

# ULV (ULTRA LOW VOLUME) APPLICATION OF WATER-BASED FOG LIQUIDS WITH SWINGFOG® HIGH PERFORMANCE FOG GENERATORS FOR VECTOR CONTROL MEASURES

In the literature "ultralow volume (ULV) is defined as the minimum volume per unit area required to achieve economic control (Anon, 1971), and is generally associated with the use of oil-based formulations of low volatility"\*.

The minimum volume per unit area is generally defined between 0.5 up to 5 litres/hectare.

Not too long ago, with thermal fog generators oil-based fog/spray liquids were nearly exclusively used for vector control measures, usually by fogging a volume in the range of 1 litre up to 5 litres per hectare, which is exactly in the range of the above mentioned definition of the ULV application method. That means relatively small quantities of the chemical agents are mixed with high amounts of oily carrier substances like diesel oil or kerosene to get the total application quantity.

The first thermal fog generators, developed in the 1940s/1950s, were designed to apply oil-based fog liquids. Right from the beginning the machines were widely used for efficient vector control measures according to the **ULV application method by fogging oil-based fog liquids**.

Recently there is a tendency to shift application of oil-based liquids to water-based fog liquids. Reasons are environmental protection, costs of oily carrier substances, possible traffic hazard by a dense visible fog and oily residues, in particular when treatment is done inside a building.

**However, things are rather different with water-based fog liquids:**

Oil-based fog liquids can be fogged in a narrow and homogenous droplet spectrum of below 30 µm VMD (Volume Median Diameter), which is in accordance with the actual WHO (World Health Organization) Specification Guidelines for Vector Control Equipment.

This is not possible when water-based fog liquids are fogged with thermal fog generators by using water as a carrier substance. Compared with oil, water has a much higher surface tension, and cannot as easily be processed in thermal fog generators, no matter which brand is used.

The droplet spectrum is no longer as homogenous and much wider, and droplets from 0 µm up to rather big droplets of 200 µm are emitted.

This fact means that nearly all droplets which are bigger than 40 µm/50 µm do

not float as aerosols in the air, and settle down in front of the fog generator, where they cause wet spots and deposits. This can clearly be seen, especially when the machine is operated stationary. All these relatively big droplets do not reach the target, are lost and cause pollution. Depending on the flow rate such losses could be approx. 20 % and more. Besides the waste of expensive chemical agents, this has also a negative influence on the effectiveness of the treatment, because less than the desired quantity of the chemical agent meets the object of application.

Swingtec® has solved this problem with our High Performance Fogging Tube, which was developed especially for the application of water-based fog liquids. This invention is meanwhile patented in countries like USA, China and South Korea. Our High Performance Fogging Tube is applicable for all types of swingfog® machines.

With our portable machine swingfog® SN 50 with our High Performance Fogging Tube a droplet spectrum of below 30 µm up to flow rates of 27 litres/hour is achieved. With our truck-mountable or our stationary used devices swingfog® SN 81 and swingfog® SN 101, flow rates up to 60 litres/hour in the same ideal droplet spectrum can be applied.

All other brands of thermal fog generators (including our swingfog® machines with standard fogging tubes) can also fog water-based fog liquids in a somehow narrow droplet spectrum, but by no means can do this at only nearly as high flow rates compared with swingfog® equipped with the High Performance Fogging Tube.



Swingfog® sn 50 with standard fogging tube, flow rate 27 litres/hour with nozzle 1.2 (Fog liquid water)

A basic problem of the application of water-based fog liquids is the fast evaporation of water aerosols. Water droplets with a diameter of 20 µm evaporate completely in 2.3 seconds at a temperature of 20°C and at a relative humidity of 80%,



Swingfog® sn 50 with high performance fogging tube, flow rate 27 litres/hour with nozzle 1.2 (Fog liquid water)

and as fast as in 0.7 seconds at a temperature of 30°C and at a relative humidity of 50 %\*\*. Under these circumstances an application would not be effective.

This negative effect is avoided by adding anti-evaporation agents like Glycols, which mix easily with water. The quantity of such agents is calculated from the total fog mixture and depends on the environmental temperature and the relative air humidity. 5 % is sufficient under cool and humid conditions, and approximately 10 % when it is hot and dry.

There are also ULV preparations on the market, in which an anti-evaporation agent is already included in the original formulation of the manufacturer. Using such formulations, the addition of anti-evaporation agents is not necessary.

A higher percentage of anti-evaporation agents can be added to increase the visibility of fog. But this has no influence on the efficiency of the application.

## Facts

Using our patented High Performance Fogging Tube, water-based fog liquids can be applied at rather high flow rates and in almost the same droplet quality as it was before only possible with oil-based fog liquids.

Fogging water-based fog liquids with our High Performance Fogging Tube is a cost saving, environmental friendly and efficient alternative compared to oil-based fog liquids.

Bernd L. Dietrich, Swingtec® GmbH

**\*Pesticide Application Methods, 3rd Edition, G.A. Matthews, Blackwell Science Ltd. 2000/UK, page 46**

**\*\*Pesticide Application Methods, 3rd Edition, G.A. Matthews, Blackwell Science Ltd. 2000/UK, page 87**