

## High pressure spraying for effective disinfection

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## High pressure spraying for effective disinfection

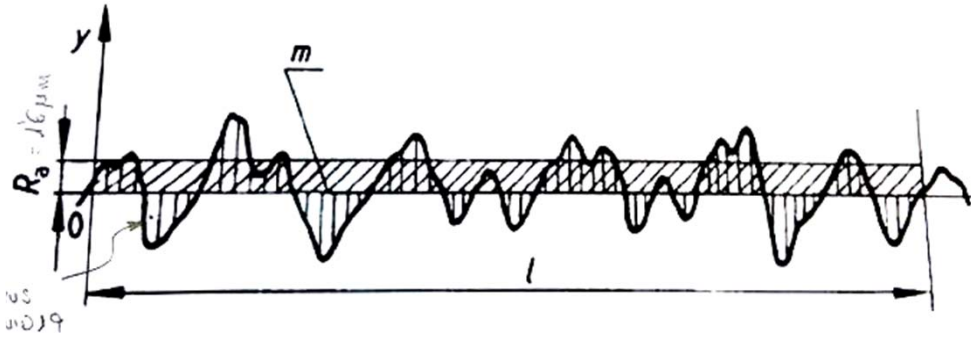


### DISINFECTANT AGENTS ACT EFFECTIVELY WHEN THE FOLLOWING REQUIREMENTS ARE MET:

- Droplets must have the right size to guarantee they interact long enough with the micro-organisms we want to eliminate. Additionally, they must be able to evaporate without the need of any hand drying.
- Droplets must be small enough to homogeneously cover the complete surface of the areas we want to disinfect, without producing excess humidity on surfaces and furniture.
- Droplets must be as small as possible to access the most inaccessible and hidden areas of objects, such as internal edges, angles, slits, etc. and guarantee disinfection. Low pressure spray, with large droplets, does not guarantee micro-organism are removed from hard to reach areas.

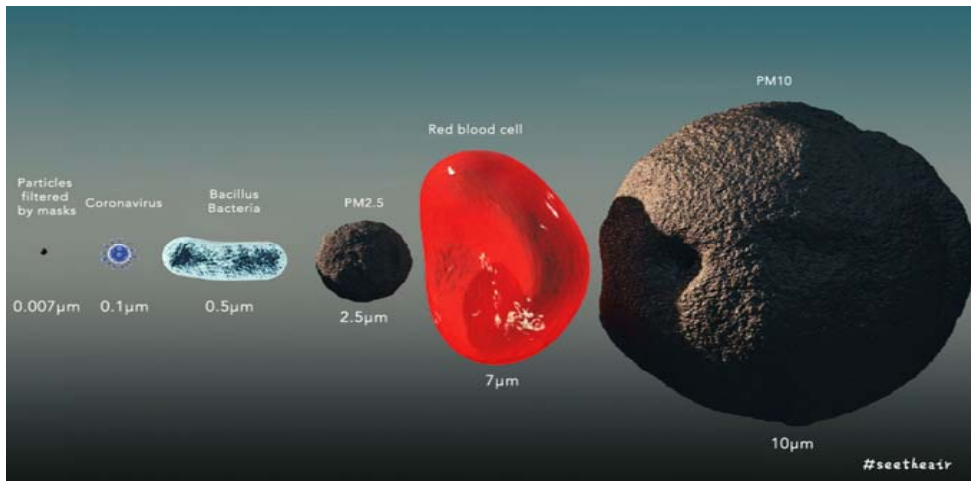
Considering that the size of COVID19 is barely 0.00012 mm, droplet size is very important.

# High pressure spraying for effective disinfection



Surface roughness  $R_a$ . In this example, a polished element, the surface roughness is  $R_a = 1.6$  microns

- All surfaces, even the smoothest ones, have a characteristic surface roughness that, in the case of polished metal surfaces, can be measured in thousandths of a millimeter.
- Due to its very small size, the coronavirus can remain lodged in the depth of the roughness valleys, thus escaping the action of the disinfectant if it is not applied correctly.

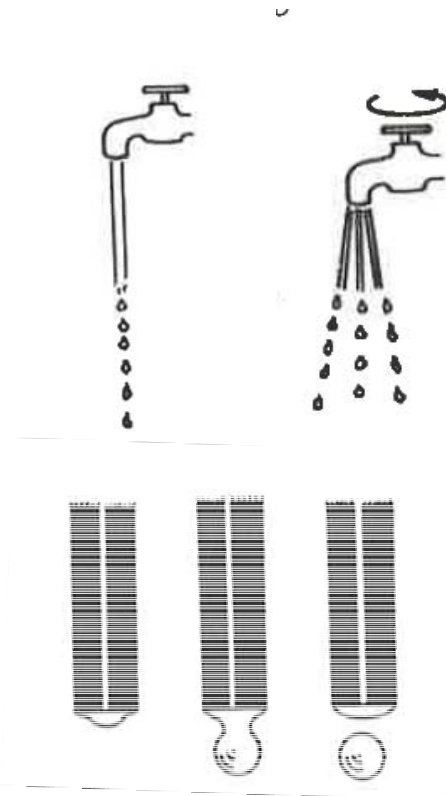


Relative dimensions. Covid-19 diameter is 0.00012 mm

**THEREFORE, IS ESSENTIAL FOR EFFECTIVE DISINFECTION TO COAT THE SURFACE TO BE TREATED WITH AN EVEN FOG WITH THE PROPER DROPLET SIZE**

## HOW DROPS ARE MADE (I)

- When you slightly open a water tap, a thin water stream appears. It remains stable for a certain distance before it breaks forming drops.
- If we open the tap a little more, drops form earlier.
- Therefore, if we increase the water speed at the tap outlet, we are also increasing the possibility of forming drops.
- Surface tension, a specific characteristic of the molecular structure of each liquid, can be assimilated to an internal cohesion force in the liquid that tends to minimize the surface of a fluid for a given volume.

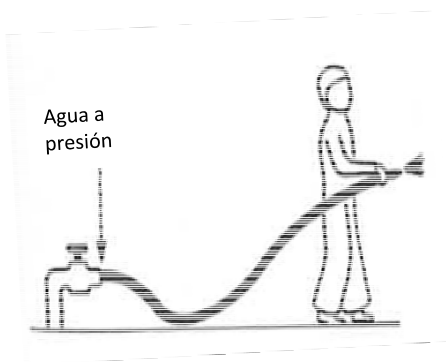


*Surface tension is responsible for the formation of drops at the dropper outlet.*



## HOW DROPS ARE MADE? (II)

- The water high surface tension causes that drops, are too large to penetrate the small surface roughness valleys present on all types of surface.



- Spray systems use the principle of the irrigation nozzle, making water under pressure to pass through a small section to give it speed and thus create turbulence and drops.
- It is necessary to provide the fluid with enough energy to pass through smaller sections and thus form smaller droplets. In high pressure spraying, this energy is provided with a high-pressure pump.

## High pressure spraying for effective disinfection



A FINE FOG MIST THAT UNIFORMLY COVERS ALL THE SURFACE, IS THE RIGHT WAY TO APPLY DISINFECTING AGENTS.

- Fine droplets, are only possible to get working with high pressure pumps (100 – 150 bar) able to achieve this efficiency and using very fine and robust nozzles, capable to withstand such pressures.
- The right fluid pressure and flow rate combination makes possible effective disinfection, with the maximum coverage and wide penetration in hard-to-reach areas.

## High pressure spraying for effective disinfection



### HAND SPRAYERS

- They are used to spray detergents, degreasers, pesticides, etc. The operating pressure obtained through the hand pump usually does not exceed 3 bar.
- The spray fan obtained is formed by relatively large particles, with a dimension in the order of tenths of a millimeter.
- It does not produce a fog effect. Fluid consumption is relatively high and requires subsequent hand drying.
- The required contact between the disinfectant and the organism to be combatted in the areas of most difficult access does not happen



These are suitable for washing, spraying fertilizers and pesticides, etc. **BUT NOT TO EFFECTIVELY APPLY DISINFECTING SOLUTIONS.**



## High pressure spraying for effective disinfection



### WASHING MACHINES / PRESSURE WASHERS

- These machines are adequate for washing, using large volumes and flow rates.
- Although some machines can reach high pressures, their spray nozzle tips are too large to break the fluid into drops that can produce a fog effect.



**THEY ARE SUITABLE MACHINES FOR WASHING AND DRAGGING WASTE, BUT NOT FOR UNIFORMLY COVERING A SURFACE WITH FINE DROPS ALLOWING THE DISINFECTANT TO ACT.**

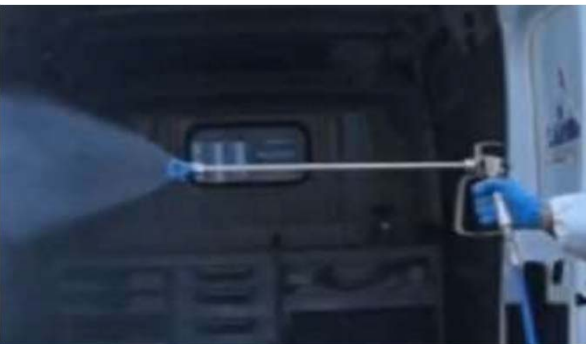


## High pressure spraying for effective disinfection



### SPRAYERS WITH HIGH PRESSURE PUMP

- When a high-pressure liquid passes through a very small orifice, it has enough energy to break into fine drops, causing high pressure atomization.
- High pressure spray technology allows to achieve the finest fluid atomization, creating a fog effect that uniformly covers the entire surface on which it is applied and reaches all types of hard-to-reach areas.



THESE SYSTEMS ALLOW TO REACH DROP SIZES WITH AN AVERAGE DIAMETER,  $D_{32}$ , BETWEEN 10 AND 25  $\mu\text{m}$  (0.010 and 0.025 mm).

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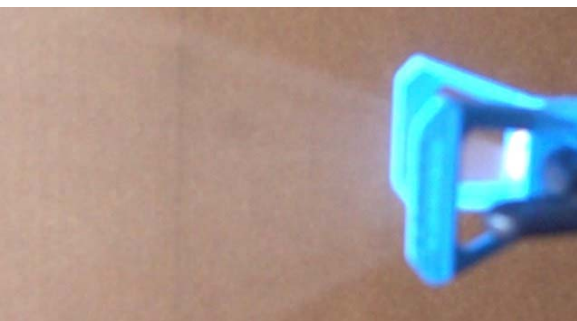


### HIGH PRESSURE PUMP SPRAYERS

- The droplet size obtained with very high-pressure spraying (100/150 bar), is considered as optimum to obtain the fog effect

### MINIMUM DIAMETER SPRAY TIPS, available in two sizes:

- 9 thousandths of an inch, equivalent to 0.23 mm in diameter, with a 40° fan angle, for a low flow fog type spray.
- 13 thousandths of an inch, equivalent to 0.33 mm in diameter with a 60° fan angle, for low flow mist spray.



### MINIMUM FLUID CONSUMPTION

- High pressure atomization contributes to the efficient use of the fluid. With 1 liter of liquid it is possible to disinfect a surface of 30m<sup>2</sup>, with delivery flow around 0.25 liters per minute, ensuring less drying time and less environmental pollution.

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### SPRAYING WITH HIGH PRESSURE PUMPS

- When disinfecting a surface, it is important to pay attention to the distance between the nozzle and the object as well as the time for applying the fluid.
- To avoid droplet bouncing back when hitting the surface and to get the fluid to cover it uniformly, droplets must arrive at optimum speed. This speed is achieved positioning the spray tip at a distance between 2 to 3 meters, depending on the surface characteristics.
- It is essential that the disinfectant film remains on the surface the necessary time (dwell time) to act on the organisms to be eliminated before it evaporates.
- The spray application rate is also very important. Special care must be paid both to cover the entire surface uniformly and to prevent the appearance of drop accumulations that would grow until they roll over the wall, losing effectiveness in disinfection.