

# CE 275

## Gas flow classification



2E

### Description

- gas flow classification with a zigzag sifter
- transparent duct to observe the separation process
- practical experiments on a laboratory scale

Zigzag sifters permit classification of solid compounds. The solid compound being separated is charged into the feed hopper. The compound is fed into the zigzag duct of the sifter at mid-height by way of a vibrating trough. An air flow flows upwards through the vertical duct. Depending on the geometry and density of the particles, they are carried along by the air or drop down due to gravity. At every bend in the duct the solid compound passes through the air flow and falls onto the opposite wall of the sifter. This corresponds to one sifting stage. Owing to the flow conditions, a vortex wake is formed between two bends of the zigzag duct. It ensures that the solid matter moves roughly perpendicular to the air flow. In this way, a transverse sift takes place at every bend.

Sequencing of large numbers of such stages results in very fine separation. CE 275 features a 20-stage zigzag duct. Transparent material provides optimum observation of the processes in the duct.

A fan generates the air flow. The volumetric air flow rate and the solid mass flow are adjustable. The fine material transported upwards with the air flow is separated by a cyclone. Pressure measurement points at the relevant positions in the trainer enable the pressure loss to be determined.

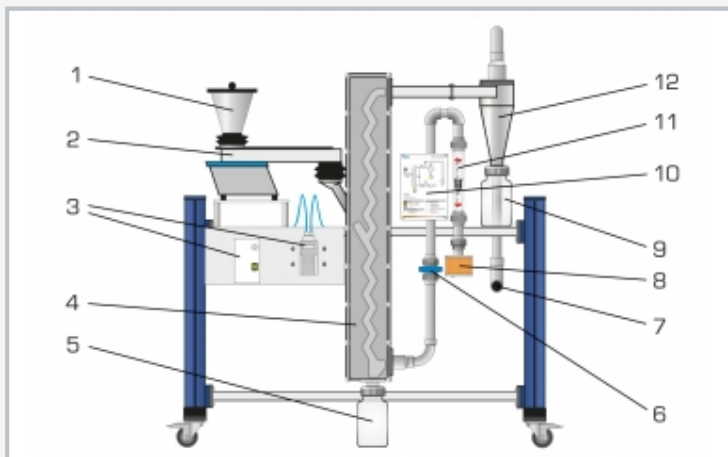
Activated carbon in different particle sizes is recommended for use as the feed material. For particle size analyses of the feed and of the coarse and fine material, a balance and a screening machine (CE 264) are recommended.

### Learning objectives/experiments

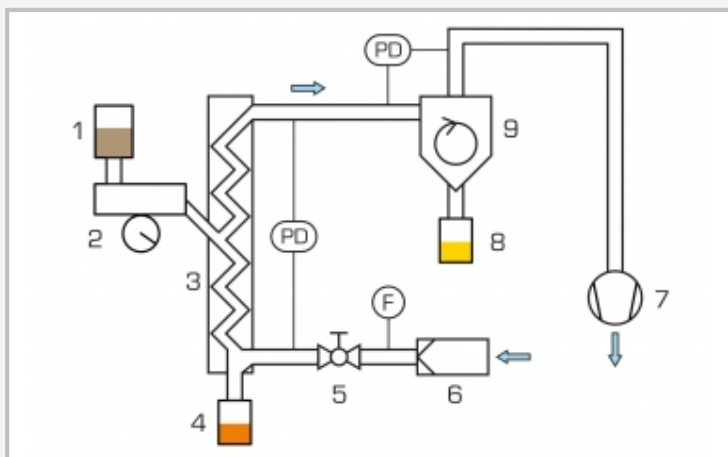
- learning the fundamental principle of wind sifting (gas flow classification)
- sorting
  - ▶ coarse material fraction
  - ▶ fine material fraction
- dependent on solid mass flow rate and volumetric air flow rate
- classifying (with CE 264)
  - ▶ fraction balance
  - ▶ separation function
  - ▶ separation size
  - ▶ sharpness of separation
- dependent on solid mass flow rate and volumetric air flow rate
- pressure losses of
  - ▶ sifter
  - ▶ cyclone
- dependent on solid mass flow rate and volumetric air flow rate

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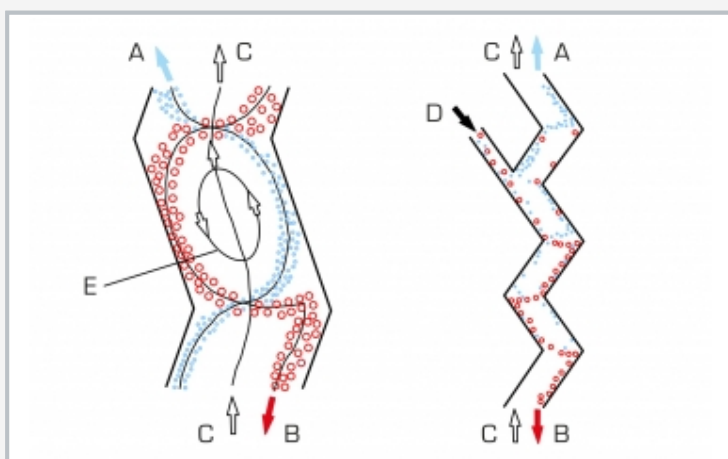
## Gas flow classification



1 feed material tank, 2 vibrating trough, 3 displays and controls, 4 sifter, 5 coarse material tank, 6 valve, 7 connection for fan, 8 filter, 9 fine material tank, 10 process schematic, 11 flow meter, 12 cyclone



1 feed material tank, 2 vibrating trough, 3 sifter, 4 coarse material tank, 5 valve, 6 filter, 7 fan, 8 fine material tank, 9 cyclone; F volumetric flow rate, PD differential pressure



Fundamental principle of zigzag wind sifting: A fine material, B coarse material, C air flow, D feed material, E vortex wake

### Specification

- [1] zigzag sifter to separate solid compounds
- [2] feed hopper with vibrating trough for feed of solid compound into sifter
- [3] dosage of feed material by way of distance of hopper outlet from vibrating trough and frequency of vibrating trough
- [4] separation of solid compound into coarse and fine material with air flow in 20-stage zigzag duct
- [5] air flow generation by fan; adjustment by valve
- [6] separation of fine material from air flow by gas cyclone with tangential inlet
- [7] 3 tanks for feed material and coarse and fine materials
- [8] recording of volumetric air flow rate and differential pressure through sifter and cyclone

### Technical data

Vibrating trough  
 ■ mass flow: max. 10kg/h  
 ■ vibration frequency: max. 3000min<sup>-1</sup>

Zigzag sifter  
 ■ height: approx. 1500mm  
 ■ cross-sectional area: 40x50mm

Cyclone  
 ■ height: approx. 550mm  
 ■ diameter: 150mm

Fan  
 ■ volumetric flow rate: max. 600m<sup>3</sup>/h  
 ■ power consumption: approx. 3600W

Tanks  
 ■ feed hopper: 3L  
 ■ coarse material: 2L  
 ■ fine material: 2L

Measuring ranges  
 ■ cyclone and sifter differential pressures: 0...100mbar  
 ■ volumetric flow rate (air): approx. 10...100m<sup>3</sup>/h

230V, 50Hz, 1 phase  
 LxWxH: 1660x790x1930mm (trainer)  
 Weight: approx. 180kg (trainer)  
 LxWxH: 660x510x880mm (fan)  
 Weight: approx. 30kg (fan)

### Scope of delivery

- 1 trainer
- 1 fan
- 2 packing unit with feed material
- 2 buckets
- 1 shovel
- 1 stopwatch
- 1 set of instructional material

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Optional accessories

083.26400      CE 264      Screening Machine