DISCAL® technopolymer deaerators

551 series

CALEFFI

01429/25 EN

Function

Deaerators are used to continuously remove the air contained in the hydraulic circuits of heating and cooling systems. The air discharge capacity of these devices is very high. They are capable of automatically removing all the air present in the system down to micro-bubble level. Circulating fully deaerated water allows systems to operate under optimal conditions, free from any noise, corrosion, localised overheating or mechanical damage.
The adjustable tee fitting allows universal installation on both horizontal and vertical pipes.

Optional insulation is available for all models.

Product range

551 series DISCAL deaerator in technopolymer with adjustable tee .... sizes DN 20 (3/4"), DN 25 (1"), DN 32 (11/4"), DN 40 (11/2"), DN 50 (2")
551 series DISCAL deaerator in technopolymer with adjustable tee with fittings for copper pipe .... sizes DN 20 (Ø 22) and DN 25 (Ø 28)

Technical specifications

Materials

Body: PA66G30
Locking nut for tee fitting:
- code 551202, 551203, 551205, 551206, 551207: PPSG40
- code 551208, 551209: brass EN 12165 CW617N

Tee fitting: brass EN 1982 CB753S
Automatic air vent body: PA66G30
Float: PP
Float guide and stem: PA66G30
Float lever and spring: stainless steel EN 10270-3 (AISI 302)
Vent (air): with rubber-sealed cap
Hydraulic seals: EPDM
Bottom cap: brass EN 12165 CW617N

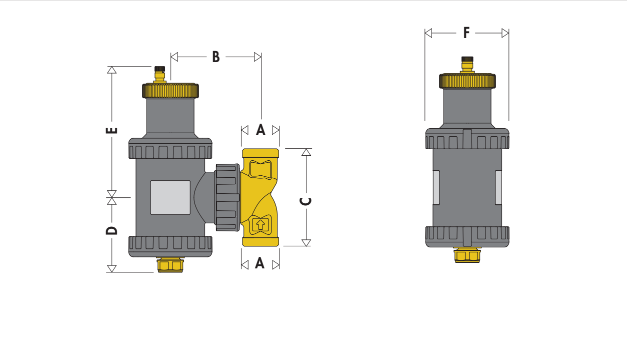
Performance

Medium: water, glycol solutions excluded from the guidelines of directive 67/548/EC
Max. percentage of glycol: 30 %
Max. working pressure: 3 bar
Max. discharge pressure: 3 bar
Working temperature range: 0–90 °C
Connections:
- main:
  - with adjustable tee fitting for copper pipe: Ø 22 and Ø 28 mm
  - with adjustable tee fitting: 3/4", 1" F, 1 1/4", 1 1/2", 2" F
- drain: 1/2" M (with plug)

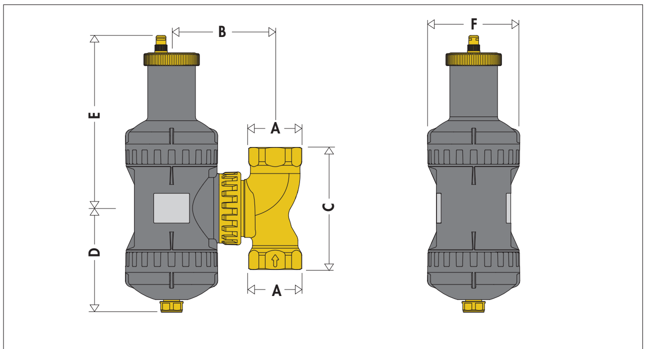
Insulation technical specifications

Materials: PPE
Density: 45 g/l
Conductivity (8301): at 10 °C: 0,039 W/(m·K)
Coefficient of resistance to water vapour (DIN 52615): ≥ 39700
Working temperature range: 0–110 °C
Resistance to fire (UL-94): HBF class

Dimensions

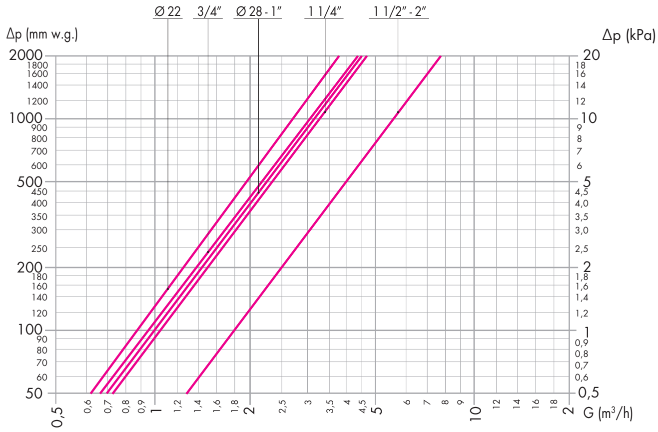


Code	A	B	C	D	E	F	kg
551202	Ø 22	87,5	115	75	131	Ø 84	1,3
551203	Ø 28	87,5	117	75	131	Ø 84	1,3
551205	3/4"	87,5	96	75	131	Ø 84	1,3
551206	1"	87,5	110	75	131	Ø 84	1,3
551207	1 1/4"	87,5	131	75	131	Ø 84	1,5



Code	A	B	C	D	E	F	kg
551208	1 1/2"	119	140	118,5	196,5	Ø 105	2,7
551209	2"	119	140	118,5	196,5	Ø 105	2,8

Hydraulic characteristics



The maximum recommended medium flow speed to the device connections is ~ 1,2 m/s.
The table below shows the maximum flow rates in order to meet this requirement.

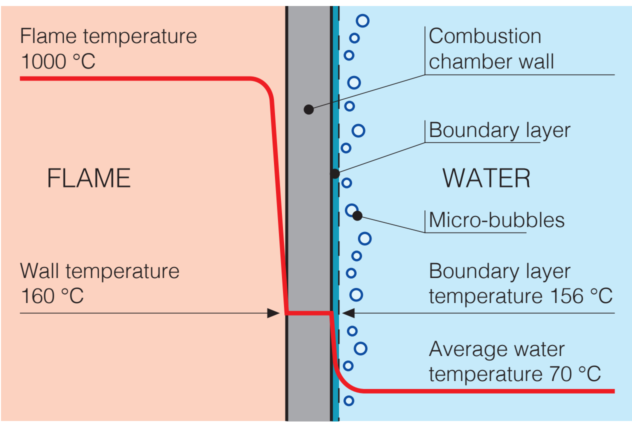
Code	Connections	DN	Kv (m³/h)	Maximum flow rate	
				l/min	m³/h
551202	Ø 22	20	8,7	21,67	1,3
551203	Ø 28	25	10	21,67	1,3
551205	3/4"	20	9,7	21,67	1,3
551206	1"	25	10	21,67	1,3
551207	1 1/4"	32	10,3	35	2,1
551208	1 1/2"	Ø 40	18	71,67	4,3
551209	2"	Ø 50	18	100	6

The air formation process

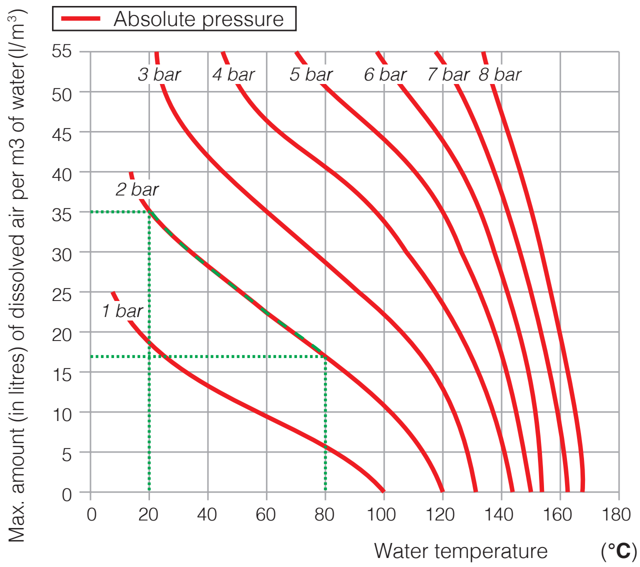
The amount of air which can remain dissolved in a water solution depends on the pressure and temperature.
This relationship is known as Henry's law; the graph allows us to quantify the physical phenomenon of releasing the air contained in the medium.
For example: at a constant absolute pressure of 2 bar, if the water is heated from 20 °C to 80 °C, the amount of air released by the solution is equal to 18 l per m³ of water.
According to this law, it may be noted how the amount of air released by the solution increases as the temperature rises and the pressure decreases. This air is in the form of micro-bubbles with diameters in the order of tenths of a millimetre.
In circuits of heating and cooling systems there are specific points where this micro-bubble formation process takes place continuously: inside boilers and devices which operate under conditions of cavitation.

Boiler micro-bubbles

Micro-bubbles form continuously on the surfaces separating the water from the combustion chamber due to the high temperature of the medium.
This air, carried by the water, collects at critical points of the circuit, from which it must be removed. Some of it is reabsorbed where it meets colder surfaces.

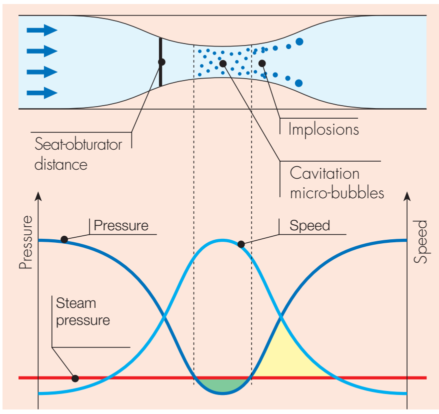


Graph of solubility of air in water



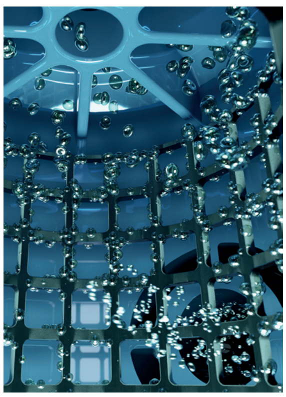
Cavitation micro-bubbles

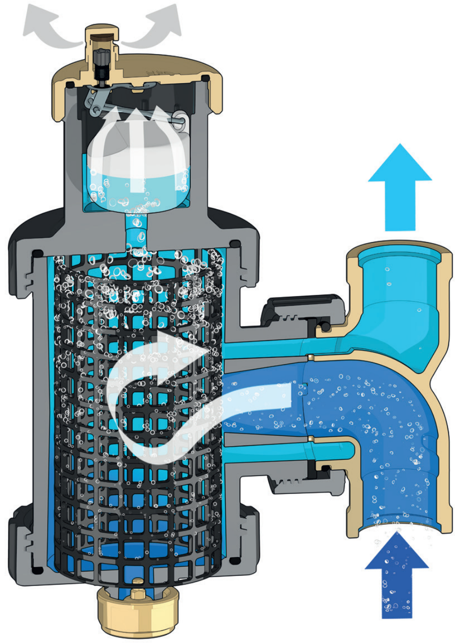
Micro-bubbles develop where the flow speed of the medium is particularly high, with a corresponding reduction in pressure.
These points are usually the pump impellers and the water orifices of the regulating valves.
These micro-bubbles of air and water vapour, the formation of which is accentuated in non-deaerated water, may subsequently implode as a result of the cavitation effect.



Operating principle

The deaerator utilises the combined action of several physics principles. The active part consists of a set of technopolymer mesh surfaces. These elements create the swirling motion required to facilitate the release of micro-bubbles and their adhesion to the surfaces.
The bubbles, fusing with each other, increase in volume until the hydrostatic thrust is sufficient to overcome the force of adhesion to the structure. They then rise towards the top of the device and are expelled through a float-operated automatic air vent valve. It is designed in such a way that the flow direction of the medium inside the valve is not important.



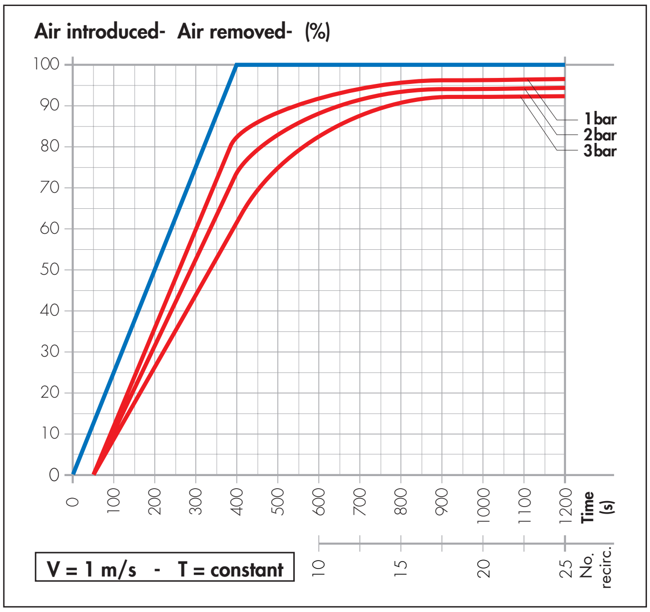


Construction details

The automatic air vent valve, located at the top of the device, is equipped with a long chamber for float movement. This feature prevents any impurities in the water from reaching the seal seat.

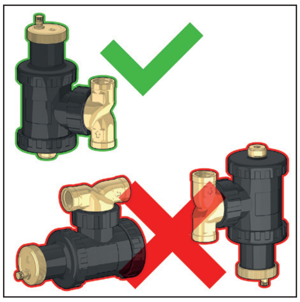
Air separation efficiency

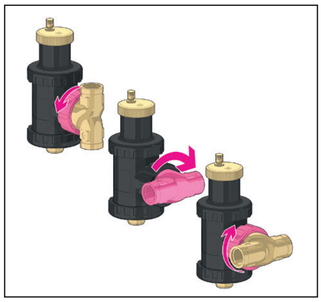
DISCAL devices are capable of continuously removing the air contained within a hydraulic circuit, with a high degree of separation efficiency.
The amount of air that can be removed from a circuit depends on different parameters: it increases as the medium flow speed and the pressure decrease.
As illustrated on the graph below, after just 25 recirculations at the maximum recommended speed, almost all the air artificially released into the circuit (blue curve on the graph) is eliminated by the deaerator, with percentages which vary on the basis of the pressure within the circuit.
The small amount which remains is then gradually eliminated during normal system operation. In conditions where the speed is slower or the temperature of the medium is higher, the amount of air separated is even greater.

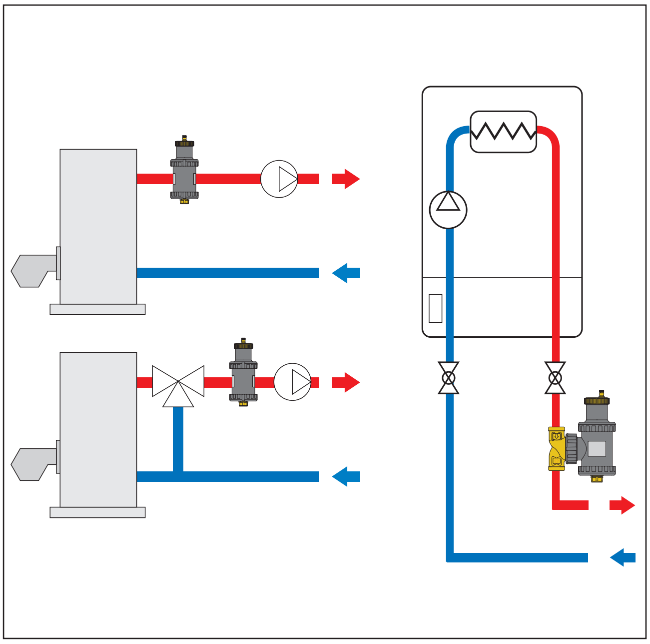


Installation

DISCAL devices may be used in the circuits of both heating and cooling systems, to guarantee progressive elimination of the air which forms continuously. They should preferably be installed where the temperature of the water is warmer and upstream of the circulation pump, points at which the most micro-bubbles form as a result of the temperature and the high medium flow speed respectively. Turn the tee fitting manually to adapt the connections to the horizontal or vertical pipes, observing the flow direction indicated by the arrow on the tee fitting. It is recommended that the air vent valve cap is replaced with a Caleffi 5620 series hygroscopic safety cap if the device is installed in a location that cannot be inspected.





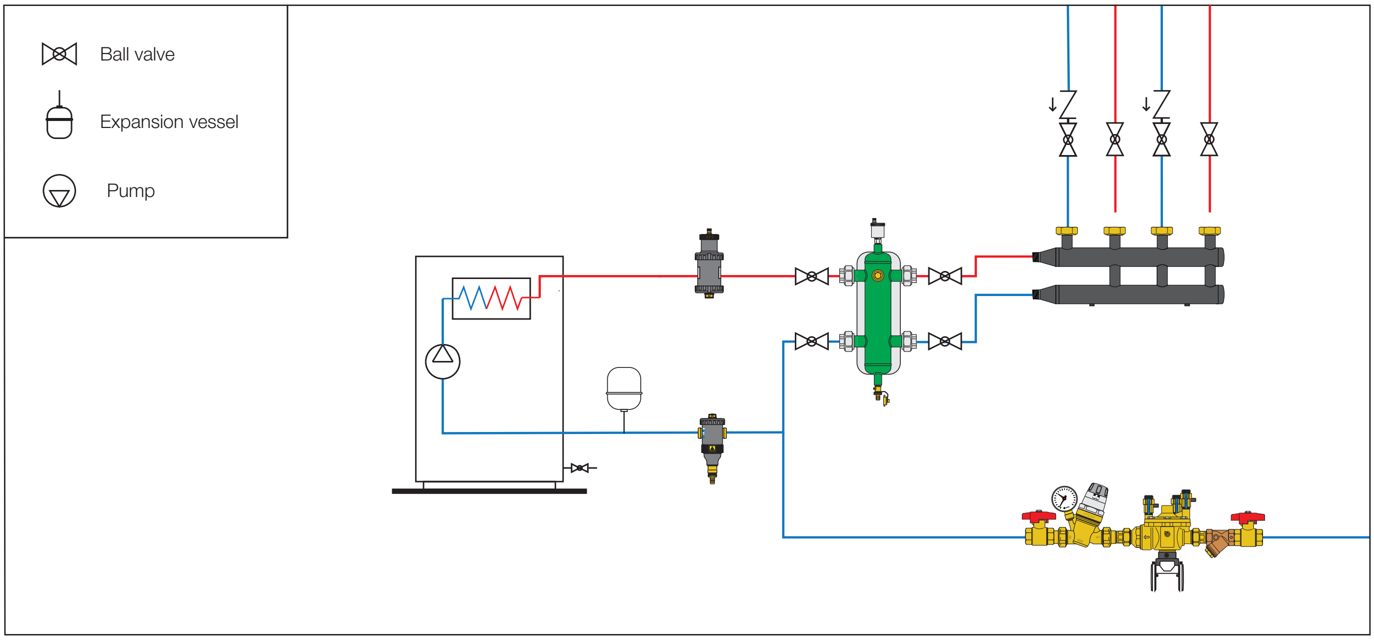


Accessories

551
Insulation for 551 series technopolymer deaerators.

Code	Use
CBN551202	551202, 551203, 551205, 551206
CBN551207	551207
CBN551208	551208
CBN551209	551209

Application diagram



SPECIFICATION SUMMARY

DISCAL 551 Series

Deaerator for horizontal or vertical pipes, in technopolymer with adjustable connection tee. Sizes DN 20, 3/4" F connections (ISO 228-1), DN 25, 1" F connections (ISO 228-1), DN 32, 1 1/4" F connections (ISO 228-1), DN 40, 1 1/2" F connections (ISO 228-1), DN 50, 2" F connections (ISO 228-1); size DN 20 (and DN 25), Ø 22 (and Ø 28) connections with olive fittings for copper pipe. Technopolymer body. Technopolymer internal element. PP float. Brass float guide and stem. Stainless steel float lever and spring. EPDM hydraulic seals. Medium water and non-hazardous glycol solutions excluded from the guidelines of EC directive 67/548; maximum percentage of glycol 30 %. Maximum working pressure 3 bar. Maximum discharge pressure 10 bar. Working temperature range 0–90 °C.

We reserve the right to make changes and improvements to our products and the related technical data in this publication, at any time and without prior notice.
The website www.caleffi.com always has the most up-to-date version of the document, which should be used for technical verifications.

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