

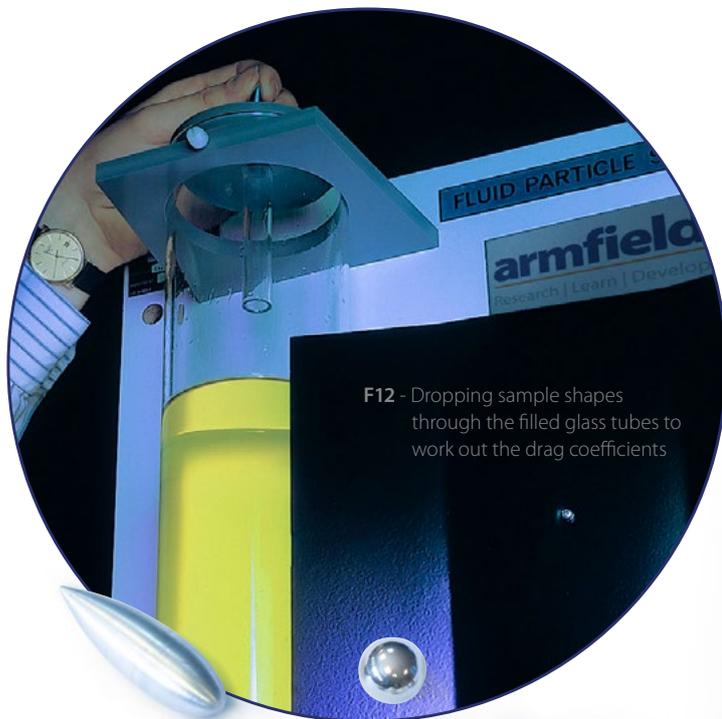
F
SERIES

Particle drag coefficients – F12

The apparatus has been designed to introduce students to the fundamental characteristics of the behaviour of particle/fluid systems, in particular the relationship between the drag coefficients of falling particles and their Reynolds' number value.

Particles covering a range of sizes and densities are supplied. The experiments are conducted by allowing single particles to fall through a number of different liquids contained in vertical glass tubes. Blockage effects are reduced to a minimum as the largest particle used has a projected area of only 1% of the tube cross-section.

The rate of fall of the particles is determined by timing their passage between two marks on the walls of the glass tubes.



F12 - Dropping sample shapes through the filled glass tubes to work out the drag coefficients

F12 - Streamlined shapes and supplies spheres



F12 - Sample shape ejectors (allowing you to recover shapes while running the experiments)

Experimental content

- ▶ Measurement of drag coefficients of spheres over several decades of particle Reynolds' number
- ▶ Exploration of dimensional analysis and dynamic similarity
- ▶ Introduction to the effects of boundary layer separation on motion of spheres
- ▶ Effect of particle shape on rate of fall and on drag coefficient

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URL: <http://www.armfield.co.uk/f12>

Applications

ChE ME CE IP

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Description

The equipment consists of two precision glass tubes 1.5m long and 93mm inside diameter fixed vertically on a wall-mounted backboard. A guide is provided at the top of each tube to facilitate the introduction of particles with the minimum of disturbance to the liquid.

A sliding valve device at the bottom of each tube allows the particles to be removed with minimum loss of liquid.

Observation of the particle movement is aided by a shielded fluorescent light mounted on the backboard between the glass tubes, marks on the tubes enable the rate of fall to be timed.

In addition to the range of spheres, two streamlined shaped objects are supplied to allow comparison to be made between their drag coefficients and those of the spheres.

Requirements

Scale



Electrical supply: Single phase

- ▶ F12-A: 220-240V/1ph/50Hz, 10A
- ▶ F12-B: 120V/1ph/60Hz, 20A
- ▶ F12-G: 220-240V/1ph/60Hz, 10A

Essential Equipment (not supplied by Armfield)

- ▶ Stopwatch or stop clock
- ▶ Glass beaker

Technical specifications

Tube length	1500mm
Outside diameter	100mm
Inside diameter	93mm
Streamlined shapes	x2
Supplied spheres	Stainless Steel
	3.17mm diameter
	6.35mm diameter
	7.9mm diameter
	9.5mm diameter
	Ceramic
	6.35mm diameter
	9.5mm diameter

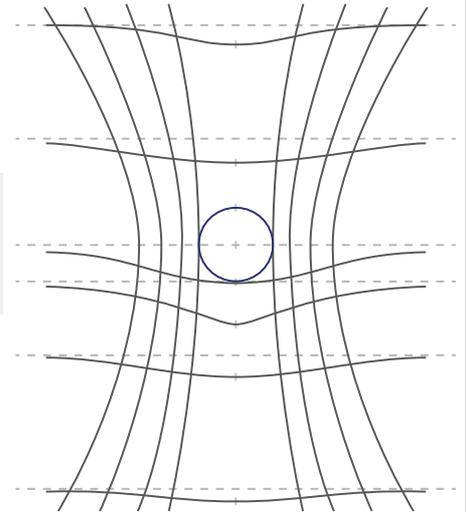
Overall dimensions

Length	0.60m
Width	0.16m
Height	1.57m
Packed and crated shipping specifications	
Volume	0.7m ³
Gross weight	80Kg

Velocity profiles

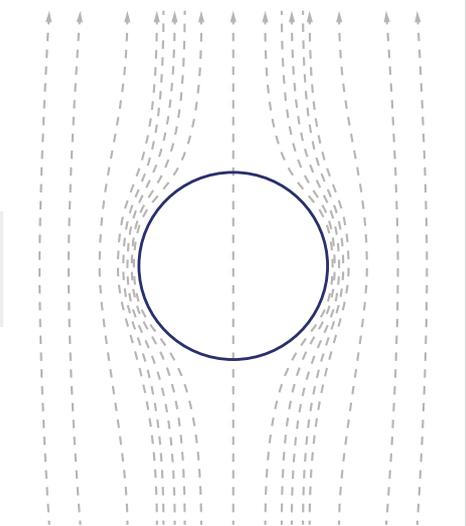
Deformation flow around a falling sphere:

Streamlines and velocity profiles are shown for an observer at rest



Streamlines for potential flow past a sphere:

Observer stationary with respect to sphere



Ordering specification

- ▶ Compact, wall mounted apparatus to study the behaviour of particles and shapes within fluids
- ▶ Two transparent vertical glass tubes, back lit by a fluorescent lamp for ease of viewing
- ▶ Tube sizes 93mm inside diameter by 1.5m long, with calibration marks for timing
- ▶ Guide to aid the insertion of particles at the top of the tubes
- ▶ Sliding valves to aid the removal of particles from the bottom of the tubes
- ▶ The equipment is supplied with sets of spheres of different sizes and materials, plus two streamlined shapes

Ordering codes

- ▶ **F12-A:** 220-240V / 1ph / 50Hz, 1 amp
- ▶ **F12-B:** 120V / 1ph / 60Hz, 2 amp
- ▶ **F12-G:** 220-240V / 1ph / 60Hz, 1 amp

Armfield standard warranty applies with this product

Knowledge base

- > 28 years expertise in research & development technology
- > 50 years providing engaging engineering teaching equipment

Benefit from our experience, just call or email to discuss your laboratory needs, latest project or application.

An ISO 9001:2015 Company



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Aftercare

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