Special twin-fluid nozzles for DeNOx applications

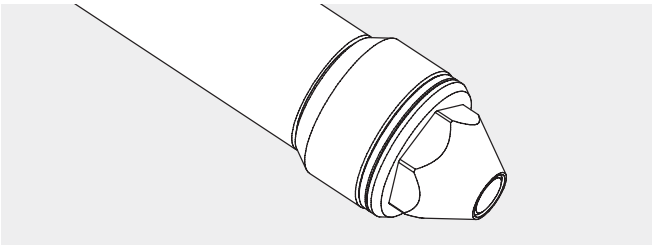
Laval nozzle

In DeNOx applications with SNCR processes, small Laval nozzles are usually used. These nozzles are characterized by a high discharge velocity, enabling the optimum droplet spectrum to be introduced into the reactor with a great penetration depth.

Our research has shown that the discharge velocity has a greater effect on the denitrification process. Moreover, these nozzles without internals are extremely insensitive to clogging and can be precisely controlled.

Special properties

- **Small spray angle** (15°), suitable for small cross-sections and horizontal ducts
- **Turn-down ratio** of 20:1 (in some cases up to 40:1)
- **Typical pressure range** Liquid 1–6 bar, g Atomizing air 1–6 bar, g
- **Very fine droplet spectrum**
- **Adjustment of the droplet spectrum** by changing the air/liquid ratio



Spray pattern of a Laval nozzle

For SCR processes and special SNCR processes there are special nozzles which have been developed to meet the specific requirements. The same principles regarding control and operation apply for all twin-fluid nozzles, irrespectively of the type.

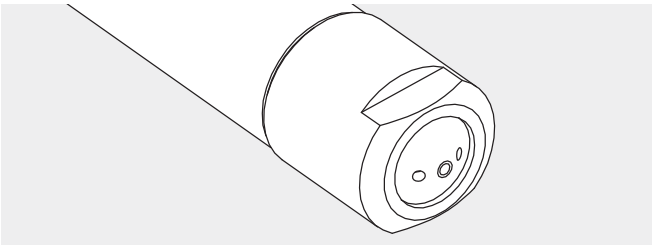
Laval flat fan nozzle

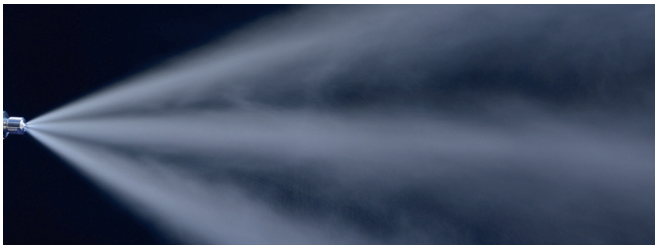
The Lechler Laval flat fan nozzle atomizes according to the principle of inside mixing. The air/fluid mixture exits via three outlet holes creating a wide and flat spray with an even better surface coverage.

The droplet spectrum and the pulse of the droplets can be adapted by changing the air/fluid ratio.

Special properties

- **Wide and flat jet,** spray angle 60°
- **Turn-down ratio** of over 10:1
- **Typical pressure range** Liquid 1–5 bar, g Atomizing air 1–5 bar, g
- **Spray alignment possible**
- **Adjustment of the droplet spectrum** by changing the air/liquid ratio





Spray pattern of a flat fan nozzle

Laval nozzles

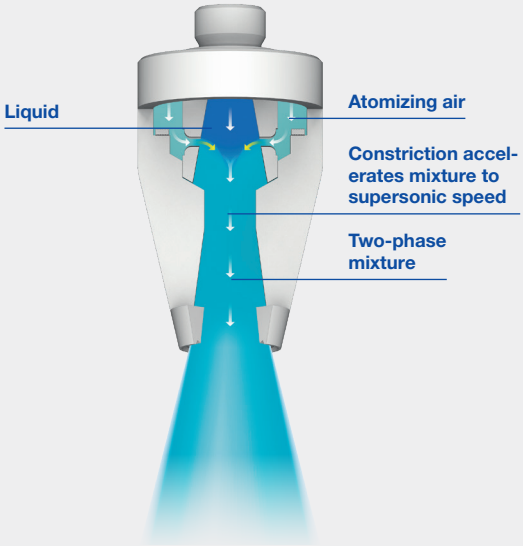
Twin-fluid nozzles for a wide droplet spectrum in special applications

Lechler Laval nozzles atomize liquids as a fine full cone. These twin-fluid nozzles work according to the supersonic principle.

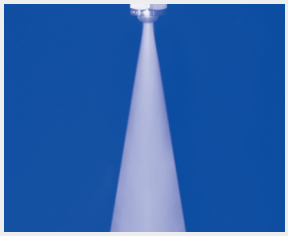
A dual-phase mixture is created from atomizing air and liquid in the mixing chamber inside the nozzle. The shape of the nozzle causes this mixture to be accelerated to supersonic speed, resulting in an extremely fine atomization of the droplets.

By changing the air/liquid ratio, the droplet size and the droplet spectrum can be adapted within a wide range. The large free cross sections of the nozzle also allow atomization of viscous or solids-laden liquids.

Choosing the right material prevents wear even where abrasive media are present, and enables use at high temperatures.



Scheme of the Laval nozzle

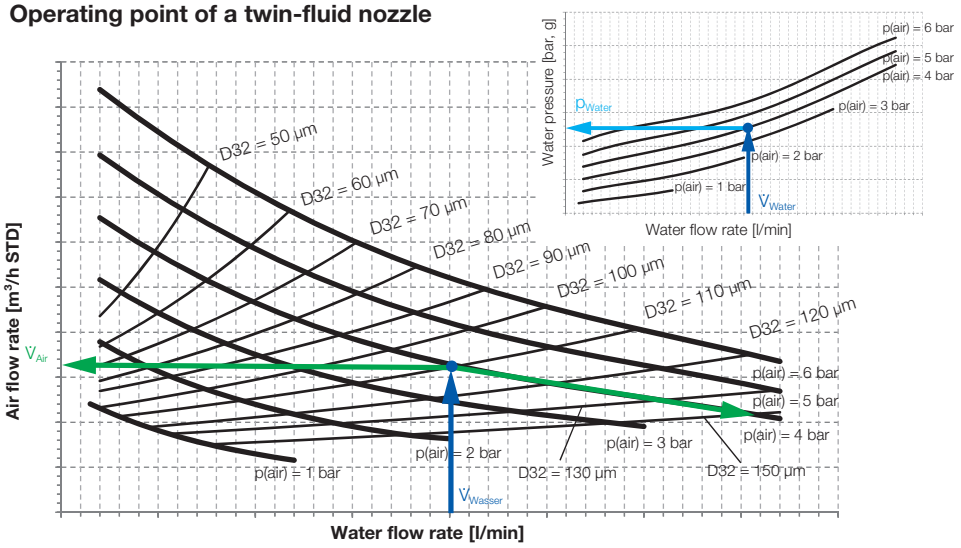


Spray pattern of the Laval nozzle

Use:

- Gas cooling in gas-bearing pipes (ducts) and medium-sized and small gas cooling towers
- Injection of solids-laden water
- Introduction of lime water in the desulfurization process
- Injection of aqueous ammonia or urea solution for the DeNOx process (SNCR/SCR)
- Chemical process engineering (spray dryers etc.)

Operating point of a twin-fluid nozzle



Properties

Small spray angle (15°), suitable for small cross-sections and horizontal ducts

Adjustment of the droplet spectrum by changing the air/fluid ratio

Clog-resistant thanks to large free cross-sections without internal fittings

Very large turn down ratio of 20:1 (in some cases up to 40:1)

Very fine droplet spectrum

Typical pressure range
Liquid 1–6 bar, g
Atomizing air 1–6 bar, g