STUDIES ON A WETTED WALL CYCLONE

by

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CERTIFICATE

This is to certify that the thesis entitled '**Studies on a Wetted Wall Cyclone**' being submitted by Mr. Sandeep Mohan Ahuja to the Indian Institute of Technology, Delhi, for the award of the degree of '**Doctor of Philosophy**' is a record of original bonafide research work carried out under our guidance and supervision and has fulfilled the requirements for the submission, which, to our knowledge has reached the requisite standard.

The results obtained in this thesis have not been submitted in part or in full to any other University or Institute for the award of any degree.

Prof. P.D. Grover
(Supervisor)

Dr. P.V.R. Iyer
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ABSTRACT

Cyclone separators are used in the industry for separating solids from a gas, as a precleaner before the major pollution control equipment, and as a classifier. Wetted wall cyclone is a modified form of a conventional reverse flow cyclone. It is based on a novel concept of having a gravity fed water film along the inner walls of the cyclone which provides a marked improvement in the collection of fine particles while retaining all its merits. It has the following advantages over a dry reverse-flow cyclone.

(i) It collects fine particles efficiently by causing their agglomeration.

(ii) It can handle sticky solids.

(iii) It reduces the re-entrainment of particles.

(iv) It does not require a rotary air lock for arresting the base pick up of solid particles.

(v) It acts as a direct contact heat exchanger and causes evaporative cooling of hot gases.

(vi) It can also be used for removing gaseous pollutants.

In the present study the overall and grade efficiency of the wetted wall cyclone is obtained under both dry and wet conditions at varying inlet air velocities. The solid concentration and water flow rate are kept constant. A radical improvement in the efficiency is observed for fine particles in the range of 1 to 3 microns under wet operating conditions.

The grade efficiency data are also analysed theoretically by applying different models. A correlation for the grade efficiency data covering a range of inlet air

velocities has been proposed.

The pressure drop across the cyclone separator has been measured and the results have been correlated to fit a simple equation. The hydrodynamics of the wetted cyclone has also been studied visually in a glass cyclone.

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