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(54) High efficiency cyclones

(57) The present invention concerns high efficiency reverse flow cyclones - with a tangential entry of essentially rectangular section, sides a and b , the first parallel to the cyclone axis; a body of height H , with an upper cylindrical section of diameter D and height h and a lower inverted cone with smaller base of diameter D_b ; and a cylindrical vortex finder of diameter D_e and length s - which may be used in laboratory or industrial conditions, whenever dedusting is needed.

The inventor could obtain an empirical correlation to estimate particle turbulent diffusivities under cyclone flow, through the use of a finite diffusivity theory which was adjusted to laboratory, pilot-scale and industrial grade efficiency curves. This correlation allows the design of reverse-flow cyclones of arbitrary geometry, as a function of particle size distribution and operating conditions. A computer program was made to obtain optimum designed reverse-flow cyclones, and two geometries have been obtained, which respectively maximise collection efficiency and one ratio efficiency/costs.

The proposed geometries, defined as ratios of the above mentioned dimensions to the cyclone inside diameter, differ from all geometries available in the literature, both being significantly more efficient. For flow rates typical of industrial multicyclones, the emissions should be 30-45% lower for the first family and 20-35% for the second, as compared with emissions from high efficiency cyclones available. Laboratory-scale tests with a similar geometry have confirmed the expected emissions reductions, at similar levels of pressure drop.

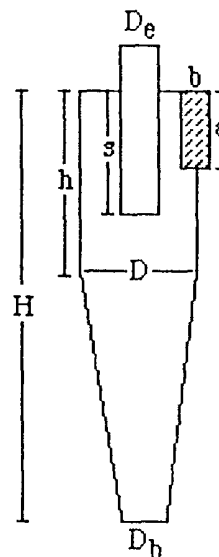


Fig. 1