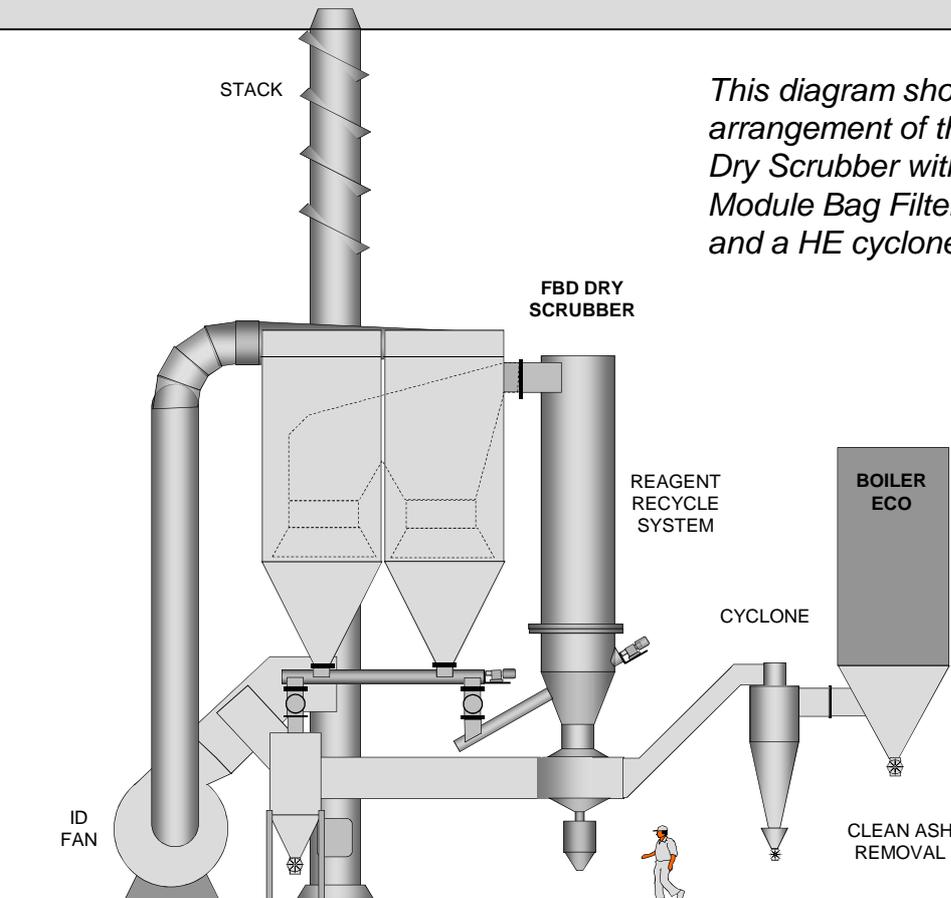


## PRODUCT DESCRIPTION P301.3

### FBD 'DRY' SCRUBBER



*This diagram shows the arrangement of the FBD Dry Scrubber with a 4 Module Bag Filter unit and a HE cyclone.*

#### **SOPHISTICATED EMISSION CONTROL EQUIPMENT**

The Flyash is removed from the flue gases by a high efficiency cyclone. This removes ~85% of the particulate leaving mainly flue gas to pass to the FBD Dry scrubber. Reagent is injected into the scrubber where it forms a high turbulence mix in the conical base of the scrubber. The HV scrubber allows extremely efficient solid gas mixing which causes the reagent to adsorb the pollutants.

Addition of water in a fine spray allows the scrubber to operate close to the dew point of the acid gases which assist the adsorbent reaction. The movement in a FBD bed causes the reagent to break down and it reaches a size when it is transported up the scrubber and into the bag filters.

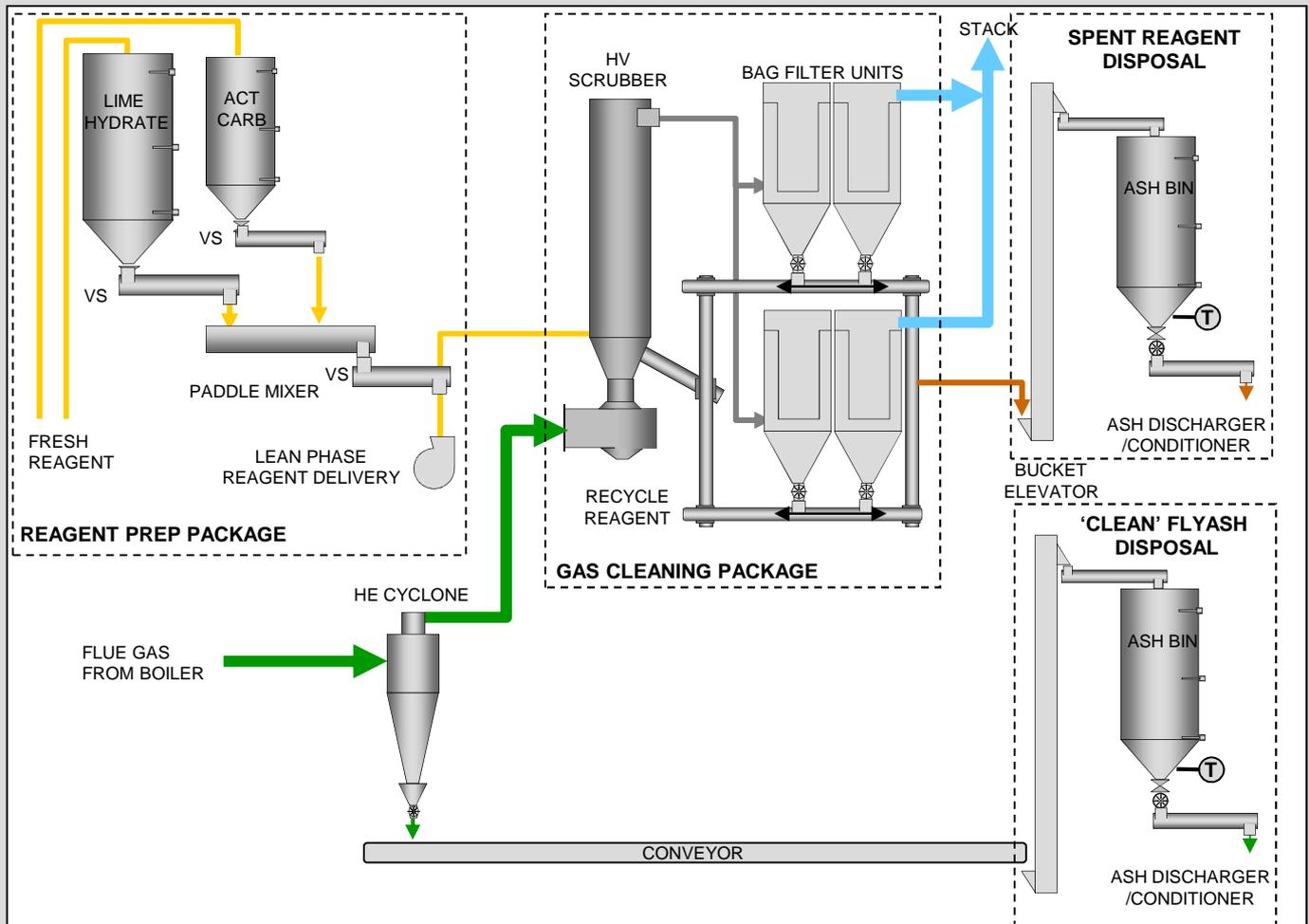
The bag filter is set up to receive the reagent on the outside surface of the vertical bags where it forms a filter cake through which the flue gases must pass. This action causes the adsorption reaction to polish the gases which pass through the bags and the filter cake to emerge cleaned to the specified level before exhausting to the stack.

The adsorption reaction relies on having an excess of reagent in contact with the pollutant so the system is set up to recycle the reagent back into the dry scrubber and filter bags. Reject material carrying the pollutant is rejected in the handling system to control the amount of reagent in flight.

#### **Performance of Dry Scrubber**

The sole purpose of the dry scrubber is to mix the dry powder reagents thoroughly with the gases leaving the combustion/boiler process. The powder reagents are lime hydrate and active carbon, which have been mixed together to form a common reagent which is delivered into the scrubber by a lean phase delivery system.

Recycling the reagent improves the efficiency of the system so a molar ratio of reagent to pollutant can be as low as 1.5:1 in order to meet for instance EU Emission levels



### MECHANICAL HANDLING ARRANGEMENT FOR FBD SCRUBBER

The Systems shown are typical arrangements used for feeding the dry powder reagents to the flue gas cleaning system using the HV scrubber. This shows how the dry powders are mixed in a settable ratio by varying the speed of the feeders to the paddle mixer.

A similar procedure sets the portion of recycled reagent used. The 2 collector screws from the 4 filters operate to reject the reagent leaving the bag filter or reverse to recirculate the reagent to the dry scrubber. The measurement of recirculated material is indicated by the DP in the scrubber bed and this is used for control of the system.

The complexity of the control is managed by a PLC which also receives information from the Continuous Emission Monitoring system or CEMS which monitors the performance of the scrubber. This allows the operators to adjust the Emission Control for compliance, or when set up with 'hands off' auto control.

The use of continuously injected fresh reagent together with recycled reagent ensure that there is always an excess of reagent in contact with the pollutants so temporary 'spikes' of high concentration can be contained. Use of simple mechanical handling systems leads to reliability, but use of single conveyors for each duty suggests that reliability could be increased by either standby equipment or a strategic spares holding. Either are available as an option.

The HV Scrubber working with a bag filter is capable of reducing the emissions of SO<sub>2</sub> by up to 97% and all other acid gas, heavy metals, dioxin and furans by up to 99% and is capable of meeting most country or states emission regulations from waste firing.