

With today's standard diameters of up to 1,000 mm, bloom casters place significantly higher demands on cooling compared to smaller formats.

New steel grades and increasing format sizes are significantly more susceptible to cracking and demand much more homogeneous cooling with reduced water flow rates.

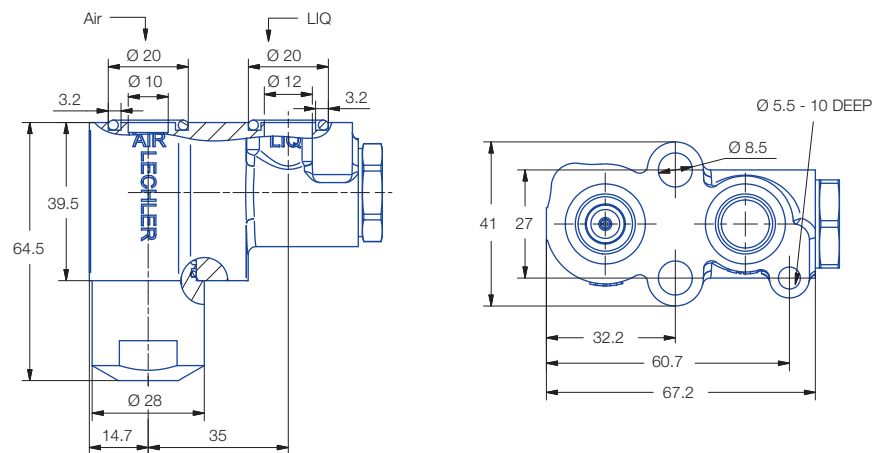
Secondary cooling in continuous casting machines for long products normally consists of several cooling zones. The nozzle arrangement is usually defined for a specific format range. In order to permit casting of different steel grades under these conditions, the nozzles themselves must have a wide operating window.

Conventional air-mist nozzles quickly reach their limits here. The degree of cooling is determined above all by the flow rate of the cooling water, which is adjusted by means of the water pressure. In the past, however, the spray geometry usually also changed with the water pressure.

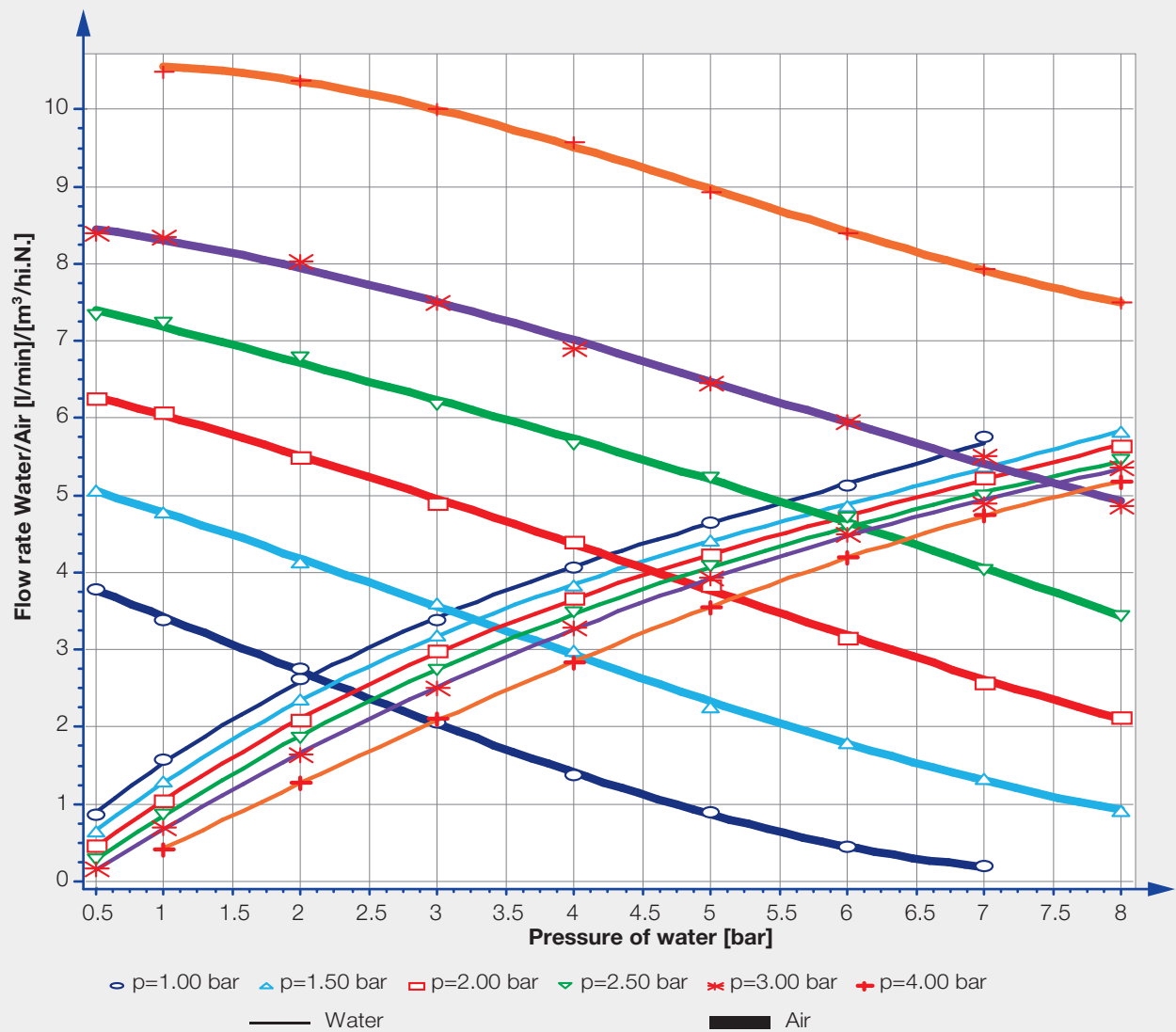
A changed spray angle led to a change in the liquid distribution – and thus to non-uniform cooling.

On newer bloom formats with larger cross section in particular, this can result in surface stresses and even cracks in the finished product.

Our goal was therefore to develop a nozzle that guarantees a stable spray angle over the entire turn-down ratio, thereby ensuring optimum cooling.



For detailed information and feature videos, please refer to www.billetcooler-flex.com



Typical pressure-flow rate diagram of a **Billetcooler FLEX®** nozzle. The large turn-down ratio of 1:10 (0.5 to 5 l/min) can be clearly seen in the lower curves for water.

The adjacent figure demonstrates the flexibility of the new **Billetcooler FLEX®**. For an example nozzle size, the excerpt shows the adjustable liquid distributions as a function of the flow rates with indication of the respective air pressures.

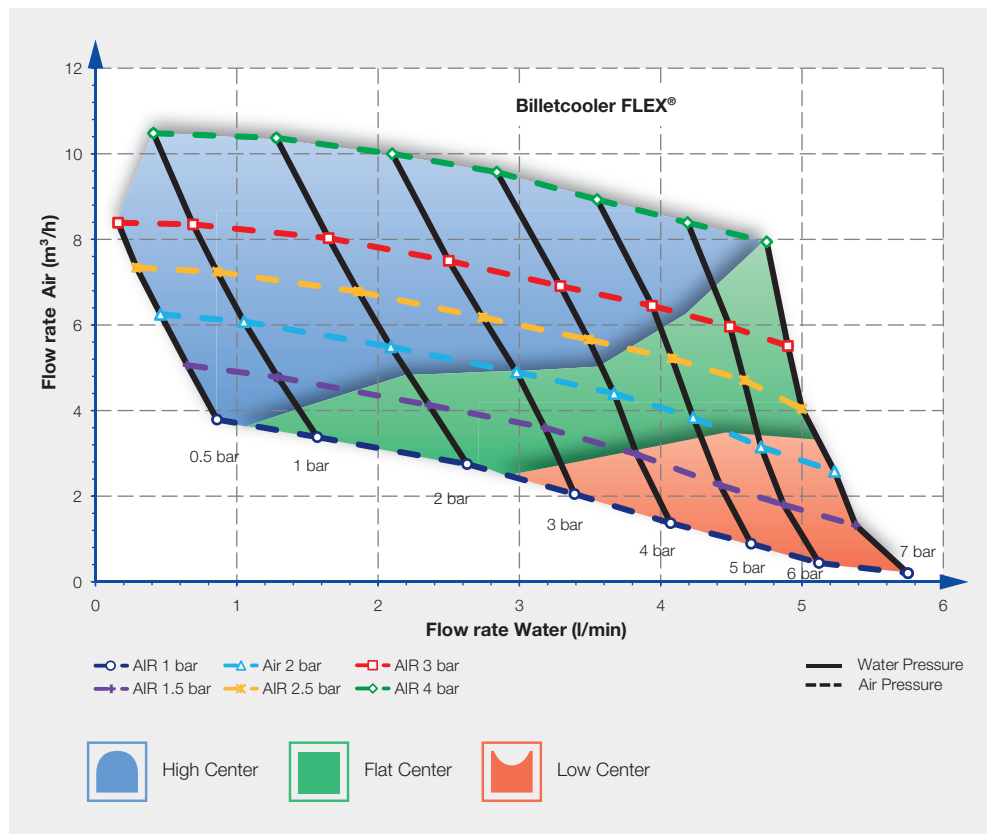
The liquid distribution can be controlled by appropriate selection of the air pressures for comparable water flow rates. As described on the previous page, this allows the local cooling to be adapted to the process-specific requirements.

It is possible to easily see from the diagram how a large operating range can be covered with varying air and water supply pressures.

The colored areas represent the different spray characteristics of the nozzle.

In the blue area (High Center), the liquid distribution is centered and decreases towards the edge of the spray.

The green area (Flat Center) is characterized by homogeneous liquid distribution, while the spray characteristic in the red area (Low Center) is similar to a hollow cone nozzle with ring-shaped distribution.



Typical flow distribution chart of a **Billetcooler FLEX®**

Flexible water flow rate – stable spray angle

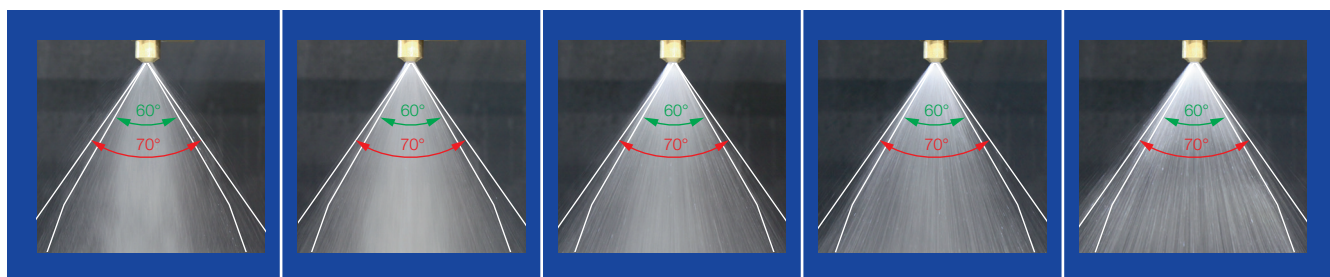
The new **Billetcooler FLEX®** nozzle is characterized by its constant spray angle over the entire turn-down range.

We offer three different nozzle sizes, each with a turn-down ratio (min./max. water flow rate) of 1:10.

Lechler therefore covers the requirements of most bloom and billet casters with just three standard nozzles.

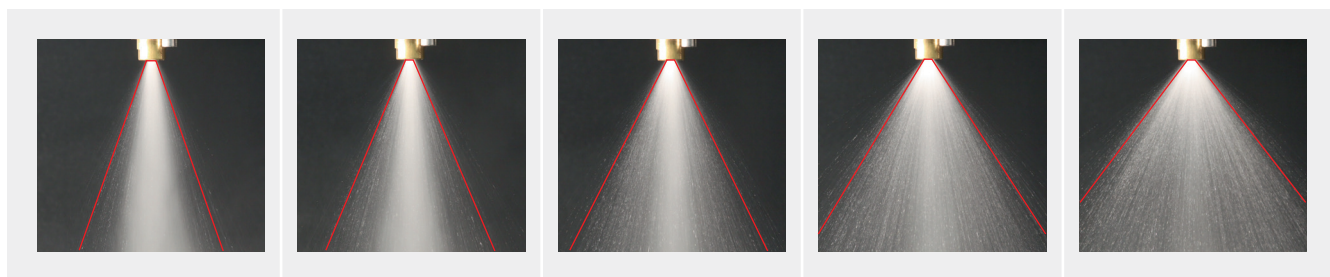
This minimizes the number of different nozzles, reduces logistics costs and helps to avoid maintenance mistakes.

BILLETCOOLER FLEX



Typical example for 60° version


Conventional nozzle



0.5 bar	1 bar	3 bar	5 bar	7 bar
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At varying water pressures and with a constant air pressure of 2 bar, the spray coverage of the **Billetcooler FLEX®** (top row) is much more homogeneous than with conventional nozzles (bottom row).

Technical specifications

Spray angle 	Type	Nozzle size	Min. water flow rate [l/min]	Max. water flow rate [l/min]	Narrowest free cross-section [mm]		Material		Weight
					Water	Air	Nozzle	Gasket	
45°	1PM.150.30.33	0.80	0.3	3.0	1.40	1.40	Brass	Viton	0.9 kg
	1PM.150.30.35	1.25	0.5	5.0	1.90	1.90	Brass	Viton	0.9 kg
	1PM.150.30.38	2.00	0.8	8.0	2.15	2.15	Brass	Viton	0.9 kg
60°	1PM.150.30.03	0.80	0.3	3.0	1.35	1.35	Brass	Viton	0.9 kg
	1PM.150.30.05	1.25	0.5	5.0	1.90	1.90	Brass	Viton	0.9 kg
	1PM.150.30.08	2.00	0.8	8.0	2.20	2.15	Brass	Viton	0.9 kg



For feature videos, please refer to
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BILLETCOOLER FLEX® – advantages and benefits

Stable spray angle

The **Billetcooler FLEX®** is characterized by its constant spray angle over the entire turn-down range.

➡ No strand overcooling or undercooling

Flexible cooling

With **Billetcooler FLEX®**, the water distribution can be individually adjusted for different formats.

➡ Optimum cooling guaranteed at all times

Large free cross-sections

Blockage-resistant and maintenance-friendly thanks to very large free cross-sections for air and water.

➡ High operating reliability

New design

All nozzle variants of the **Billetcooler FLEX®** have a forged, space- and weight-saving nozzle body.

➡ Maintenance-friendly design

Lower air consumption

Thanks to the new nozzle design, the **Billetcooler FLEX®** requires less compressed air than simpler air-mist nozzle designs and therefore helps to improve the energy efficiency of the overall installation.

➡ Saves operating costs

Low noise emissions

Compared with conventional nozzles for secondary cooling, the **Billetcooler FLEX®** reduces noise emissions by up to 15 dB.

➡ Improved work safety



For detailed information and feature videos, please refer to www.billetcooler-flex.com