle sizes



Average settling time of the particle



The diagram of the particle sizes shows on the basis of different examples which particle diameter can be created by different manufacturing processes. The highlighted zone in red characterizes those particles which can expand into the alveole of the lungs.

The accompanying graphic clarifies how long the particles, depending on their size, are hovering in the air - average settling time of the particles at a room height of 1 meter.

Harmful gas table concerning the adsorption ability of activated carbon

INFORMATION

Absorptionsfähigkeit der verschiedenen Schadstoffe ist abhängt von:

Gaskonzentration in der Luft · Feuchtigkeit · Temperatur · Kontaktzeit im Filter · Porengröße der Aktivkohle · Porenverteilung · etc.

LIST OF HARMFUL SUBSTANCES

acetic acid	1	decay smells	1	mysol	1	uric acid	1
Acetone	2	dichlorobenzene	1	Decane	1	valeric acid	1
acetylaldehyde	3	dichlorethylene	1	naphta(gasoline)	1	vinegar	1
Acrylic Acid	1	dichlorpropane	1	naphtalene	1	vinyl chloride	1
Acrysäurenitril	1	diesel	1	nicotine	1	xylene	1
aggressive gases	4	diethyl ketone	2	nitric acid	2		
alcohol	2	dimethyl sulfate	1	nitrobenzene	1		
alcohol smells	2	dimethylaniline	1	nitroethane	1		
amines	3	dioxane	2	nitrogen oxide	3		
ammonia	3	ethanetiol	2	nitroglycerine	1		
aniline	1	ether	4	nitropropane	1		
antiseptic materials	1	ethylacetate	1	nonane	1		
arolein	2	ethylacrylate	1	octane	1		
asphalt smells	1	ethylene	4	ozone	1		
benzene	1	ethylene chlorohydrin	1	palmitic acid	1		
Dichloroethylether	1	ethylene dichloride	1	pentanal	1		
body odors	1	ethylene oxide	3	pesticides	1		
bromethane	1	fertilisers	1	petrol	1		
bromine	1	fish smells	1	phenol	1		
burning smells	2	formaldehyde	4	phosgene	2		
butadiene	2	formic acid	2	propane	3		
butane	3	fruits storing	1	propanol	2		
butanol	1	glue steams	1	propionic acid	1		
butanone	1	grease oil and fat	1	pyridine	1		
buthylene	2	haloalkane	2	quicksilver steams	3		
butyl acetate	1	heptane	1	radioactive materials	4		
butyl ether	2	hexane	2	resins	1		
butyraldehyde	2	hospital smells	1	ropyl ether	1		
camphor	1	hydrocyanic acid	4	rubber	2		
carbon dioxide	3	hydrogen	4	silicon ethyl connections	3		
carbon monoxide	4	hydrogen bromide	3	slaughterhouse smells	2		
chloretane	2	hydrogen chloride	2	smells from paper coating	1		
chlormethyl ether	2	hydrogen fluoride	3	smoke	2		
chlornitrosopropane	1	hydrosulfide	2	styrol	1		
chloro propane	1	isopentyl acetate	1	sulfur dioxide	3		
chlorobenzene	1	isopropanol	2	sulfur trioxide	2		
chloroform	1	isopropyl acetate	1	sulfurcarbons	2		
chloromethylpropane	1	isopropyl ether	1	sulfuric	1		
citrus fruits	2	kitchen smells	1	sulfurwater	2		
clarification plant smells	1	lacquer steams	1	tar	1		
cleaner	1	lactic acid	1	tetrachloroethylene	1		
comestible smells	1	liquid combustibles	1	thiols	1		
creatine	1	menthol	2	toxic gases	1		
cresols	1	methane	4	trichlorethan	1		
cyclohexane	1	methanol	2	trichlorethylene	1		
cyclohexanol	1	methyl acetate	2	trichloronitromethane	1		
cyclohexanone	1	methyl butanol	1	terpentine	1		
cyclohexene	1	methyl chloride	2	urea	1		

legend capacity index
1 = absorbing capacity
2 = satisfactory adsorption
3 = average adsorption (the adsorption is low, but under certain circumstances it can be satisfied)
4 = low adsorption: the adsorption is very low therefore the results with activated carbon are not to your satisfaction.
Please ask us concerning the use in such cases

Umrechnungstabellen

SPEED

1 m/s = 3,6 km/h	1 km/h = 0,278 m/s	1 ft/mm = 0,00508 m/s	1 m/s = 196,85 ft/mm

LENGTH

1 mile = 1,609 km	1 km = 0,621 miles	1 yd = 0,914 m	1 m = 1,09 yd
1 ft = 0,305 m	1 m = 3,28 ft	1 in = 25,4 mm	1 mm= 0,039 in
1 mm = 1.000 µm	1 µm = 0,001 mm	1 µm = 1.000 nm	1 nm = 0,001 µm

SURFACE

1 ft^2 = 0,0929 m^2	1 m^2 = 10,8 ft^2	1 in^2 = 6,45 cm^2	1 cm^2= 0,155 in^2

VOLUME

1 ft^3 = 0,0283 m^3	1 m^3 = 35,3 ft^3	1 ft^3 = 28,3 liter	

AIR FLOW

1 cfm= 0,472,10-3 m^3/s		1 m^3/s = 3 600 m^3/h	1 m^3/h = 0,278,10-3 m^3/s
1 cfm= 1,699 m^3/h			

MASS

1 lb = 0,454 kg	1 kg = 2,20 lbs	1 oz = 28,3 g	1 g = 0,0352 oz

FORCE

1 kgf = 9,80665 N	1 N = 0,102 kgf	1 lbraf = 4,45 N	1 N = 0,225 lbf

PRESSURE

1 mmCE= 9,81 Pa	1 Pa = 0,102 kgf	1 kPa = pz	1 kPa= 10,2 g/cm^2
1 kg/cm^2= 0,980665 bar	1 bar = 1,02 kg/cm^2	1 kg/m^2 = 98,0665 kPa	1 kPa= 0,00987 atm
1 psi = 6,89 kPa	1 bar = 101325 Pa	1 atm = 101,325 kPa	1 mb = 100 Pa
1 mmCE= 1 kg/m^2	1kPa = 0,145 psi	1 Pa = 1 N/m^2	1 in w, g,= 254 Pa

ENERGY

1 kgm = 9,80665 J	1 J = 0,102 kgm	1 cal = 4,184 J	1 J = 0,239 cal
1 kWh = 3,6 MJ	1 MJ = 0,278 kWh	1 Btu = 1,055 kJ	1 J = 0,945,10-3 Btu

POWER

1 CV = 0,736	1 kW = 1,36 CV	1 kcal/h = 1,16 W	1 W = 0,860 kcal/h
1 Btu/h = 0,292 W	1 W = 3,42 Btu/h		

TEMPERATURE CALCULATION FORMULA

0 °C = 32 °F	0 °F = -17,8 °C
°F = (9/5) x °C + 32	°C = (5/9) x °F - 17,8

TEMPERATURE CONVERSION TABLE

°F.....**°C**	**°F**.....**°C**	**°F**.....**°C**	**°F**.....**°C**
0 -17,8	30 -1,1	50 10,0	80 26,7
10 -12,2	32 0	60 15,6	90 32,2
20 -6,7	40 4,4	70 21,1	100 37,8