

## FIXED AND FLUIDISED BED APPARATUS – CEL



Close up of columns showing fluidisation of bed by air.

### DEMONSTRATION CAPABILITIES

- *pressure drop through packed and fluidised beds, for air and water systems*
- *verification of Carman-Kozeny equation*
- *onset of fluidisation*
- *observation of differences between particulate and aggregative fluidisation*

*The apparatus is designed to facilitate the study of flow through fixed and fluidised beds of solid particles. Provision is made for the simultaneous study of air and water systems in order to demonstrate the difference between ‘aggregative’ and ‘particulate’ fluidised bed characteristics. Students can readily observe the important phenomenon of ‘bubbling’.*



## DESCRIPTION

Upward flow of fluid through a bed of particles is a naturally occurring phenomenon, for example the movement of ground water. Industrial applications include ion-exchange, extraction of soluble components from raw materials and other chemical processes.

The Armfield CEL apparatus facilitates the study of flow through fixed and fluidised particle beds. The simultaneous study of air and water systems and the phenomenon of 'bubbling' can be observed.

The apparatus comprises a laminate backboard, mounted on a tubular steel frame, which supports the two clear acrylic cylindrical columns for air and water. Each column is supplied with sintered bronze bed plates and wall tapings. The columns are demountable in order to remove the particle bed. Separate manometers are provided for measurement of bed pressure drop in the columns.

Water is circulated from a sump tank through a control valve and variable area flow meter to the appropriate column by a pump. An overflow returns the water to the sump tank.

Air supply to the second column is by diaphragm pump via a bypass control valve and variable area flow meter. Air is discharged to atmosphere.

The apparatus is designed to be used on the laboratory bench.

## REQUIREMENTS

**Electrical supply:**

**CEL-A: 220-240V/1ph/50Hz@2A**

**CEL-B: 120V/1ph/60Hz@5A**

## OVERALL DIMENSIONS

**Height: 1.00m**

**Length: 0.75m**

**Depth: 0.60m**

## SHIPPING SPECIFICATION

**Volume: 1.0m<sup>3</sup>**

**Gross weight: 130kg**

## ORDERING SPECIFICATION

- A bench top apparatus for the study of fixed and fluidised beds of solid particles.
- Two cylindrical columns, one for air and one for water, each column diameter 50mm and height 550mm, with sintered bronze bed plates.
- Two sizes of bed material (Ballotini) are supplied, 200/300 and 500/750 micron ranges.
- Each column has tapping points and a manometer for measurement of the bed pressure drop (manometer fluid supplied).
- Pumped water and air supplies with control valves and variable area flowmeters.

**Flow ranges:**

**Air: 2-25 litres/min**

**Water: 0.2-2.0 litres/min**



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