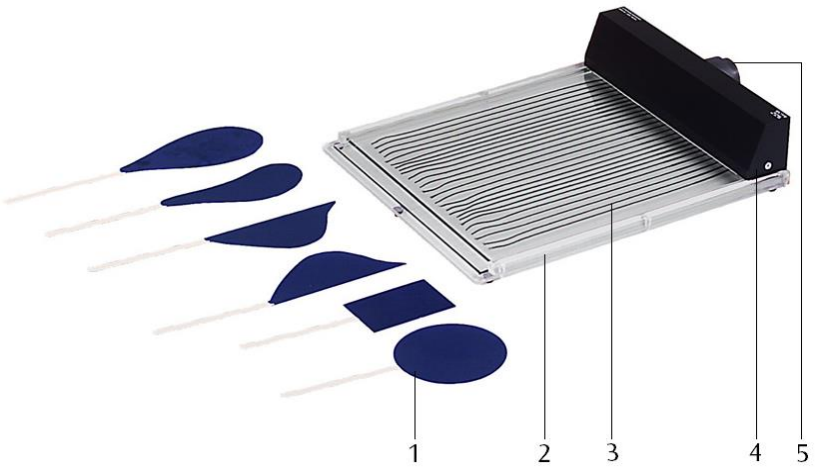
Air flow apparatus 1000765

Instruction sheet

09/15 SP



1 Aerodynamic bodies
2 Glass plates
3 Woollen threads
4 Air chamber
5 Air inlet

1. Description

The air flow apparatus is used to demonstrate air flow patterns for objects of different shapes. The flow patterns can be projected onto a wide screen with an overhead projector.

26 woollen threads fastened at their ends at an equal distance from one another are arranged between two glass plates. The glass plates have a gap of approximately 1 mm between them and are sealed off lengthwise on both sides.

Air supplied by an external blower is initially introduced to the air chamber through the air inlet. From the air chamber, the air flows into the empty space between the two glass plates and exits into the open from the opposite end.

The air chamber is equipped with a one-way valve which prevents the air from flowing in the wrong direction in case the air flow apparatus is connected to the suction nozzles of the blower by mistake.

Aerodynamic bodies of different shapes can be introduced into the air flow. The inserted bodies can be positioned in the air flow from outside.

1.1 Scope of delivery

1 Air flow apparatus
1 Circular body
1 Rectangular body
1 Streamlined body
1 Wing section
2 Bodies to demonstrate narrowing of flow

2. Technical data

Air flow apparatus	
Dimensions:	370 x 320 x 80 mm^3
Weight:	3 kg
Aerodynamic bodies	
Circular body:	105 mm Ø
Rectangular body:	90 mm x 60 mm
Streamlined body:	160 mm x 80 mm
Wing section:	150 mm x 60 mm
Narrowing bodies:	150 mm x 65 mm

3. Operating principle

As a result of the small gap between the glass plates, an almost entirely uniform flow of air is created in the space between the glass plates.

The course of the air flow is demonstrated by the woollen threads. Initially, the threads are equidistant and run parallel to one another.

If any obstacles are introduced into the air flow, then the air flows sideway around the body making the woollen threads change their position.

Changes in the velocity of the air flow are also demonstrated by the threads. The closer the threads are to one another, the greater the velocity of the flow.

4. Operation

Required accessories:

1 Air blower with hose @230 V
1000606

or

1 Air blower with hose @115 V
1000605

1 Overhead projector (recommended)

- Place the air flow apparatus on the overhead projector.

The woollen threads run parallel to one another.

- Connect the jet of the blower to the inlet of the air flow apparatus via the hose.
- Switch on the overhead projector.
- Switch on the blower.
- Adjust the air flow so that the ends of the threads do not begin to vibrate.

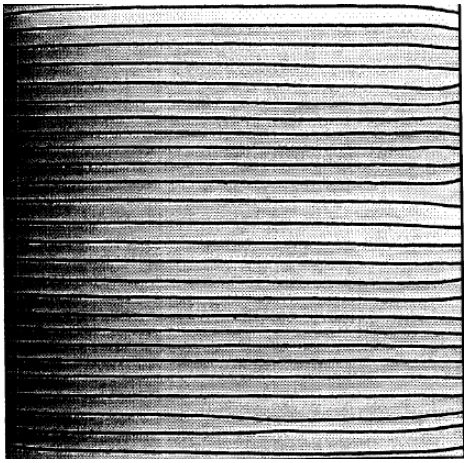
If the air pressure is too low, it is not possible to demonstrate the proper course of the air flow.

- Place the desired aerodynamic body in a central position between the two glass plates.
- Gently shift the aerodynamic body to prevent the threads from getting entangled.
- The air flow splits and goes around the flow body. The threads show the course of the air flow in front of and behind the flow body.
- When the desired result has been obtained, switch off the blower.

The threads remain in their final position.

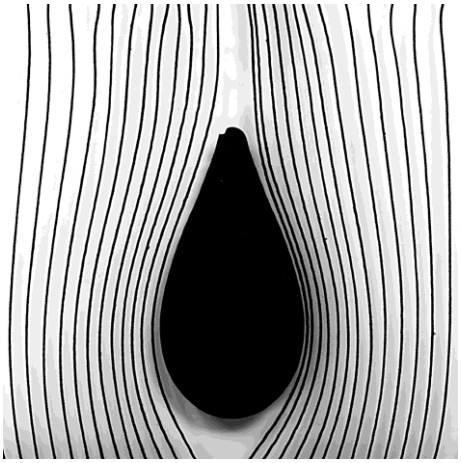
5. Sample experiments

5.1 Course of flow in the case of a linear laminar flow



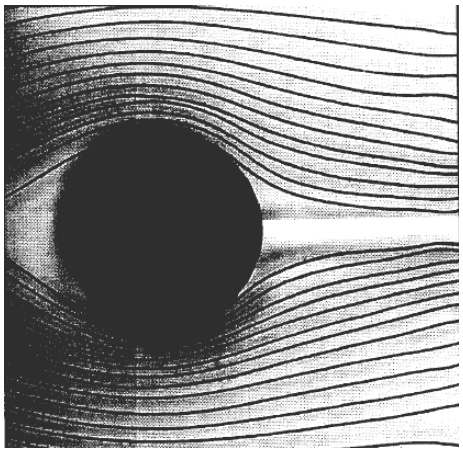
In the case of linear laminar flow, all flow lines are parallel. The direction and flow velocity are equal at all points of the air flow.

5.2 Course of flow along a teardrop-shaped body



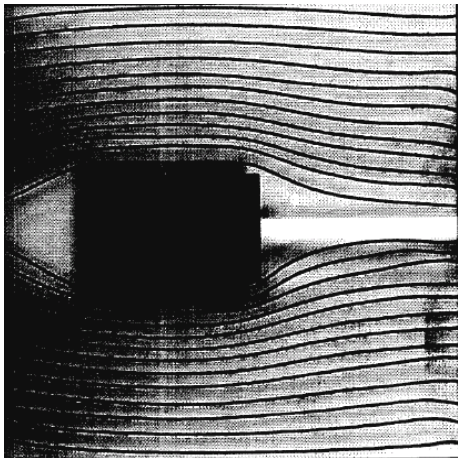
When the air flow moves around a teardrop-shaped body, the flow lines narrow around the body itself. The velocity of flow also increases. Once the flow passes the body, the flow velocity reduces.

5.3 Course of flow around a spherical body



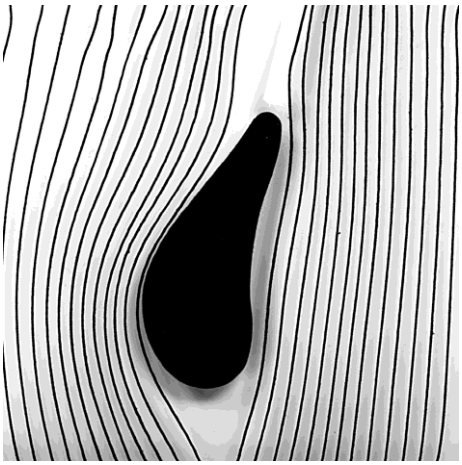
When air flows around a circular or spherical body, the flow lines narrow around the body itself. The velocity of flow also increases. Once the flow passes the body, the flow velocity reduces.

5.4 Course of flow along a rectangular body



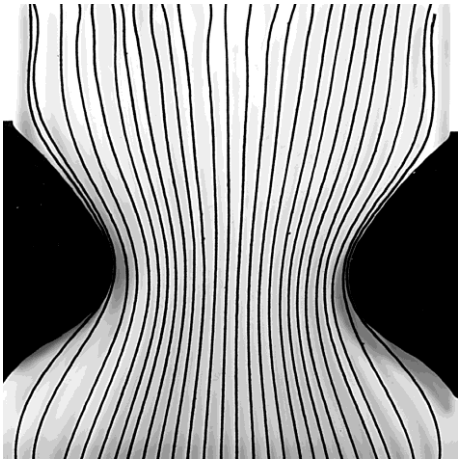
When air flows past a rectangular body, the flow lines narrow around the body itself. The velocity of flow also increases. Once the flow passes the body, the flow velocity reduces.

5.5 Course of flow around a wing



Below the wing surface, the direction and velocity of the air flow remain largely constant. Above the wing surface, however, the flow velocity increases. Owing to this, suction is created along the upper wing surface.

5.6 Course of flow at a bottleneck



In this experiment, two flow bodies are introduced into the air flow apparatus.

At a pinch or bottleneck, the distance between the flow lines is reduced. Simultaneously, there is a sharp increase in the flow velocity and the bodies are sucked inwards. Thereafter the flow velocity decreases.