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 denitification 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

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/liquid mixture exits via three outlet holes creating a wide and flat spray with an even better surface coverage.

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

Very fine droplet spectrum

Spray pattern of the flat fan nozzle
MasterNOx® for DeNOx processes

The Lechler MasterNOx® nozzles are usually used in the non-catalytic denitrification of flue gases (SNCR process). They are usually designed as flat fan nozzles and achieve a high spraying range to make the liquid penetrate as far as possible into the boiler. The nozzle specially developed for the retrofitting of existing power plants is characterized by a small outer diameter, so that it can fit between the pipes of the boiler wall. It can also have a protective flow of barrier air around it without the need for the pipes to be bent aside.

### Special properties

- **Spray angle**
  - 15°, 30°, 60°
- **Turn-down ratio**
  - of over 50:1
- **Typical pressure range**
  - Liquid 1-10 bar, g
  - Atomizing air 1-6 bar, g

### 1AW nozzle

The Lechler 1AW nozzle works according to a newly developed and patented atomization principle. It divides the supplied atomizing air into a primary and secondary air flow. Thanks to the specific inflow geometry, the secondary air exits through an annular gap causing a very fine atomization in the edge region of the spray.

This twin-fluid nozzle enables finest droplet spectra and shortest evaporation distances while also allowing very good controllability of the flow rate. Cluster heads designed specifically for these nozzles multiply the flow rates and adapt the spray pattern to the requirements at the point of injection.

### Single nozzle without barrier air

- Spray angle 15°; full cone

### Cluster head with three nozzles with barrier air

- Spray width approx. 55°, spray depth approx. 15°; flat fan

### Special properties

- **Spray angle of the individual nozzle**
  - 15° as full cone
- **Turn-down ratio**
  - of 10:1
- **Typical pressure range**
  - Liquid 1-5 bar, g
  - Atomizing air 1-5 bar, g
- Particularly fine droplets thanks to tertiary atomization
- Design as single or bundle nozzle lances
- Adjustment of the droplet spectrum by changing the air/ fluid ratio

### Spray pattern of the MasterNOx® nozzle 30°

### Spray pattern of the 1AW nozzle
Lechler nozzle lances -
Highest spraying accuracy in the flue gas duct

The robust, high-quality stainless steel construction ensures a high degree of functional reliability. Lances are available in a variety of material to suit specific process requirements.

Lechler nozzle lances are available with many options, including but not limited to:

- Protection tube to increase the service life in case of higher temperatures, high dust loads and aggressive gases, with barrier air as an option.
- Wedge flange, standard flange and special flange in accordance with customer requirements
- Guide rail to facilitate lance installation
- Shifting device to change the insertion length – with or without gastight sealing
- Expansion joint or stuffing box for expansion compensation at high temperatures
- Assembly connecting piece with flange connector for welding onto flue gas duct
- Further special customizations including wear protection, insulation, water cooling or coating
- Pre-assembled accessory kits for process media connections (e.g. quick release couplings, shut-off ball valves, strainers)

Lechler nozzle lances are manufactured in line with ultramodern production processes and according to the state of the art.

Connection options

Option 1: Quick release couplings
Option 2: Flange connector
Option 3: Conical screw connection

Spillback nozzles

Option 1: Single nozzle
Option 2: Cluster head with 3 to 6 single nozzles
Material

Lances are manufactured from stainless steel (316/316L) as standard, but depending on requirements can also be made of chemical and high-temperature resistant materials.

Accessories are available in galvanized steel or stainless steel and the hoses are available in rubber or stainless steel.

Flange connections

Option 1: Wedge
Option 2: Standard flange e.g. DIN, ANSI etc.
Option 3: Special flange according to customer specification

Talk to us

Each gas cooling tower and flue gas duct is different. Which is why standard solutions do not always make sense. Speak with us and let us work together to find the best solution for your purposes.

VarioJet® nozzle

Option 1: without protection tube and without protection cap
Option 2: with protection tube and with protection cap