

# Focus on IFA's work

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## Size selective dust sampling

### Problem

Occupational respiratory diseases such as pneumoconiosis (dust lung) can be caused by airborne substances (dusts). A reliable procedure for determining the hazards is a requirement for collecting reliable measurement data on the dust levels at workplaces. The European standard EN 481 "Workplace atmospheres – Size fraction definitions for measurement of airborne particles", in effect since 1993, defines three particle fractions that have to be determined in the air at the workplace: the inhalable (I), the thoracic (T), and the respirable (R) (which penetrates to the alveoli) fractions. These definitions refer to the regions in the respiratory tract that the particle fractions can reach.

To receive precise information on exposure, the three dust fractions I, T, and R should be measured all at once on the person who is to be evaluated. This requires a new generation of measuring instruments.

### Activities

In the framework of a European study ("Size selective personal air sampling using porous plastic foams"), polyurethane foams with different porosity were tested as size selective and collecting elements together with a subsequent plane filter.

Polyurethane foam can be chosen according to its porosity and geometry so that only those dust particles that fit the definition for thoracic (T) or



Two-stage dust sampling system PGP-EA, 3.5 l/min

respirable (R) dust fraction can pass through. This new system was adapted to fit the existing sampling system PGP-GSP (with air flow of 3.5l/min).

The new sampling system can be used in two two-stage and one three-stage variants to determine either I/R (IFA PGP-EA) or I/T dust (IFA PGP-ET) and I/T/R (IFA PGP-ETA) dust. PGP-EA at 3.5 l/min is the only option currently available commercially. A further system for 10 l/min is currently being developed.

### Results and Application

The I dust concentration is determined by weighing all the filter elements (foams and plane filter), whereas the R dust fraction is determined by weighing the plane filter. Supplementary chemical analytic procedures are tested for their suitability for element analyses of the loaded foam pieces.

Prototypes of the new sampling system were tested in dust chambers and field test trials. The PGP-EA system is recommended for welding fume measurements. Applications for other dust types must be checked on a case-by-case basis.

### Area of Application

Social accident insurers, independent and in-company measuring bodies, occupational physicians, toxicologists, occupational safety specialists

### Additional Information

- DIN EN 481: Workplace atmospheres – Size fraction definitions for measurement of airborne particles (09.93). Beuth, Berlin 1993
- Kenny, L.C.; Aitken, R.J.; Görner, P.: Investigation and application of a model for porous foam aerosol penetration. *J. Aerosol Sci.* 32 (2001), pp. 271-285
- Möhlmann, C.; Aitken, R.J.; Kenny, L.C.; Görner, P.; VuDuc, T.; Zambelli, G.: Size selective personal air sampling: a new approach using porous foams. *Ann. Occup. Hyg.* 46 Supplement 1 (2002), pp. 386-389

- De Vocht, F.; Hirst, A.; Gardner, A.: Application of PUF Foam Inserts for Respirable Dust Measurements in the Brick-Manufacturing Industry. *Ann Occup Hyg* 53 (2009) No. 1, pp. 19-25, doi:10.1093/annhyg/men068

### Expert Assistance

IFA, Division 3: Hazardous substances: handling – protective measures

### Literature Requests

IFA, Zentralbereich