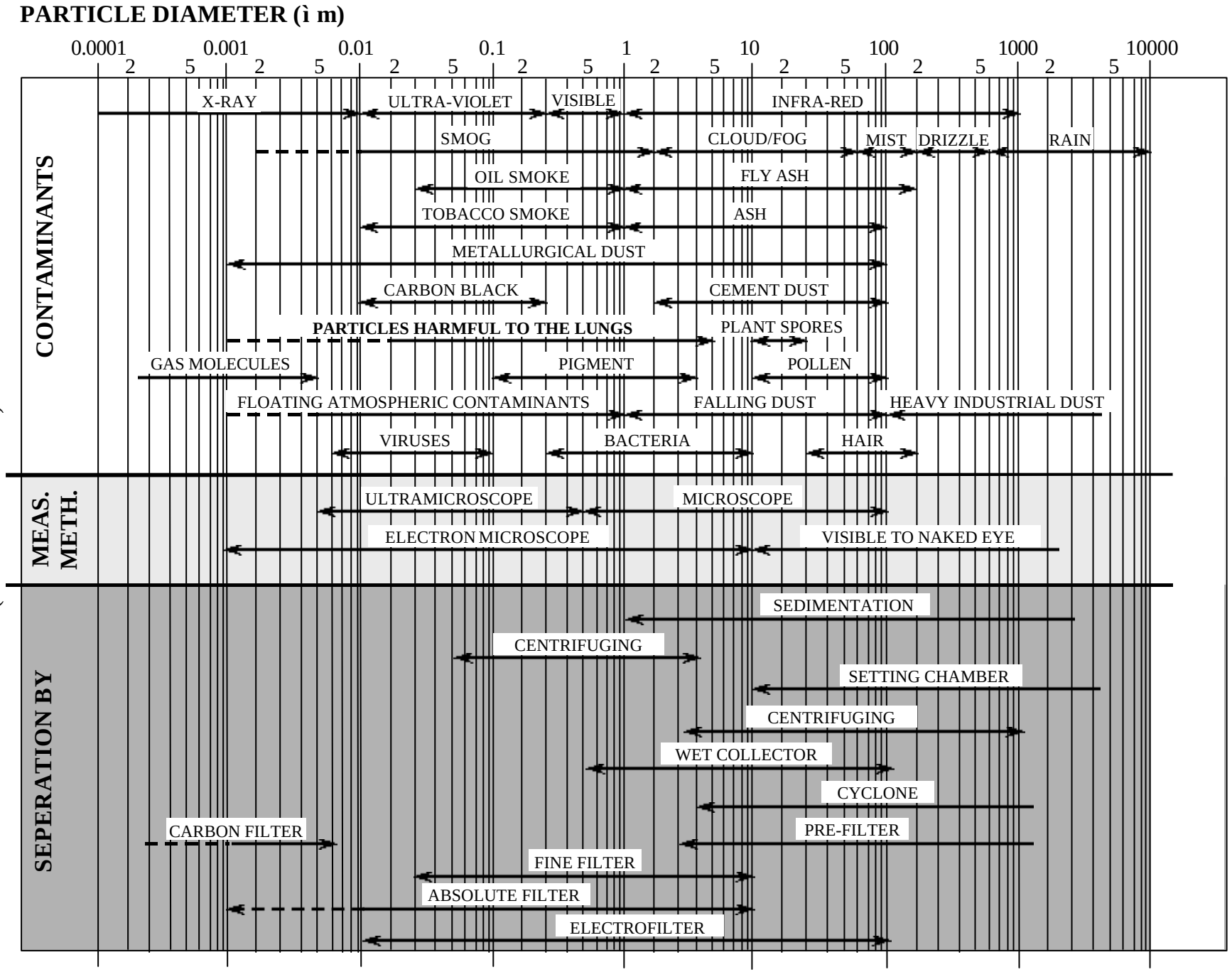
RELATIVE SIZE CHART OF COMMON AIR CONTAMINANTS

(SIZE IN MICRONS)



Respirator performance - the unpleasant reality

It is generally assumed in the UK that if respirators are worn, the industrial wearer will be afforded at least the minimum level of protection specified in the relevant standard. For example, full facepiece dust respirators for which the nominal protection factor (NPF) specified is 900, are approved by the Health and Safety Executive for use against concentrations of asbestos fibres up to 900 times the Maximum Exposure Limit - (see EH41).

Is this assumption valid?

Numerous studies have determined actual Workplace Protection Factors (WPF). Although the test methods used have not been standardised there has been a surprising unanimity in the published results. Most studies have found that the "lower" performance devices such as half-facepiece respirators have generally performed as expected whereas the "higher" performance full-facepiece and powered respirators Have performed less well than expected. For example, the Institute of Occupational Health at Birmingham University found that full-facepiece respirators achieved mean WPF of only about 35 as against NPF of 900. The WPF studies tend to suggest that the above assumption may be valid for "low" performance respirators but is generally invalid for normally "high" performance respirators.

How should respirators be selected to give "adequate" protection if the normal selection procedure may be invalid?

The first step in selecting respiratory protective equipment (RPE) is to request WPF information from the supplier who should have carried out his studies to determine WPF to meet his duties under Section 6 of the *Health and Safety at Work Act.* If the supplier cannot provide WPF information the HSE should be informed of this failure to meet Section 6 duties.

If no WPF information is available from the supplier, the user has to set his own protection factors. In the light of the results of most WPF studies, it would be a very imprudent user who assumed that the NPF for the other than "low" performance equipment had any relevance whatsoever in industry. But from where does the prospective user obtain authorative guidance?

The HSE has recently published two very useful guides for the selection and use of RPE: EH53 covering RPE for use against radioactivity and HS(G)53 covering RPE for the general COSHH environment. The EH53 guidance is the more concrete as to the levels of protection which can be expected of RPE. The table allows comparison of some of the protection factors described in EH41, EH53 and HS(G) 53 and typical WPF.

As can be seen, EH53 specifies lower protection factors than the other two HSE guides and the EH53 protection factors are very similar to the WPF for the "low" performance respirators. However, for the "high" performance respirators, the EH53 protection factors are higher than the WPF.

Adoption of the EH53 protection factors for the "low" performance respirators is likely to be realistic. The EH53 protection factors for the "high" performance respirators should perhaps be reduced by at least a factor of 3 to ensure that wearers are not exposed unnecessarily to contaminants. Adoption of these protection factors still requires that the correct type of respirators to be selected, that the respirators be correctly worn and the wearers are correctly trained and supervised.

Higher protection factors should be adopted only if it has been proven that such protection factors can be achieved in the user's workplace or his employee's given his level of training, supervision and maintenance.

It should be noted that the reduction of the protection factors assigned to all types of respiratory protective equipment should ensure that greater effort is spent in reducing exposures by means other than by the use of personal protective equipment. That is, the effort should go into control as required by the Asbestos, COSHH and Lead Regulations rather than into running a respiratory protection programme of potential dubious effectiveness.

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This is copied from the original article which appeared as a Spotlight Feature on Respiratory Protection in Health & Safety at Work in July 1990.

Respirator Type/Classification	Cited in HSE Guidance EH41[1]	EH53	HS(G) 53[2]	Published WPF
Filtering facepiece				
FFP2	10	3	c6	) 5 - 20
FFP3	-	5	50	)
Half-facepiece				
+ P2 filter	10	3	c6	) 5 - 20
+ P3 filter	-	5	50	)
Full-facepiece				
+ P3 filter	900	100	1,000	18[3]
Full-facepiece powered TMP3	2,500	200	2,000	10
Powered helmet hood, visor TH3	-	50	500	20 - 40

[1] EH41 protection factors based on now obsolescent standards

[2] Limiting protection factors for properly worn and correctly maintained devices

[3] Cuendet and Bilat, Service et neuchatelois de medicine de travail d'hygiene industrielle, Neuchatel, Switzerland

Myers and Peach (1983), Ann. Occ. Hyg. 27(3), 251-259 – data very limited

Myers, Peach, Cutright and Iskander (1984), Am. Ind. Hyg. Assoc. J. 45 (10), 681-688– results for two devices