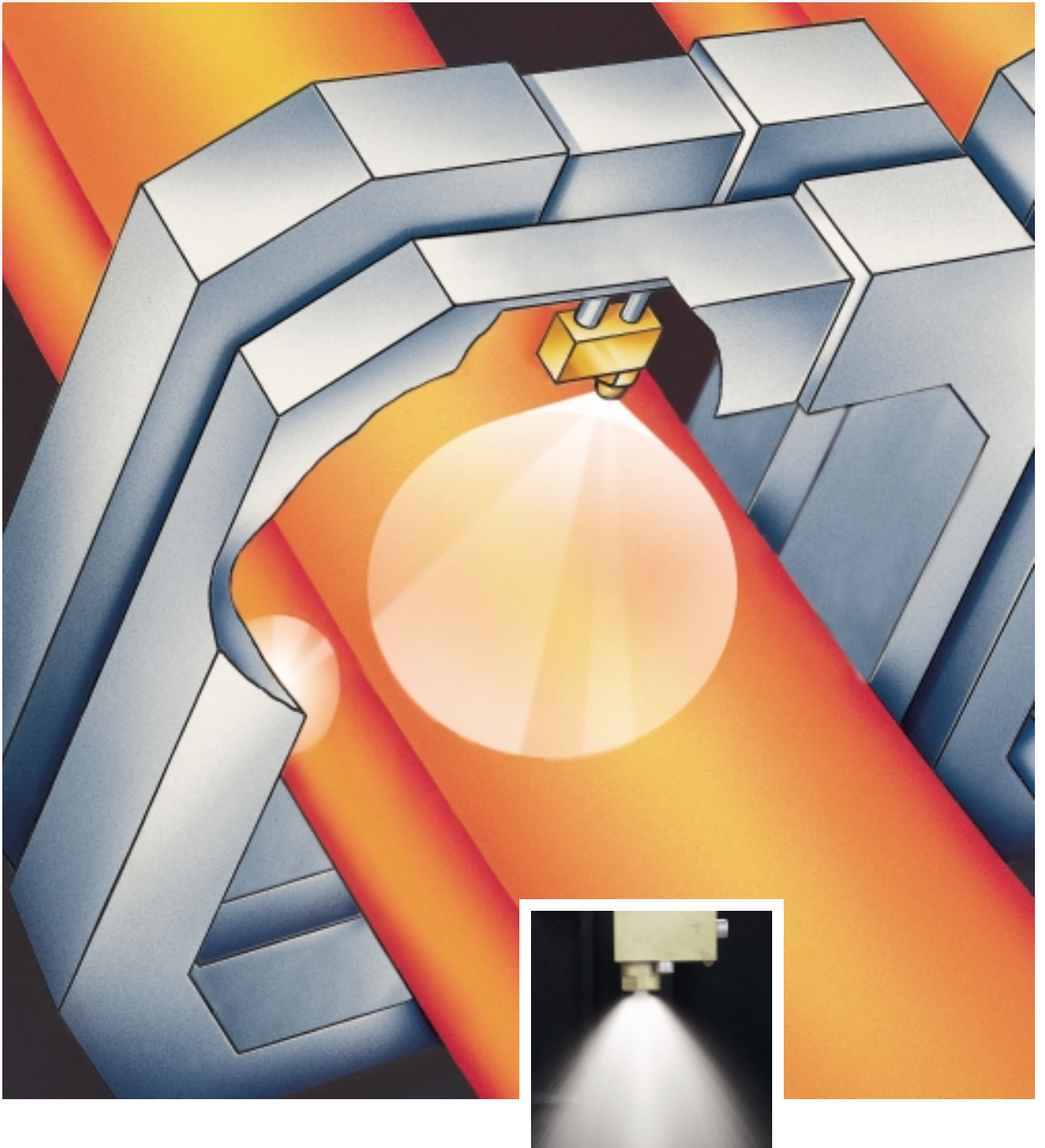




BilletCooler

Air Mist Nozzle for Billet and Bloom Casters



BilletCooler

The latest air mist technology and user benefits

The problem

When air mist cooling becomes necessary for a billet or bloom caster flat jet nozzles may not always be the best choice. This is especially true where the formation of Halfway Cracks is experienced. This type of cracks have shown to be caused by reheating of the surface of the strand after it has passed the sharp heat extraction zone beneath a spray jet. During this reheating process the surface expands and imposes a tensile strain on the interior, hotter and hence weaker regions of the solid shell which then can crack. The use of flat jet nozzles intensifies this effect.

Full cone or oval cone nozzles would provide a softer cooling over an extended surface area. These two spray patterns are the standard for single fluid water secondary cooling systems, however there has unfortunately not been an adequate version using air mist. Common full cone air mist nozzles show quite unstable spray performances, very high air consumptions and a tendency to clog very easily.

Oval cone air mist nozzles are often rather flat jet nozzles with multi slot orifices. Non uniform spray patterns and the very thin, easy to clog slots, also made these nozzles barely more than a compromise.

The solution

BilletCooler full or oval cone air mist nozzles

With this new nozzle generation it is now possible to utilise air mist cooling also in billet and bloom casters as effectively as in slab casters. The compact block design allows mounting either on horizontal spray rings but also on vertical nozzle headers. Turn down ratios as wide as 1 : 14 have been achieved at water pressures between 1,0 and 10 bar at 2 bar air constant.

Nominal spray angles for circular full cone nozzles range between 60° and 90°. The maximum spray coverage of the oval cone version is 90° x 60°.

Free passages approximately three times larger than before makes the BilletCooler a real non clogging nozzle.

Patent application pending.

The application

- Billet and bloom casters for higher steel grades such as stainless steels, special spring steel, tire cord steels etc. require more sophisticated cooling systems with higher turn down ratios and often smaller flow rates than hydraulic water nozzles can offer.
- Narrow face cooling in slab casters in the foot roll / top zone segment.
- Wide face cooling in slab casters with support grids in the top zone below the mould.

The benefits

- High turn-down ratio (min./max. flow rate) 1:10 (max. 1:14) for high flexibility and extended product (steel grade) mix. Reduces the number of different nozzle types in the machine.
- Compressed air consumption reduced by appr. 40% for low investment & operation costs
- High Heat Transfer Coefficient (HTC) for high casting speeds
- Compact design ideal for spray rings and vertical headers.
- Plate connection for easy and maintenance friendly mounting.
- Large free passages prevent clogging for high operation safety with improved plant availability.

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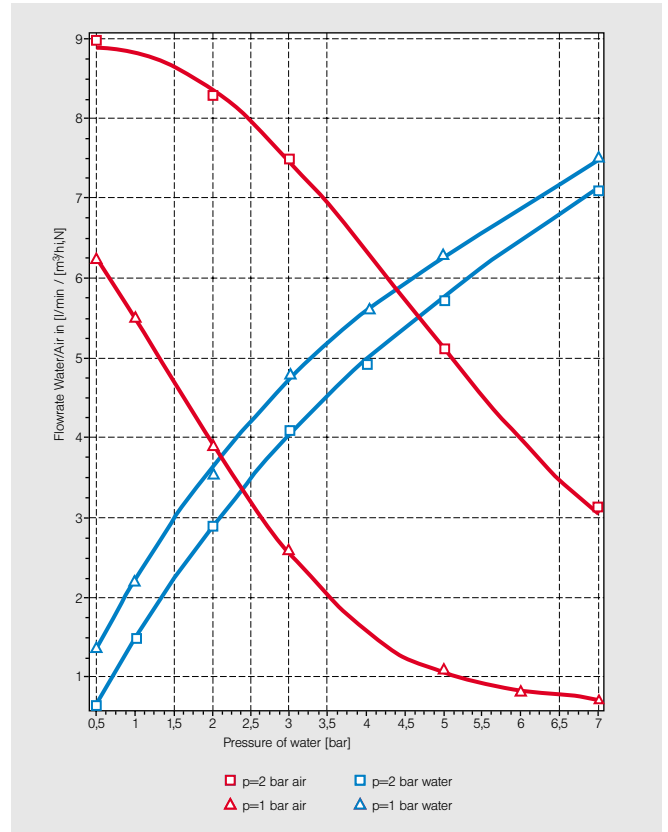
Technical data



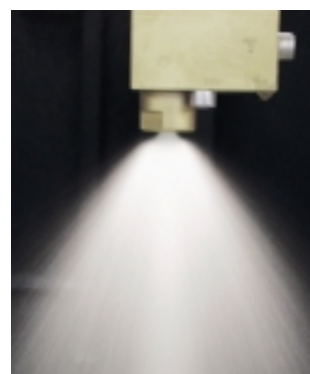
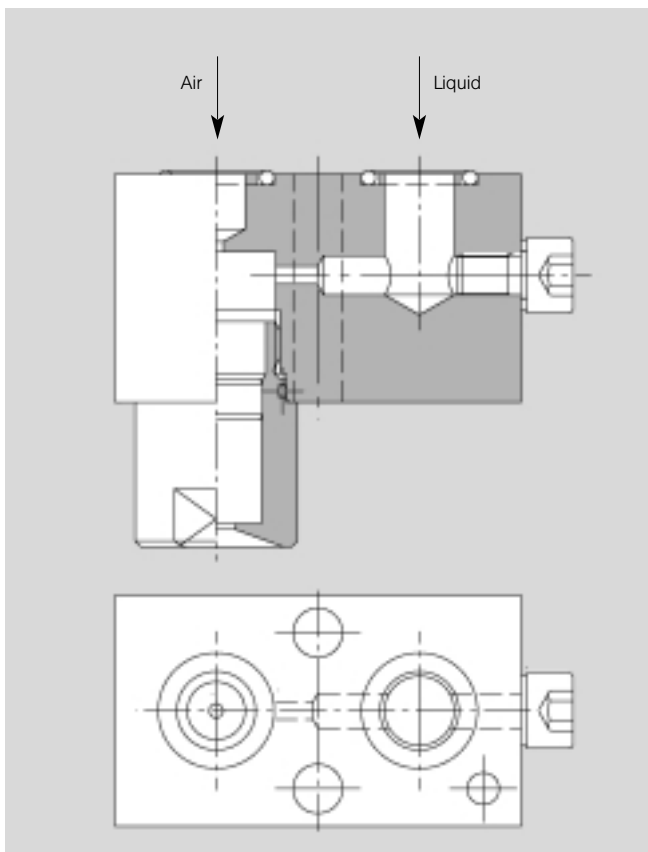
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Spray patterns	Circular full cone and oval full cone
Spray angle	Circular full cone: 60° (max. 90°) Oval full cone: max. 90° x max. 60°
Flow rates	Min. size: 0,5 l/min at 0,5 bar and 3,0 l/min at 7 bar and 2 bar constant air pressure Max. size: 1,0 l/min at 0,5 bar and 10 l/min at 7 bar and 2 bar constant air pressure
Free passage	Min. size: air and water 1,0 mm Max. size: air and water 3,0 mm
Material	Brass (SS on request)
Max. turn down ratio	1: 10



Pressure-flowrate-diagram



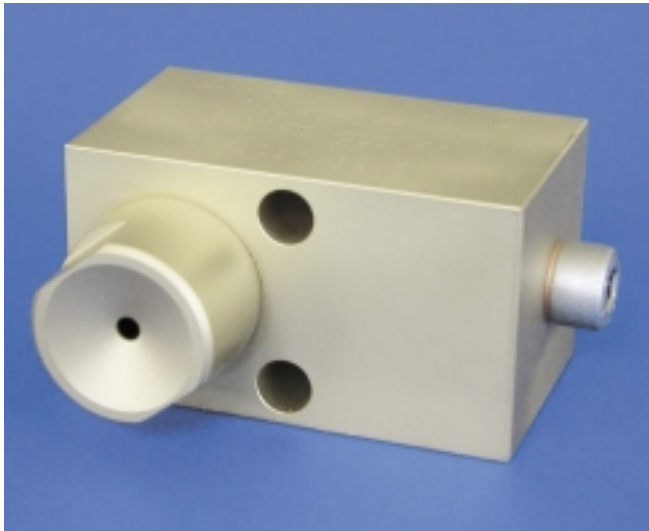
Spray cone at 7 bar water and 2 bar air

BilletCooler Liquid distribution

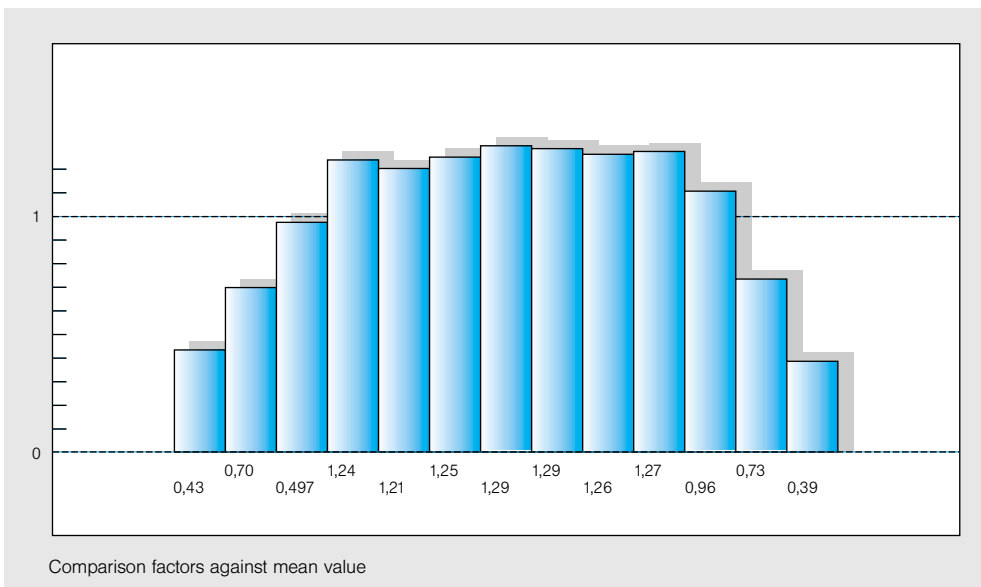


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Liquid distribution at a water flow of 7 l/min at 7 bar water and 2 bar air

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