

AIR RESISTANCE AND THE SHAPE OF OBJECTS

MED 19.14



Material:

Item-no.	Qty.	Description
DS101-1G	1	Support base, large, L=500 mm
DS103-7G	1	Sliding saddle H=70 mm
DS103-3G	1	Sliding saddle, H=34 mm
DS103-1G	1	Rail support, vertical, H=152 mm
DM701-2L	1	Blower 12 V
P3130-2Q	1	Fixed voltage transformer 12V DC/10 A
DM715-2S	1	Adapter rail
DM712-1H	1	Stand for aerodynamic objects
DM710-2S	1	Aerodynamic objects, set
DM725-ND	1	Newtonmeter „inno“, 20 N/2000 g
P3120-5B	1	S-shaped assembly platform

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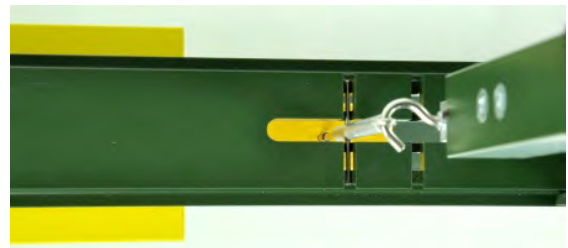
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Purpose

Especially at high flow speeds the shape of an object has an important role to play for the air resistance when the cross-sectional area is the same size.

Preparation

- the sliding saddle 70 mm is fixed on the support base
- the blower is inserted into the sliding saddle and screwed down tightly
- the adapter rail is mounted on the blower
- at the right end of the adapter rail the vertical rail support is fixed with the sliding saddle (34 mm)
- the Newtonmeter is attached to the S-shaped assembly platform
- the holder for the aerodynamic objects is placed in the slit of the adapter rail
- the weighing bar is positioned so that both hooks fit exactly into each other (see image)
- the rotary knob for the flow speed of the blower is turned to the very left
- the blower is powered by a fixed voltage transformer (12 V DC, min. 6 A)



Experiment 1

The sphere is used as an aerodynamic body; we attach it to the stand for aerodynamic objects from below.

Then we turn on the Newtonmeter, select the range „mN“ and tare it to 0. We turn on the blower and slowly increase the flow speed to 10 m/s.

Afterwards we read off the value and note it in our chart.

Aerodynamic bodies, cross-sectional area each 9 cm ²	Air resistance in mN
Ball	
Hemisphere (round side)	
Hemisphere (hollow side)	
Disk	



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Experiment 2

The hemisphere is used as an aerodynamic body; we attach it to the stand for aerodynamic objects from below.

The spheric side should face against the blower.

We adjust the weighing bar through the sliding saddle and place the aerodynamic body in a complete vertical position.

Then we turn on the Newtonmeter, select the range „mN“ and tare it to 0.

We turn on the blower and slowly increase the flow speed to 10 m/s.

Afterwards we read off the value and note it in our chart.



Experiment 3

We turn the hemisphere by 180 ° so that the hollow side is facing the blower.

We adjust the weighing bar through the sliding saddle and place the aerodynamic body in a complete vertical position.

Then we turn on the Newtonmeter, select the range „mN“ and tare it to 0.

We turn on the blower and slowly increase the flow speed to 10 m/s.

Afterwards we read off the value and note it in our chart.



Experiment 4

The hemisphere is used as an aerodynamic body; we attach it to the stand for aerodynamic objects from below.

We adjust the weighing bar through the sliding saddle and place the aerodynamic body in a complete vertical position.

Then we turn on the Newtonmeter, select the range „mN“ and tare it to 0.

We turn on the blower and slowly increase the flow speed to 10 m/s.

Afterwards we read off the value and note it in our chart



Result

The differences in the measurements are caused by more or less whirls, happening as well as before and after the aerodynamics object in our example.

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Alternative Setup

In case that this experiment is performed with a dynamometer and a pulley the following set-up is recommended:

- on the right end of the adapter rail the dynamometer mount with pulley is fixed
- the dynamometer 0,2 N is inserted from above and screwed down carefully
- we cut of a thread of approx. 12 cm and make a loop at one end
- the thread is put through the hanger of the pulley and inserted as shown on the image.



Experiment

The stand for aerodynamic objects has to be in a full vertical position during the entire experiment. If necessary, adjust the height level of the dynamometer and tare it in the same direction as it will be used during the experiment (check the image above).

As soon as the blower is turned on the aerodynamic object is pushed to the right side, therefore the stand for aerodynamic objects is not in vertical position anymore. We loosen the screw from the dynamometer mount with pulley and pull the dynamometer upwards until the stand for aerodynamic objects is in a full vertical position again.

Now we can perform a correct measurement of the resistance.

