



VAPOUR BLAST

[USER'S MANUAL

ORIGINAL
USER'S MANUAL

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VAPOUR BLAST

FAN

IGNITION



LION

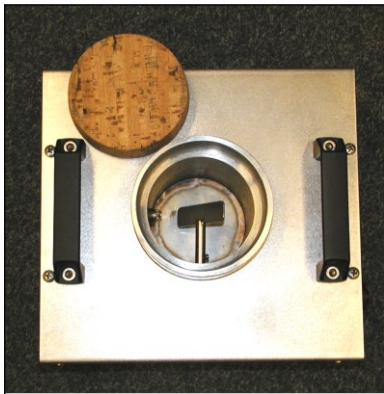


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1 Description

The Vapour Blast has been developed to teach fire professionals about the different ways in which air, heat and combustible materials can combine to create high bursts of energy. During an experiment, a small amount of volatile inflammable liquid is allowed to evaporate in the Vapour Blast before being ignited. The amount of liquid and the duration of air mixing time can produce a dramatic range of outcomes.



The Vapour Blast consists of a stainless steel cylinder which is closed underneath and can be closed at the top end with a large cork. A spark plug is mounted onto the wall of the cylinder, connected to an ignition transformer. A fan is also installed, ensuring a homogeneous mix. The housing is made of stainless steel and is fitted with handles. When the mixture in the cylinder is ignited, the cork of the Vapour Blast is blown off with a force proportional to the energy potential of the mixture used.

To ensure evaporation of the liquid, the bottom of the cylinder is heated to a maximum of 50°C. The Vapour Blast features an LED indicator for displaying ventilation and ignition.

2 Connection and operation of the Vapour Blast

The voltage required for the ignition and the fan is 230V~. The Vapour Blast can be connected to a mains electricity power source. The ignition and the fan are operated using switches on the wired remote control.

Safety checklist

- Only use the Vapour Blast in a large, well ventilated space with a fixed ceiling and never under lights/fluorescent lights.
- Do not use the Vapour Blast near inflammable materials or substances.
- Ensure that the switches are in the 'off' position when connecting to the mains electricity.
- Check that the fan and ignition are working properly before starting an experiment.
- Never lean over the equipment during ignition!
- An explosion may occur immediately upon switching on the ignition or after several seconds. Always stand clear of the unit during operation.

General operation

- Switch off the ignition and the fan.
- Pour a few drops of inflammable liquid into the Vapour Blast.
- Push the cork into its hole.
- Switch the fan on for a short while to allow the liquid to evaporate, and then switch it off again.
- Switch on the ignition for a moment, and then switch it off again.

Contents

- Vapour Blast
- Cork (2x)
- Wired remote control
- 230V Power supply cable

- Starter set containing three different liquids and ten pipettes
- Manual

3 Technical specifications

Cylinder material:	stainless steel
Cylinder dimensions (h x d):	17 x 12.5 cm
Nom. contents of cylinder:	1,05 dm ³
Bottom Cylinder Heating:	max. 50°C
Dimensions of device (w x d x h):	21 x 32 x 29 cm
Weight:	approx. 12 kg
Electrical connection:	230 V-AC - 50/60 Hz - 50VA

4 Inspection, maintenance and guarantee

- Inspect the Vapour Blast regularly. Check the various electrical connections for any damage.
- If appropriate, clean the equipment with an all-purpose cleaner. Do not use caustic substances or solvents.
- The guarantee on the equipment ceases to be valid: if the instructions in the manual and the maintenance prescriptions have not been adhered to; in the event of faults or damage arising from improper use, neglect, and/or rough treatment; and if the equipment has been modified.
- LION cannot accept any liability for losses arising from the use or inadequate functioning of the Vapour Blast.

5 Experimenting with the Vapour Blast

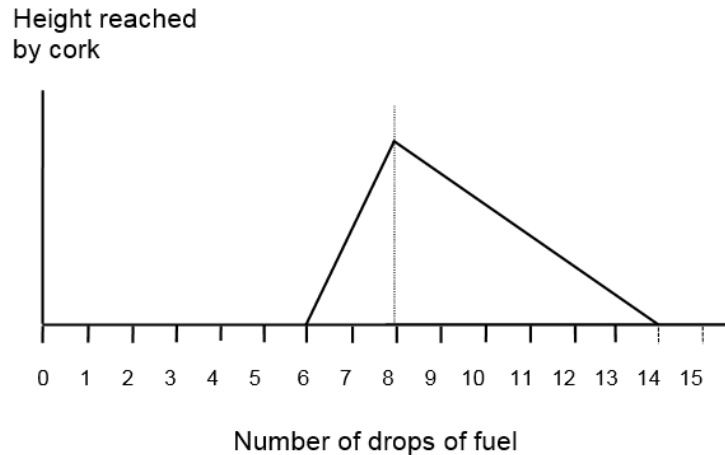
A series of experiments can be carried out to gain insight into the energy potential within the explosion limits, using progressively more drops of volatile liquid. You can measure how high the cork is blown by the force of the explosion. You can then plot the results in a graph as shown in the example below. The height reached by the cork is a measure of the energy released by the explosion.

Example of an experiment

1. Add one drop of fuel to the Vapour Blast.
2. Push the cork into its hole.
3. Switch the fan on for a short while until the liquid has evaporated fully (at least 5 seconds, longer for larger quantities of liquid)
4. Ignite the Vapour Blast.
5. Measure how high the cork is blown.
6. Turn on the fan for a short while – without replacing the cork on the Vapour Blast – to allow the residual vapour to disperse (at least 5 seconds; the residual vapour must disappear completely!).
7. Repeat these steps, adding an extra drop of fuel each time, until no more explosions occur (because the mixture is saturated).

Next, plot the results in a graph. In theory, this should take the form shown below:

In practice, the graph may differ from this, as experimental conditions vary and full evaporation does not always take place, or residual vapour remains in the Vapour Blast. The Vapour Blast may also become warm during the experiments, aiding evaporation. In order to carry out this experiment well, it is important that the instructor is familiar with the equipment. It is also important for the Vapour Blast and the liquids to be at room temperature.



Other experiments

“Maximum power”

Use a number of drops of fuel sufficient to reach the explosion zone. Leave the fan on during ignition. This reinforces the effect, resulting in the vapour igniting faster. Compare the situation with and without the fan.

Other fuels

Use various fuels to compare the lower explosion limits or the evaporation speeds etcetera. Ensure that the temperature of the Vapour Blast is the same for every experiment! (Let the cylinder cool down between experiments).

The fuels must be able to evaporate at the prevailing temperature.

Increased temperature

Pour approximately 4 cl of pure ethanol into the Vapour Blast. Within a few minutes after switching on the fan, the ideal mixture for combustion is achieved at 20°C. This can lead to a significant explosion. Only a proportion of the liquid evaporates during this explosion. Increase the temperature and repeat the experiment. The mixture will now be oversaturated. The energy will be reduced and eventually, at a certain temperature, no more explosions will occur as the upper explosion limit has been passed.

PLEASE TAKE NOTE OF THE FOLLOWING!

Safety checklist

- Only use the Vapour Blast in a large, well ventilated space with a fixed ceiling and never under lights/fluorescent lights.
- Do not use the Vapour Blast near inflammable materials or substances.
- Ensure that the switches are in the 'off' position when connecting to the main power supply.
- Make sure that the fan and ignition are working properly before starting an experiment.
- Never lean over the equipment during ignition!



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