Particle Number Concentration –Stationary instruments	**Category:** **D. Particle Exposure Assessment** **Institute: VITO** **Location: Boeretang 200, 2400 Mol, Belgium** **Contact Details of Technology Expert:** **Evelien Frijns** **Phone: +32 (0)14 335367** **Fax: + 32 (0)14 321183** **E-mail: evelien.frijns@vito.be**

Short technology description/Overview *(approx 300 words)*:

Condensation Particle Counters (CPCs) operate on the principle of enlarging small particles using a condensation technique to form droplets that are large enough to be detected optically. An aerosol sample is drawn continuously through a cooled saturator and then into a heated condenser, where water/butanol vapor diffuses into the sample stream. Effectively, water/butanol diffuses to the centerline of the condenser faster than heat is transferred from the warm walls, which produces supersaturated conditions. Particles that are present in the sample stream (and larger than the minimum activation size) serve as condensation nuclei for the water vapor. Once condensation begins, particles grow quickly into larger water droplets and pass through an optical detector where they are counted easily. VITO offers the CPC's TSI model 3025a (butanol) and the model 3786 (water).

The **Unipolair charging and Electrometer** Grimm NanoCheck (model 1.320) combines a unipolar diffusion charger with a conductivity measurement and a faraday cup electrometer for continuous nano particle counting (10 sec interval) below the optical range from 300 nm down to 25nm. In addition the mean particle diameter of the nano particle size distribution is determined.
The Grimm NanoCheck works only in combination with the Grimm Dustmonitor. The Grimm Dustmonitor (model 1.108) is an optical instrument used for continuous measurement of fine dust (PM10, PM4, PM2.5 en PM1). A random sampling head collects the dust in accordance to the Johannesburger Convention and leads the particles directly into the optical chamber with the laser. There each particle is counted and classified by size and the concentration is proportional to the collected time. Every 10 seconds a mass distribution (µg/m³) is given in 15 classes from 0,32 to 20 µm.

Main Features (Equipment Capabilities):

- Concentration range: 0 to $1x10^5$ particles/cm^3 (CPC) / $5x10^2$ to $5x10^5$ particles/cm^3 (NanoCheck)
- Particle Size Range: 2,5 nm – 3 µm (CPC) / 25-300 nm (NanoCheck)
- Power requirement External power supply (CPC) / Rechargable Smart Li Ion Battery (8 hrs) or external power supply (NanoCheck)
- Alcohol requirement: water (CPC) / no fluids required (NanoCheck)
- Measuring interval: 1 sec (CPC) / 10 sec (NanoCheck)

Typical Samples & Images:

Any further Information: