Blue Air SYSTEMS

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CAC – Super cooled blowing air, for 15-62% increased productivity with amazing payback times

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The Advantage in Plastics Technology

Blue Air offers the innovative technologies to make plastics processing as easy and efficient as possible.

Auxiliaries for the plastics processing industry with emphasis on **drying and cooling** applications

Solutions for Plastics Processing

Drying

Mold Area Dehumidification

Cooling

Internal Product Cooling

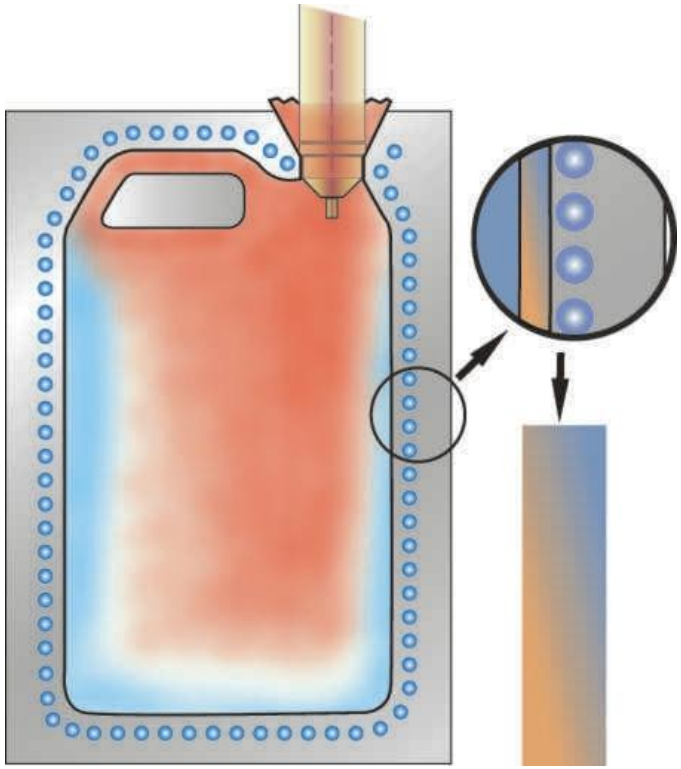
Water Chiller

Internal Product Cooling CAC

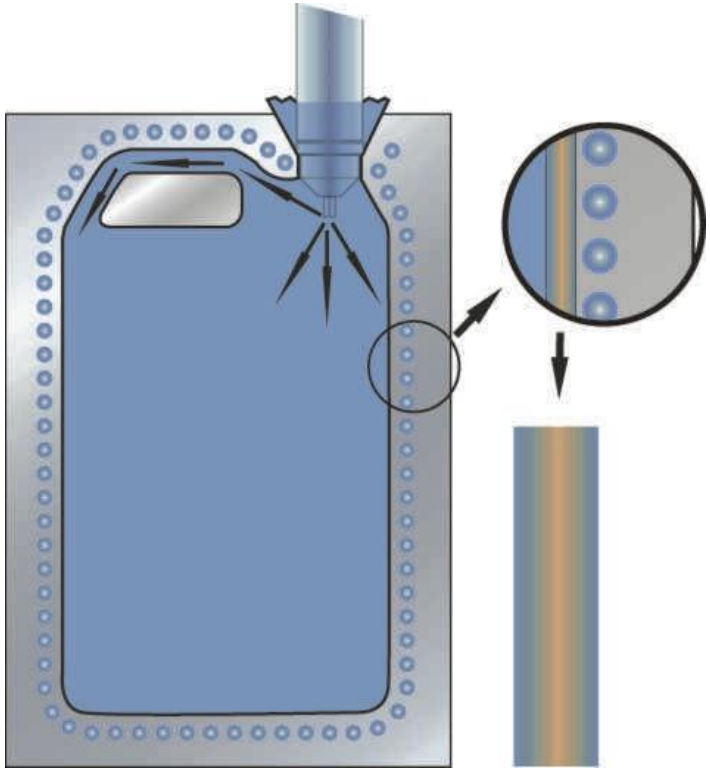
Extrusion Blow Molding with Chilled Compressed Air

Internal Product Cooling CAC

Extrusion Blow Molding with Chilled Compressed Air



Blowing process with **normal air**



Blowing process with **chilled compressed air**

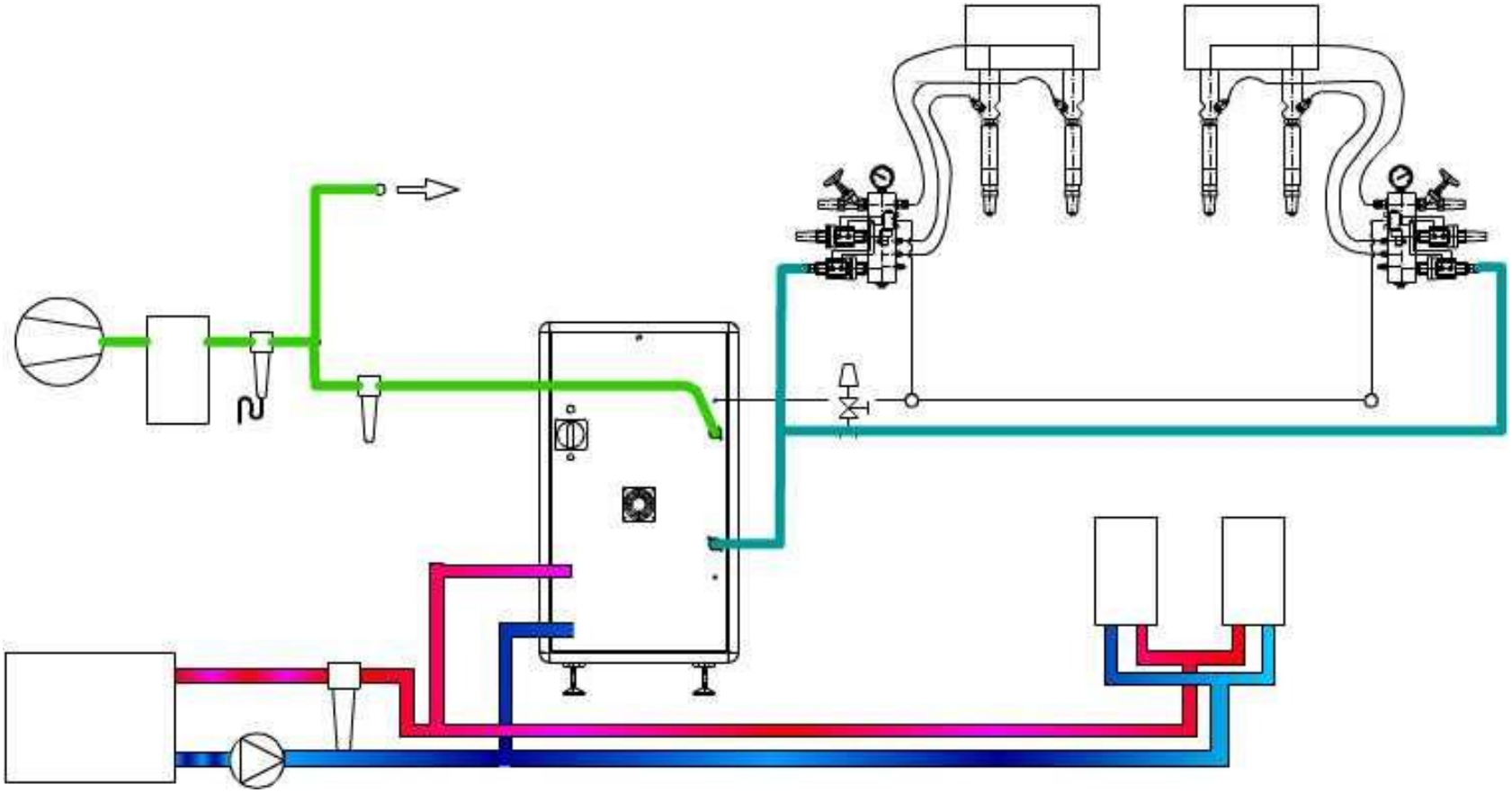
Internal Product Cooling CAC

Advantages of the CAC-System

- Quality increases due to specific and intensive heat removal from the inside
- Production increases up to 50% (depending on the product)
- Quick return on investment between 1 month and 1 year
- Suitable for virtually all blow molding machines
- Low energy consumption and maitenance expenses
- Easy integration with fully automatic operation
- CFC - free system

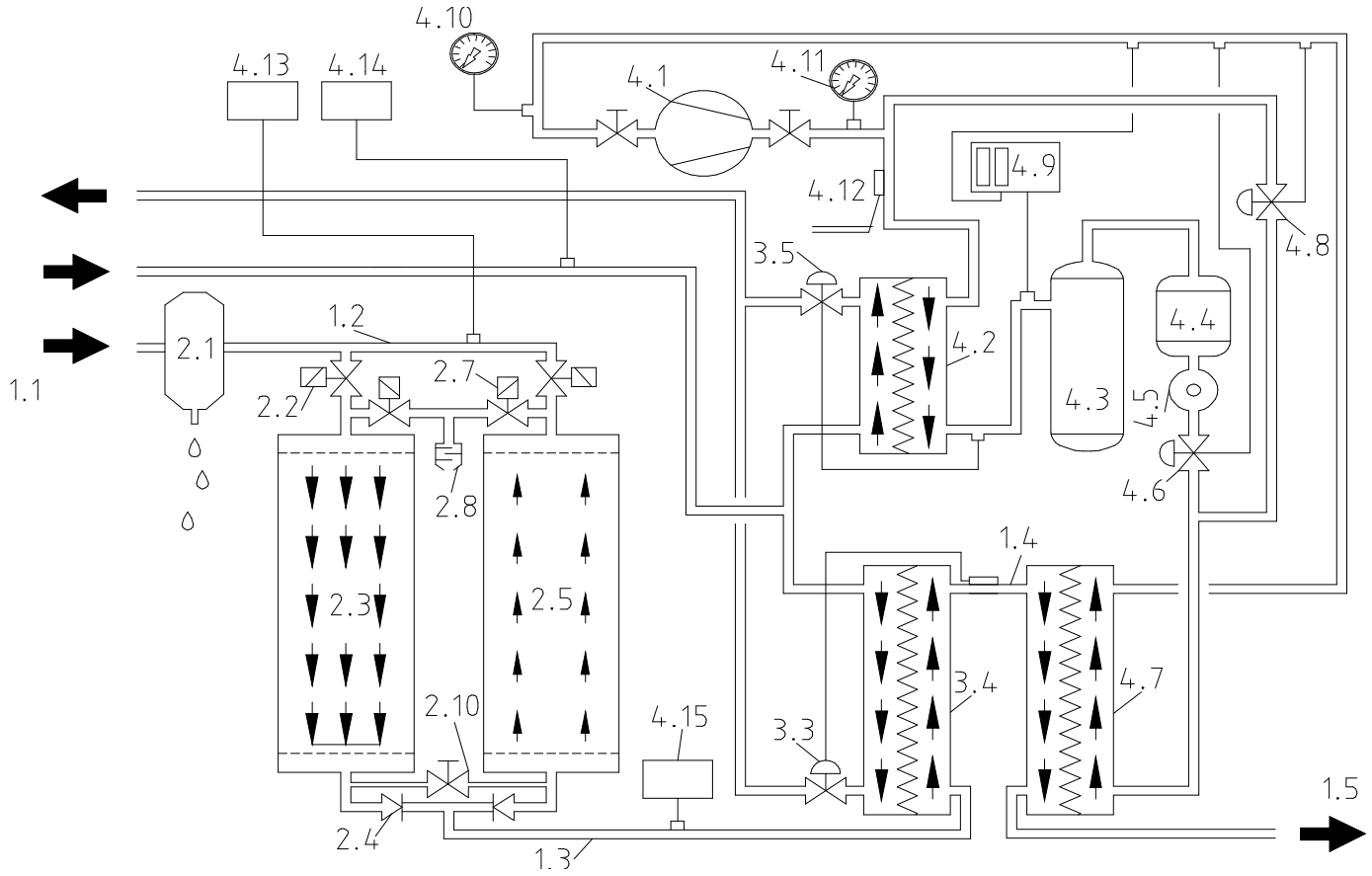
Internal Product Cooling CAC

Operating Principle



Internal Product Cooling CAC

Operating Principle



Internal Product Cooling CAC

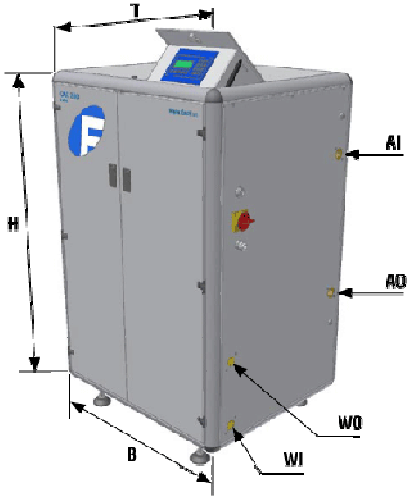
Operating Principle

“Pre-dried” compressed air **(1.1)** is supplied to the CAC unit at a pressure of 6 - 10 bar. The compressed air is then filtered, dried and cooled. The pre-filter and liquid separator **(2.1)** removes dust particles and liquid, which might be delivered with the compressed air, and is responsible for the purity of the compressed air entering the unit **(1.2)**. The flow of compressed air entering is diverted by a solenoid valve **(2.2)** to the adsorber **(2.3)** and passes the desiccant bed, which adsorbs the vapor contained in the compressed air, thus drying it. The dried air (1.3) then passes through the check valve **(2.4)** and leaves the drier for the pre-cooler **(3.4)**. Simultaneously a small amount of the dried air is branched off from the drier outlet, expanded to atmospheric pressure by a small choke valve **(2.10)** and then flows through the desiccant **(2.5)** removing the previously adsorbed moisture. The purged air is discharged inside the unit`s housing through a solenoid valve **(2.7)** and the silencer **(2.8)** and is being used to cool the compressor. The filtered and dried compressed air **(1.3)** is cooled in two stages and two different heat exchangers. The first stage takes place in an air/water heat exchanger **(3.4)**. Low temperature chilled water is pumped into the inlet of the cooler **(3.1)**. The chilled water runs through a water coil against the direction of the air flow, extracts a large amount of the heat contained in the compressed air and leaves the heat exchanger and the unit through the chilled water outlet **(3.6)** returning to the plant´s chiller system. An automatic regulating valve **(3.3)** controls the chilled water and prevents unnecessary flow of water. A similar heat exchanger [evaporator **(4.7)**] cools the air in the second cooling stage but now refrigerant (R404a) is used to cool the air instead of chilled water. A robust and reliable refrigeration circuit is incorporated in the CAC unit. The refrigeration compressor **(4.1)** compresses the refrigerant in a condenser **(4.2)** raising the refrigerant`s temperature. Through the automatically controlled valve **(3.5)** chilled water runs through the condenser to cool the refrigerant. The cooled and condensed refrigerant is then stored in a liquid receiver **(4.3)**. The refrigerant enters the evaporator **(4.7)**, passing through a filter-drier **(4.4)**, the sight glass **(4.5)** and the automatically controlled expansion valve **(4.6)**. Due to it`s expansion the refrigerant`s temperature drops in the evaporator **(4.7)**. The refrigerant now flows against the direction of the air flow, extracts a major portion of the remaining heat from the compressed air and returns at low pressure to the compressor. A cooling capacity regulating valve **(4.8)** controls the cooling capacity of the refrigeration circuit, thus preventing the evaporation temperature in the cooling coil of the evaporator **(4.7)** to drop below -40°C (-40°F). After the second stage of the cooling, the compressed air exits at a temperature of appr. -35°C (-31°F). Two thermostats **(4.12)** control the temperature range of the hot gas thereby regulating the unit`s capacity. If the safe temperature range is exceeded either one of the thermostats stops the cooling compressor. A dew point meter **(4.15)** controls the humidity of the compressed air after drying and alarms the operator if the vapor content is too high, thereby preventing freezing of the evaporator.

Compressed Air Chiller - CAC

Type		CAC-120 SA	CAC-180 SA	CAC-240 SA	CAC-360 SA	CAC-540 SA	CAC-720 SA
Nominal air flow	Nm3/h [cfm]	120 [70]	180 [105]	240 [140]	360 [210]	540 [315]	720 [420]
Minimal air flow*	Nm3/h [cfm]	80 [47]	120 [70]	160 [94]	240 [140]	360 [210]	480 [280]
Max. operating pressure**	bar [psi]	10 [145]	10 [145]	10 [145]	10 [145]	10 [145]	10 [145]
Power consumption***	kW [HP]	2.2 [3.0]	3.0 [4.0]	4.5 [6.1]	6.1 [7.9]	8.5 [11.4]	10 [13.6]
Required cooling capacity****	kW [US tons]	5.0 [1.4]	7.6 [2.2]	10.1 [2.9]	15.2 [4.3]	23.0 [6.6]	30.4 [8.7]
Compressed air outlet temperature	°C [°F]	-35 [-31]	-35 [-31]	-35 [-31]	-35 [-31]	-35 [-31]	-35 [-31]
Compressed air inlet [AI]		G 1"	G 1"	G 1"	G 1 ½"	G 1 ½"	G 2"
Compressed air outlet [AO]		G 1"	G 1"	G 1"	G 1 ½"	G 1 ½"	G 2"
Chilled water inlet [WI]		G ½"	G ½"	G ½"	G ½"	G ½"	G ¾"
Chilled water outlet [WO]		G ½"	G ½"	G ½"	G ½"	G ½"	G ¾"
Width [B]	mm [inch]	870 [34 ¼]	870 [34 ¼]	870 [34 ¼]	1330 [52 ⅓]	1330 [52 ⅓]	1280 [50 ⅜]
Depth [T]	mm [inch]	750 [29 ½]	750 [29 ½]	750 [29 ½]	860 [33 ⅞]	860 [33 ⅞]	1280 [50 ⅜]
Height [H]	mm [inch]	1160 [45 ⅝]	1160 [45 ⅝]	1400 [55 ⅛]	1500 [59]	1900 [77 ⅞]	1900 [77 ⅞]
Weight	kg [lbs]	277 [610]	344 [760]	454 [1000]	580 [1280]	800 [1985]	1200 [2650]

* Adjustment by service technician necessary ** Special models to 15 bar [218 psi] on request. *** Electrical power consumption is: assoc on a standard voltage of 3x400V 50Hz. **** Chilled water load based on air inlet temperature of 35°C [95°F]



- Required compressed air quality: ISO 8573.1
- Residual oil: (Kl. 1) 0.01 mg/m³
- Residual moisture: (Kl. 5) 7°C [45°F] pressure dew point
- Residual dust: (Kl. 2) 1 µm or 1mg/m³
- Chilled water pressure drop: 2 bar [29 psi]
- Chilled water pressure: min. 2 bar [29 psi], max. 10 bar [145 psi]
- Air pressure: 6 bar [87 psi] - 15 bar [218 psi]
- Chilled water temperature: max. 15°C [59°F], min. 2°C [36°F]
- Standard voltages: 3x400V, 50 Hz - 3x460V, 60 HZ (other voltages upon request)

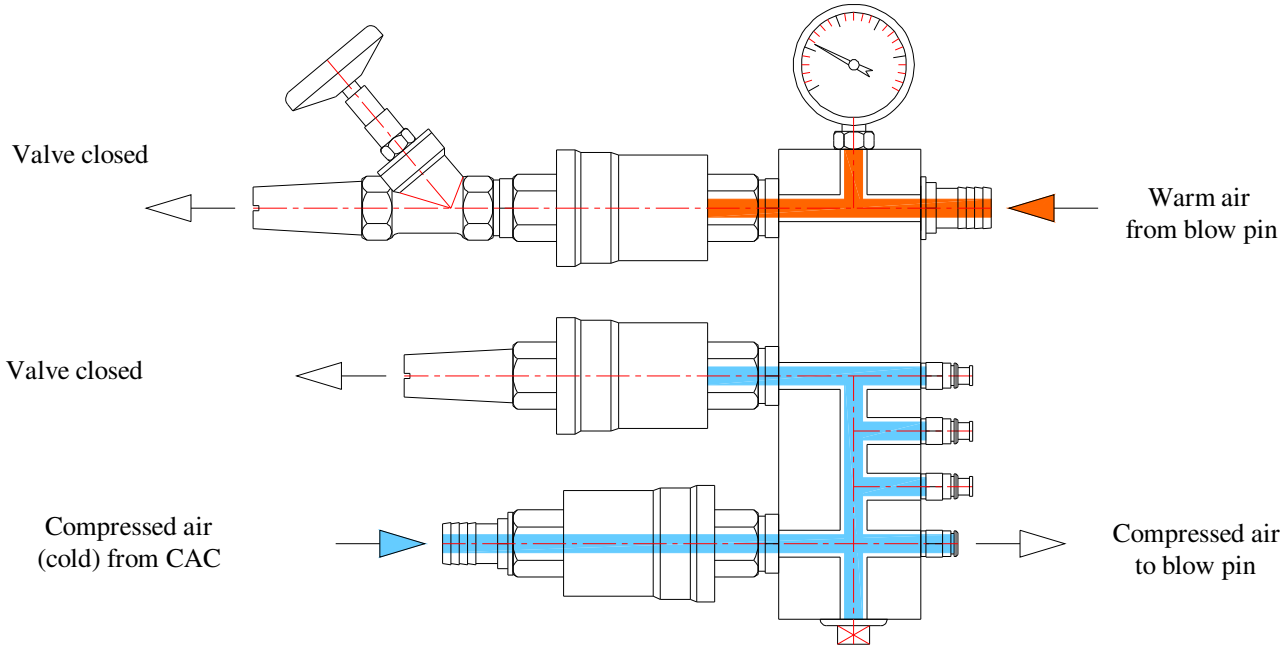
Internal Product Cooling CAC

Blowing Valve Block

Internal Product Cooling CAC

Pressurising and Continuous Blowing („D“)

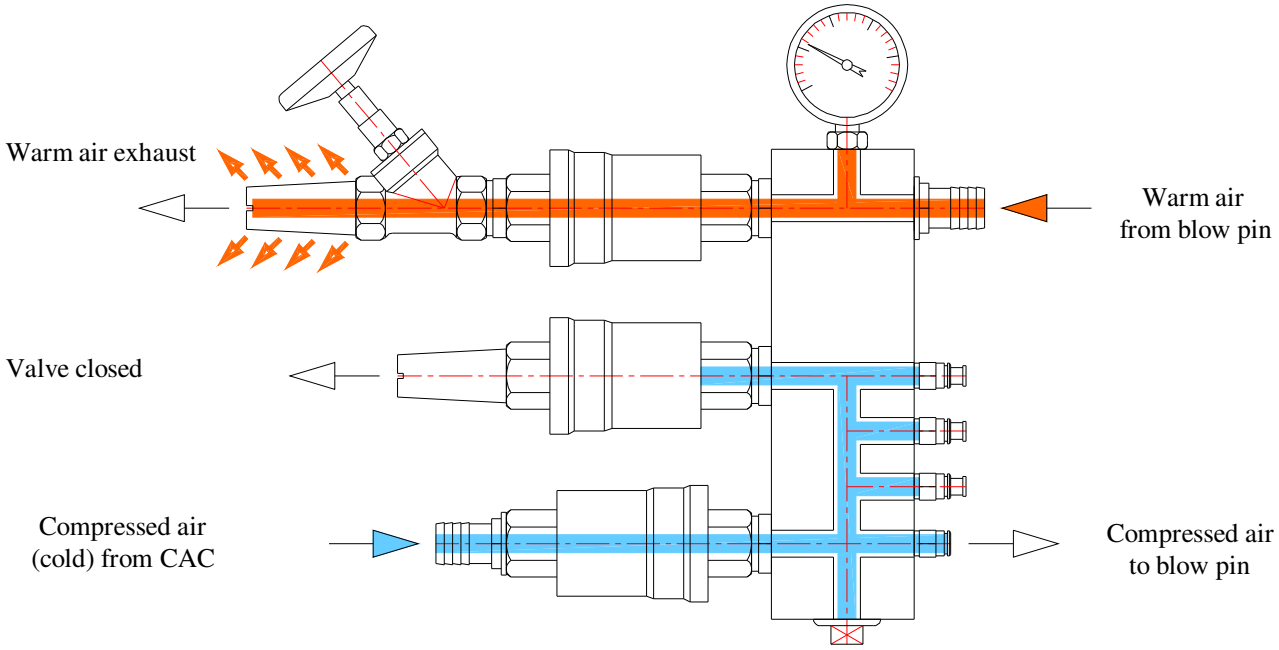
Step 1: Cold compressed air is inflating the product



Internal Product Cooling CAC

Pressurising and Continuous Blowing („D“)

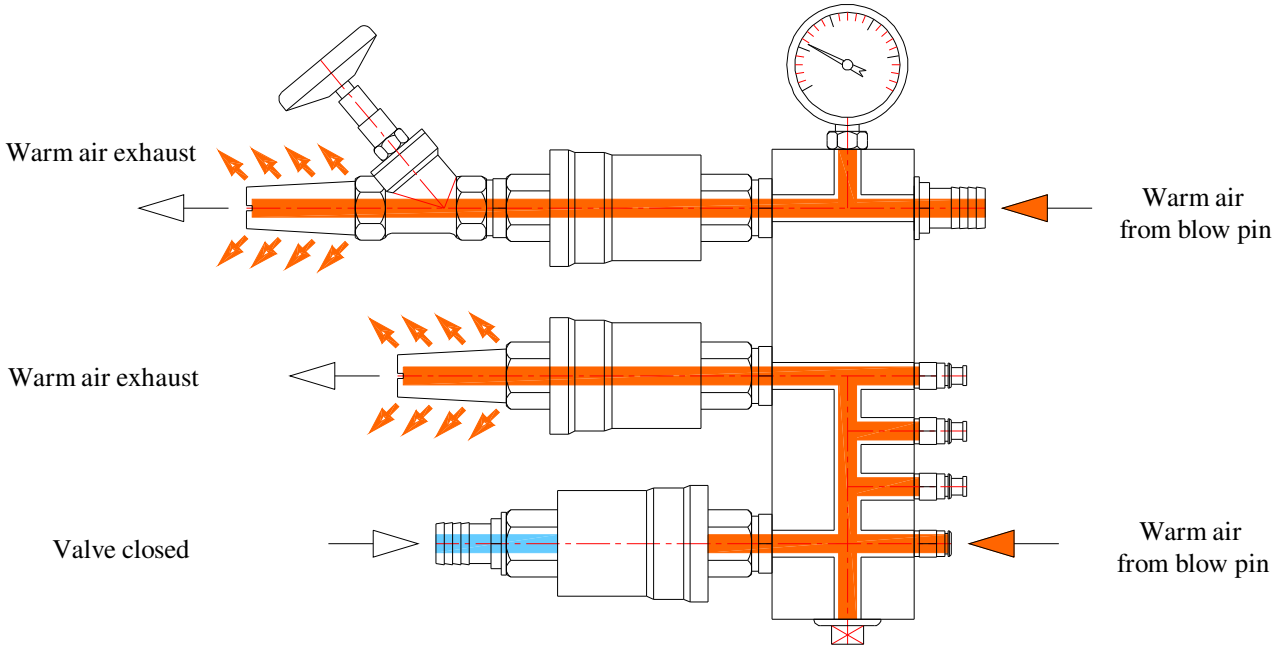
Step 2: Cold compressed air is flushing the product



Internal Product Cooling CAC

Pressurising and Continuous Blowing („D“)

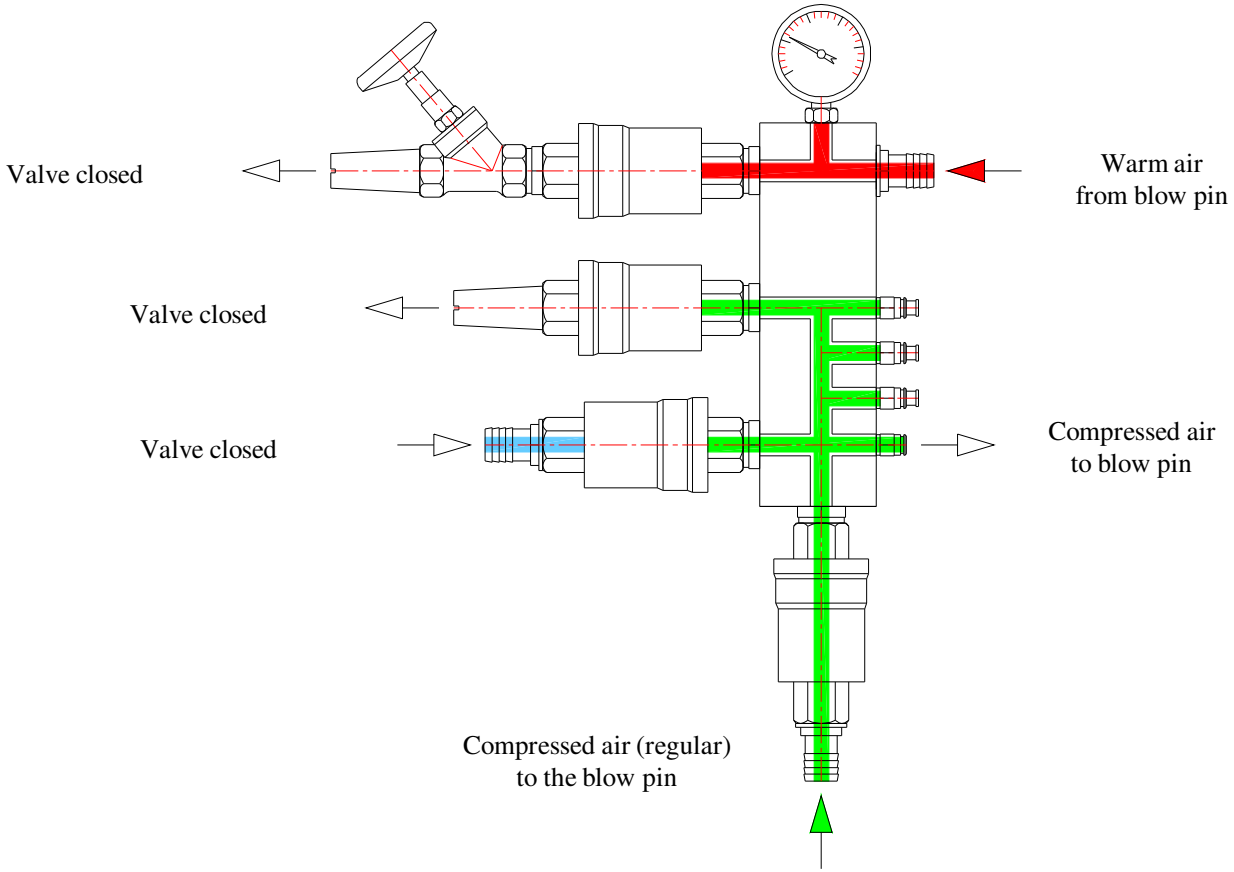
Step 3: Warm air exhaust over both silencers



Internal Product Cooling CAC

Pre-blowing with Compressed Air („V“)

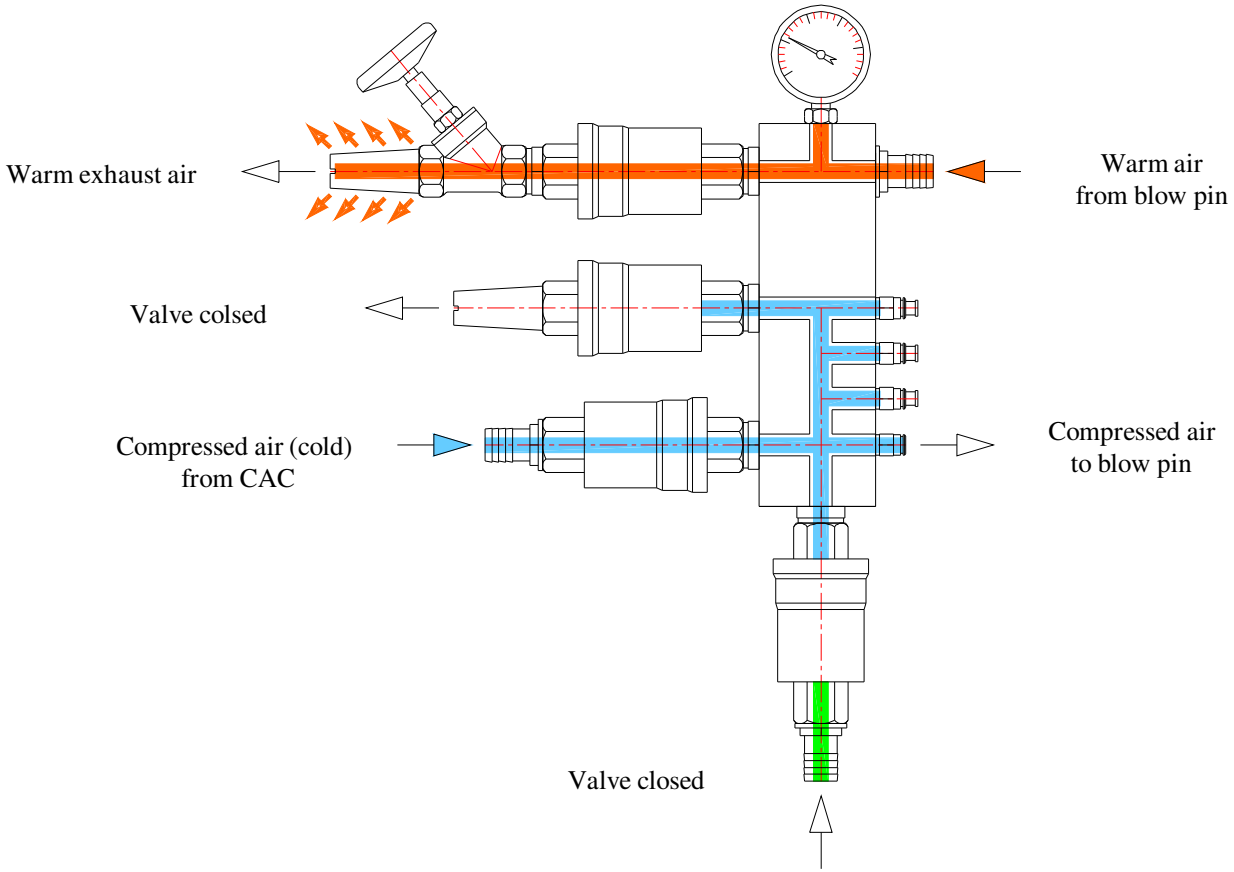
Step 1: Regular compressed air ist inflating the product



Internal Product Cooling CAC

Pre-blowing with Compressed Air („V“)

Step 2: Cold compressed air is flushing the product

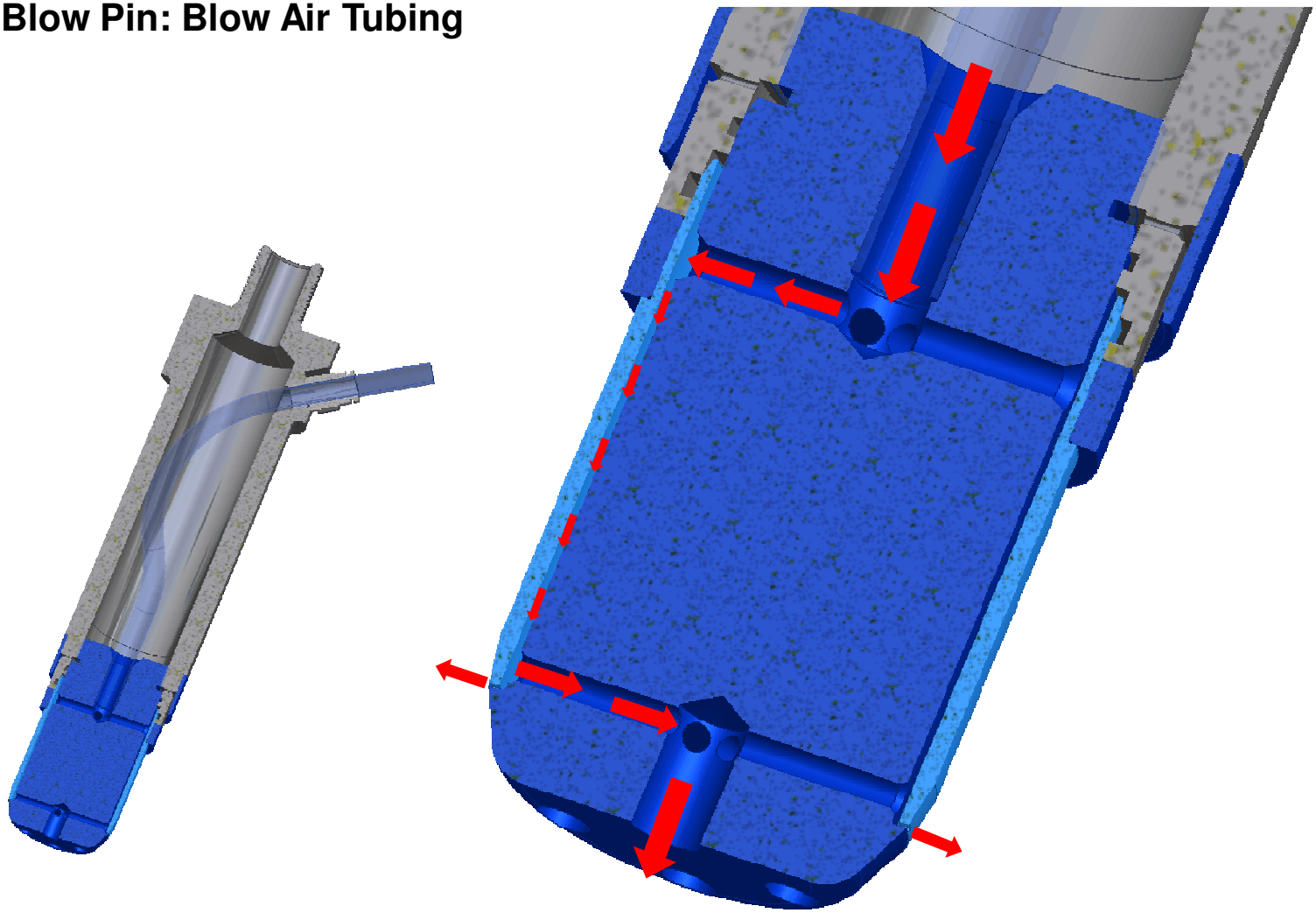


Internal Product Cooling CAC

Blow Pins

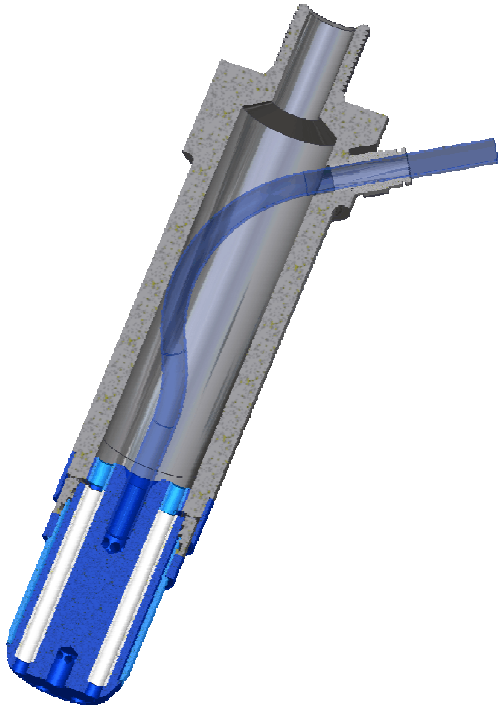
Internal Product Cooling CAC

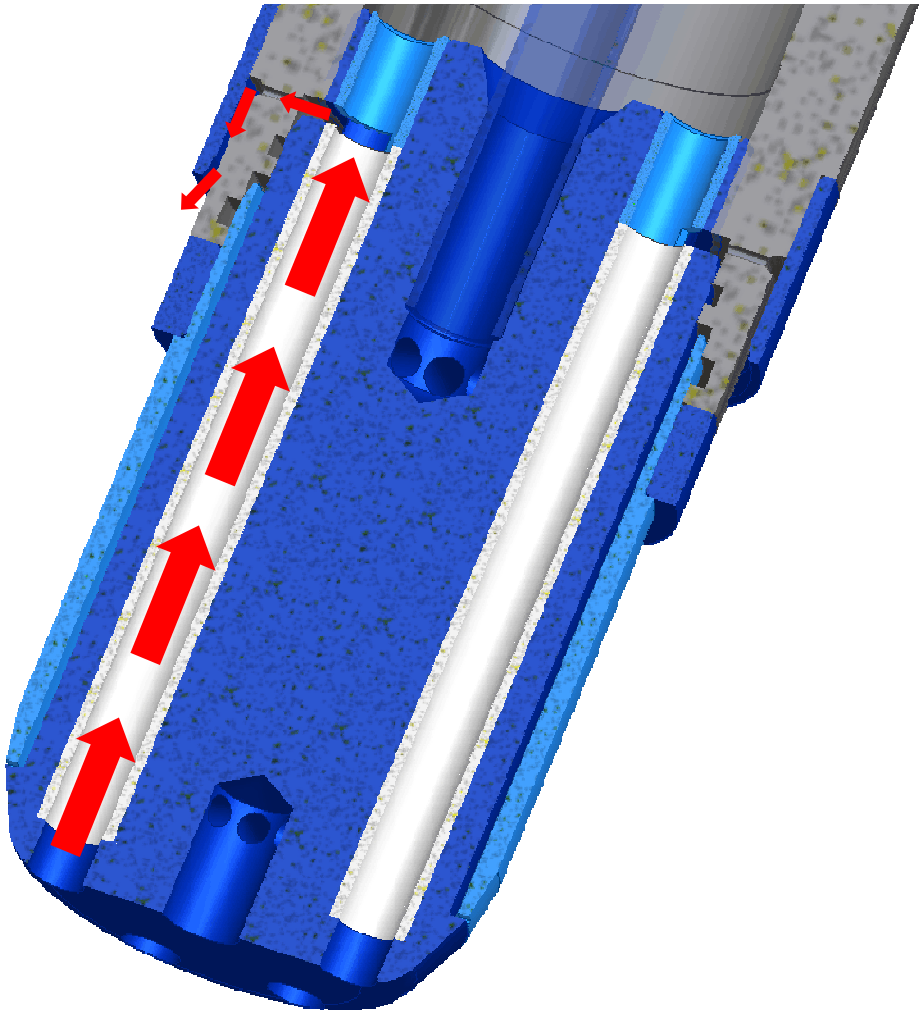
Blow Pin: Blow Air Tubing



Internal Product Cooling CAC

Blow Pin: Exhaust Air Tubing





Internal Product Cooling CAC

Examples

Container for cosmetic lotion:

Weight: 33 g	Compressed air consumption: 40 m³/h
Volume: 0,45l	Compressed air temperature: -28°C
Material: HDPE	Cycle time: 19,6 sec.
Cycle time: 12,6 sec.	Cycle time reduction: 16%

Production increase: 19%

Container for dish washing liquid:

Weight: 55 g	Compressed air consumption : 85 m³/h
Volume: 0,9l	Compressed air temperature : -28°C
Material: HDPE	Cycle time : 10,8 sec.
Cycle time: 13,2 sec.	Cycle time reduction : 18,2%

Production increase: 22,2%

Amortization time for the CAC-unit: 93 days

Country: USA
Machine: Battenfeld
Compressed air pressure: 7 bar
Cooling water temperature: 9°C
Compressed air temperature: 28°C
Blowing method: Continuous blowing
CAC-model: CAC 180
Number of blow molding machines: 2
Number of blow stations: 2
Number cavities/station: 3

Internal Product Cooling CAC

Examples

Container for chemical substances:

Weight: 450 g	Compressed air consumption: 107 m³/h
Volume: 10 l	Compressed air temperature: -31 °C
Material: HDPE	Cycle time: 16,2 sec.
Cycle time: 22,2 sec.	Cycle time reduction: 27,4%

Production increase: 37,7%

Amortization time for the CAC-unit: 58 days

Country: Germany
Machine: Kautex
Compressed air pressure: 8 bar
Cooling water temperature: 8 °C
Compressed air temperature : 30 °C
Blowing method: Stagnant air
CAC-model: CAC 120
Number of blow molding machines: 1
Number of blow stations: 1
Number of cavities/station: 1

Internal Product Cooling CAC

Examples

Container for bath lotion:

Weight: 54 g	Compressed air consumption: 61 m³/h
Volume: 0,57l	Compressed air temperature: -29°C
Material: HDPE	Cycle time: 9,7 sec.
Cycle time: 12,4 sec.	Cycle time reduction: 27%

Production increase: 27%

Container for liquid cleaner:

Weight: 32 g	Compressed air consumption : 33 m³/h
Volume: 0,3l	Compressed air temperature : -29°C
Material: HDPE	Cycle time : 9,5 Sek.
Cycle time: 11,8 sec.	Cycle time reduction : 19,5%

Production increase: 24,2%

Amortization time for the CAC-unit: 77 days

Country: England
Machine: Bekum
Compressed air pressure: 8 bar
Cooling water temperature: 9°C
Compressed air temperature: 34°C
Blowing method: Stagnant air
CAC-model: CAC 120
Number of blow molding machines: 2
Number of blow stations: 2
Number of cavities/station: 3

Internal Product Cooling CAC

Examples

Container for dish washing liquid:

Weight: 180 g	Compressed air consumption: 95 m³/h
Volume: 3 l	Compressed air temperature: -30°C
Material: HDPE	Cycle time: 11 sec.
Cycle time: 14 sec.	Cycle time reduction: 21,5%

Production increase: 27,3%

Amortization time for the CAC-unit: 75 days

Country: Nederlands
Machine: Comec
Compressed air pressure: 8 bar
Cooling water temperature: 10°C
Compressed air temperature: 32°C
Blowing method: Stagnant air
CAC-model: CAC 120
Number of blow molding machines: 2
Number of blow stations: 1
Number of cavities/station: 1

Internal Product Cooling CAC

50ml / PP / 3g
Production increase: 18%

300ml / PE / 27g
Production increase : 10%

100ml / PE / 19g
Production increase : 27%

250ml / PE / 21g
Production increase : 16%

200ml / PE / 28g
In exchange for liquid gas

200ml / Coex / 28g
In exchange for liquid gas

500ml / PE / 45g
Production increase : 26%

1000ml / PE / 63g
Production increase : 22%

500ml / PE / 61g
Production increase : 25%

500ml / PE / 32g
Production increase : 18%

Internal Product Cooling CAC

500ml / PE / 39g
Production increase: 20%

500ml / PE / 42g
Production increase: 22%

800ml / PE / 48g
Production increase: 20%

500ml / PE / 28g
Production increase: 17%

1000ml / PE / 75g
exchange for liquid gas

1000ml / PE / 69g
Production increase: 15%

1000ml / PE / 100g
Production increase: 25%

1000ml / PE / 50g
Production increase: 26%

500ml / PE / 33g
Production increase: 18%

750ml / PE / 41g
Production increase: 20%

Internal Product Cooling CAC

2000ml / PE / 84g
Production increase: 25%

2000ml / PE / 94g
Production increase: 28%

1000ml / PE / 39g
Production increase: 18%

2000ml / PE / 57g
Production increase: 26%

3000ml / PE / 70g
Production increase : 20%

10000ml / PE / 400g
In exchange for liquid gas

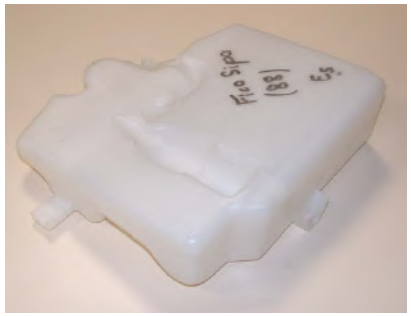
5000ml / PE / 142g
Production increase : 22%

5000ml / PE / 129g
Production increase : 20%

300ml / PE / 32g
Production increase : 18%

400ml / PE / 80g
Production increase : 25%

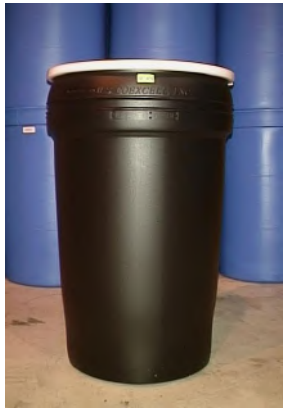
Internal Product Cooling CAC



3500ml / HDPE / 450g
Production increase: 38%

1598ml / HDPE / 250g
Production increase: 24%

1341ml / HDPE / 220g
Production increase: 22%



150l / HDPE / 8,5kg
Production increase: 54%

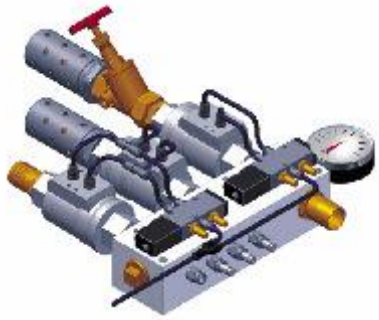
200l / HDPE / 11kg
Production increase: 62%

2100ml / PE / 225g
Production increase: 19%

2500ml / PE / 240g
Production increase : 21%

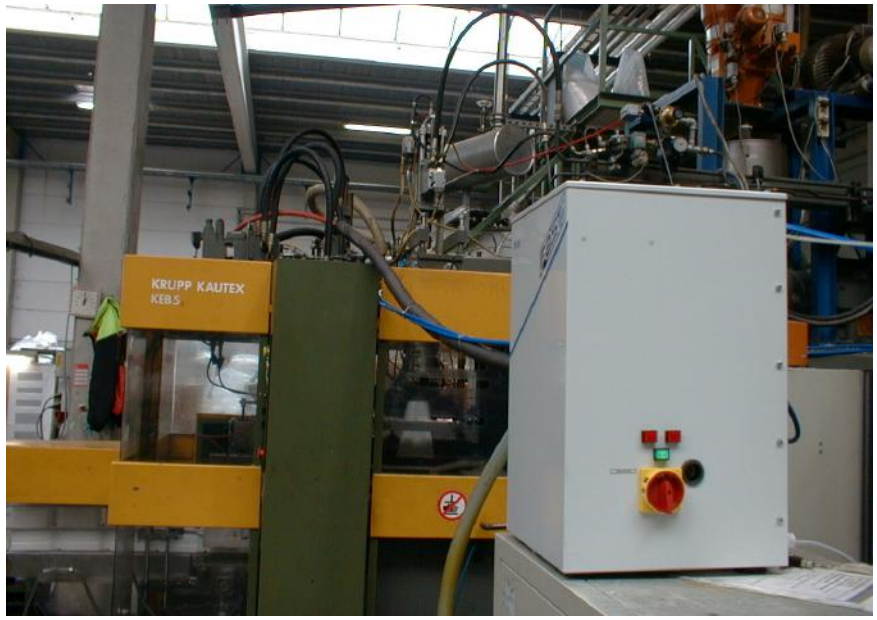
Internal Product Cooling CAC

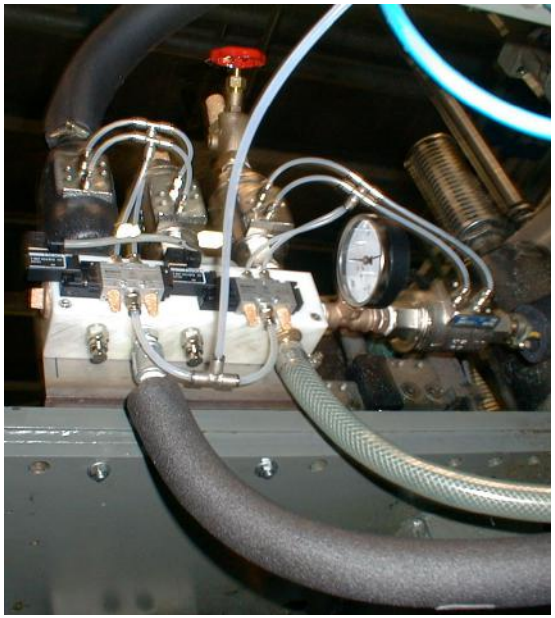
Internal Product Cooling BMB

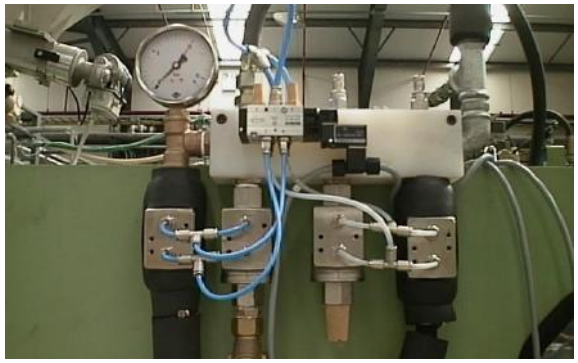


Technical Data		BMB 80	BMB 160
Max. Air flow rate	Nm^3/h (cfm)	80 (50)	160 (100)
Max. Air pressure	bar (psi)	14 (200)	14 (200)
Max. Power consumption	W	450	950
Connected load	W	1.100	1.900
Max. Cooling water temperature	°C (°F)	21 (70)	21 (70)
Min. Cooling water pressure	bar (psi)	2 (30)	2 (30)
Weight	kg	35	45

Internal Product Cooling BMB







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