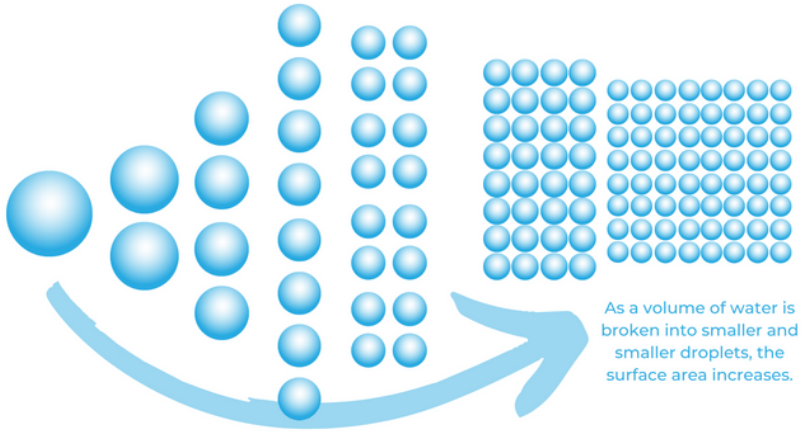
The Go-to People for
Spray Nozzle Solutions

NOZZLE KNOWLEDGE SERIES
ARTICLE 3: DROP SIZE

This is the third of eight technical notes from our Nozzle Knowledge series.

Drop size is a measure of surface area of the spray; the smaller the drop size, the bigger the surface area. And the bigger the surface area, the more heat transfer and chemical interaction.

Drop size is extremely important for many spray applications. But what factors affect drop size?



PRESSURE

Spraying at different pressures will generate different drop sizes.

The higher the pressure, the smaller the drop size and for any specific nozzle, this can be calculated using this formula

Drop Size Pressure Formula

$$\frac{D_1}{D_2} = \left(\frac{P_1}{P_2}\right)^{-0.3}$$

D1 = Drop size at pressure P1
D2 = Drop size at pressure P2

SPRAY PATTERN

There are four basic spray pattern types and here they are in order from biggest to smallest drop size.

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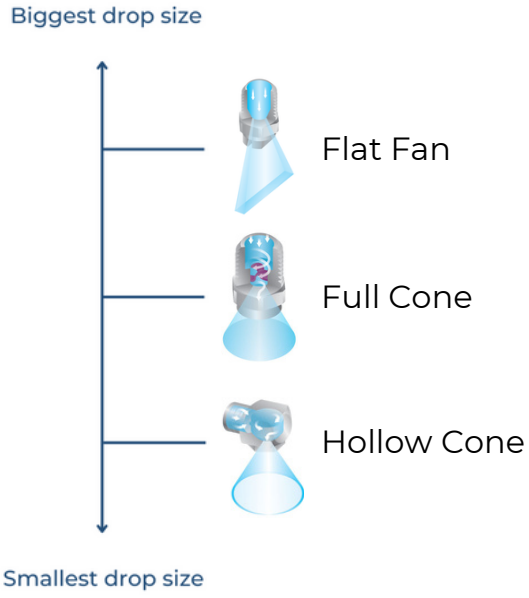
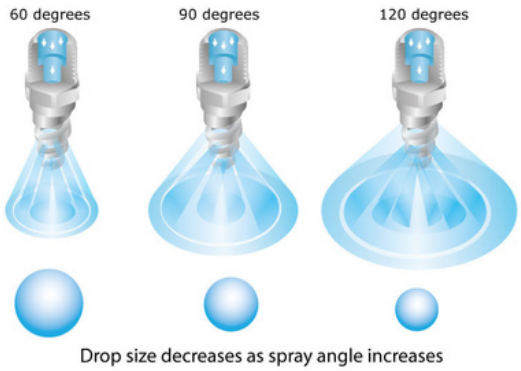


Solid Stream
NOT APPLICABLE

SPRAY ANGLE

Flat fans, full cones and hollow cones come in different spray angles, and the wider the spray angle, the smaller the drop size will be. However, there is a slight peculiarity: drop size tends to increase with some of the wider spray angles.

A 150 or 170 degree spiral nozzle, for example, has bigger drop sizes than a 90 degree nozzle of the same type.



Drop size decreases as spray angle increases

FLUID PROPERTIES

Basic drop size calculations will be calibrated for water, therefore different fluids will require the drop size to be adjusted.

Specific gravity of the fluid has an effect on drop size and this can be adjusted using this formula

Drop Size Specific Gravity Formula

$$D_f = D_w SG^{0.3}$$

Df = Drop size with viscosity SG
Dw = Drop size for water
SG = Specific gravity of liquid

The viscosity of the fluid can affect drop size and it can be calculated by using this formula

Drop Size Viscosity Formula

$$D_f = D_w V_f^{0.2}$$

Df = Drop size with viscosity Vf
Dw = Drop size for water
Vf = Viscosity

Surface tension is the other factor that can affect drop size and this can be calculated using this formula

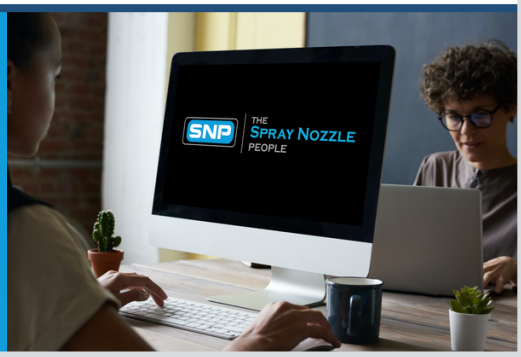
Drop Size Surface Tension Formula

$$D_f = D_w \left[\frac{S_t}{73}\right]^{0.5}$$

Df = Drop size with liquid surface tension St
Dw = Drop size for water
73 – Surface tension of water

At SNP, we have tools that can calculate all of this for you so please don't hesitate to get in touch.

ext article: Impact & Reach



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