Advanced Cyclone Systems

EMISSION CONTROL

CASE STUDY

Innovnano | Portugal | 2009

ReCyclone EH System
to recover nanoparticles from a ZnO reactor

FOREWORD

Advanced Cyclone Systems designed and supplied a ReCyclone EH for Innovnano, (an important micro and nanoparticles of metal oxides manufacturer in Portugal), to increase the yield of one of their manufacturing facilities.

Innovnano is a subsidiary of CUF, centenary in the chemical industry. CUF is the largest Portuguese chemical group, with production facilities in Portugal and Spain.

IDENTIFYING THE PROBLEM AND SOLUTION

The intention of the company was to reduce losses of the wet scrubber, treating 260m³/h of gas and placed downstream the reactor. Ultimately, the objective was to recover all particles on a dry basis.

Filters were excluded because of particle hold up and risk of condensation in a very humid environment.

ACS proposed a full insulated and heat traced Electrostatic ReCyclone®. The equipment was composed by one Hurricane and one electrostatic recirculator. The Median Volume Diameter (MVD) of the particels is 1.3µm and efficiency was expected to be higher than 95%.

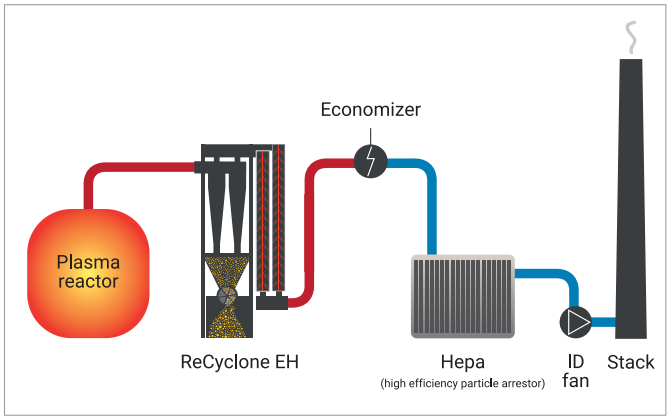

Fig. 1 – Process scheme

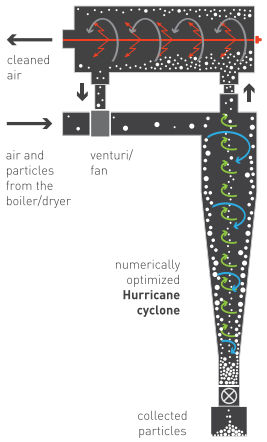

Fig. 2 – Electrostatic ReCyclone

ABOUT HURRICANE CYCLONES

Patented ReCyclone® systems are based on numerically optimized cyclone geometries, different from any other in the market (**Hurricane**), and on an innovative recirculation system. With ReCyclones the fine material, leaves the cyclone and enters the recirculator – a straight through cyclone without the conical part. By centrifugal forces, the particles are moved to the peripheral portion of the recirculator and separated from the main gas, which flows through the axis and leaves the equipment to the atmosphere.

In a **Electrostatic ReCyclone**, a DC high voltage is applied to the center of the recirculator by means of an electrode. The ultrafine particles bombarded with ions, become negatively charged, and are attracted by the walls of the recirculator, being recirculated to the cyclone.

Reduction in emissions by more than 50 %, when compared with the Mechanical ReCyclone, obtaining similar efficiencies to those of bag filters.

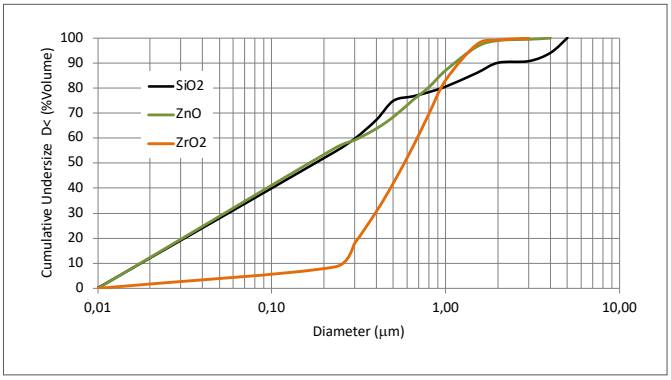

Fig. 3 - Particle size distribution used in simulations (Coulter)

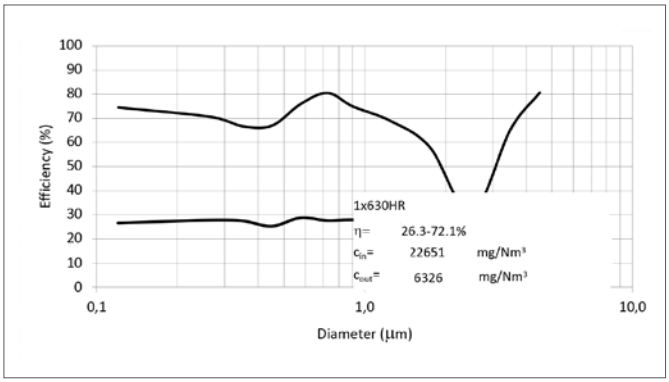

Fig. 4 – Predicted maximum and minimum grade efficiency curves with corresponding global efficiency values

OPERATING CONDITIONS

- Product **Gas**
- Particle size distribution **Fig. 3**
- Temperature (ºC) **Ambient**
- Actual flow rate (Am^3/h_{wet}) **260**
- Inlet concentration **5-50**
- Median particle size (µm) **1.3**

EFFICIENCY

- Efficiency (%) **>96**

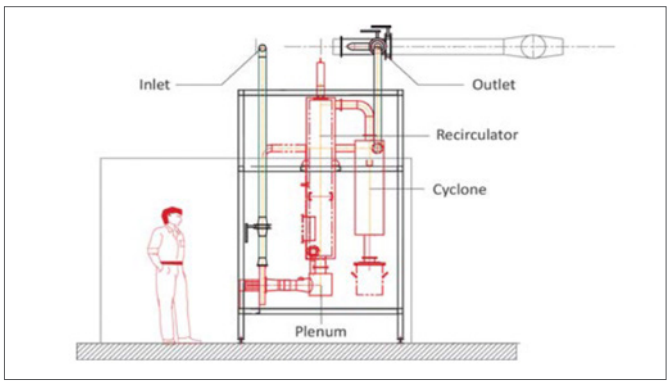

Fig. 5 – General arrangement of the system (1 Hurricane and 1 ReCyclone EH)

CONCLUSIONS

ACS has successfully supplied and installed this system, working closely with the client for design and engineering.