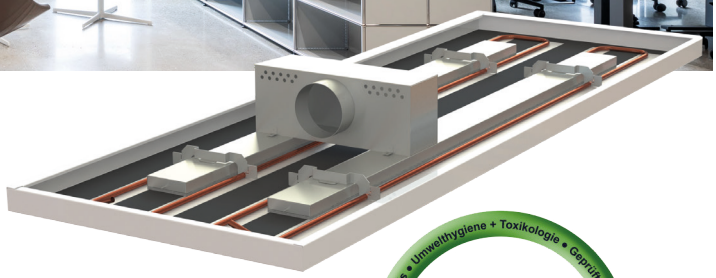
AQUILO

Hybrid system with building mass connection



QUICK FACTS

- In combination with A11-S, A11-C, SPECTRA M-S, SPECTRA M-C
- Very high heating & cooling capacity
- Superior sound absorption values (class A)
- Enhanced energy efficiency thanks to active building mass connection (A11-C, SPECTRA M-C)
- Sound power level Lw: < 25 dB (A)
- Fresh air intake is silent and draught-free thanks to ceiling panel perforations

BARCOL-AIR
by Swegon

Technical description

General

AQUILO + the A11 or SPECTRA M radiant ceiling system are highly efficient radiant ceiling systems with integrated supply air and superior acoustic effectiveness. The integrated supply air element delivers highly effective ventilation results. At the same time, the supply air jet on the back of the ceiling panel increases the convective capacity, which supports the heating and cooling effect in the room without a risk of draughts.

The AQUILO hybrid system with A11-C and SPECTRA M-C ceilings incorporate the storage mass for dissipating heating loads using the thermally active building system principle.

The A11-S sail allows the use of our specially developed Convector Wings to increase performance.

Activation

Water system: The radiant ceiling is a passive system that in the case of cooling absorbs heat from the room via the ceiling surface, transfers it to the water, which is conducted in activation registers, and dissipates it, respectively emits heat in the case of heating.

The activation of the radiant metal ceiling system A11-C and A11-S consists of meandering copper pipes (outside diameter 12 mm) and aluminum heat-conducting rails (width 80 mm), which are connected by laser spot welding and glued into the ceiling panels.

The activation of the SPECTRA M-C and SPECTRA M-S radiant metal ceiling system consists of meandering copper pipes (outside diameter 12 mm), which are pressed into aluminum heat-conducting profiles. The connection between the activation register and the ceiling panel is made with magnet technology.

Optional added performance: AQUILO + Convector Wings

Convector Wings are matt black anodised aluminium profiles with upright and slotted “wings” on both sides. With the profile open at the bottom, the Convector Wings can be attached to the straight sections of a pipe meander. This multiplies the heat exchanger surface area, which in turn leads to an increase of capacity on the water side.

Functions

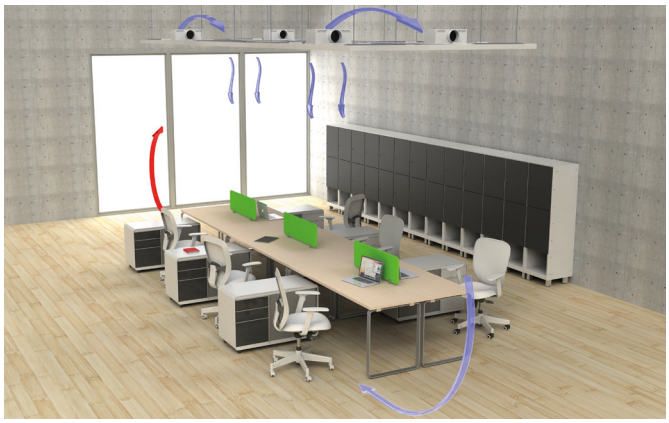
AQUILO + the radiant ceiling system is multifunctional. In addition to the thermal functions of cooling/heating and the active concrete management, there is the possibility of further integration: acoustically effective inserts or baffles (ARCHISONIC®), various built-in components (e.g. smoke detectors, lighting).

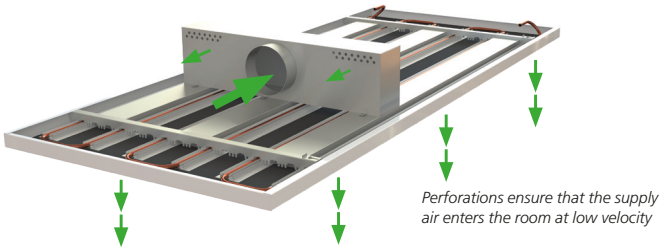
Combinations

- AQUILO + A11-S + ARCHISONIC®
- AQUILO + A11-C + ARCHISONIC®
- AQUILO + SPECTRA M-S / + SPECTRA M-C

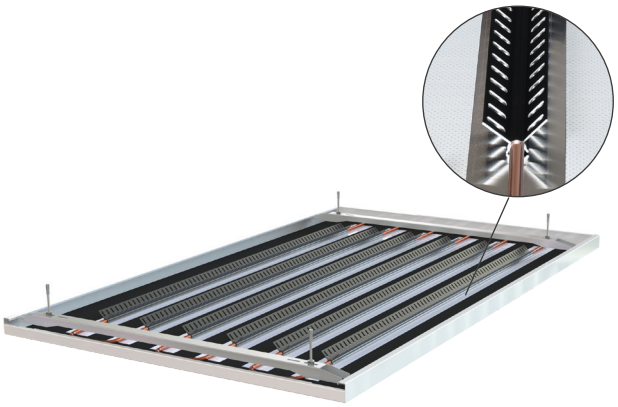
Hygiene conformity

- Hygiene conform to VDI 6022 / SWKI VA104-0

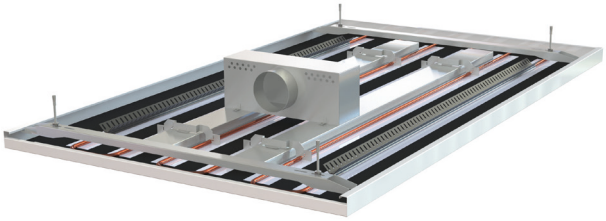




3-channel type AQUILO with supply air flow characteristics.



Activated A11-S ceiling panels are suitable for use with Convector Wings.

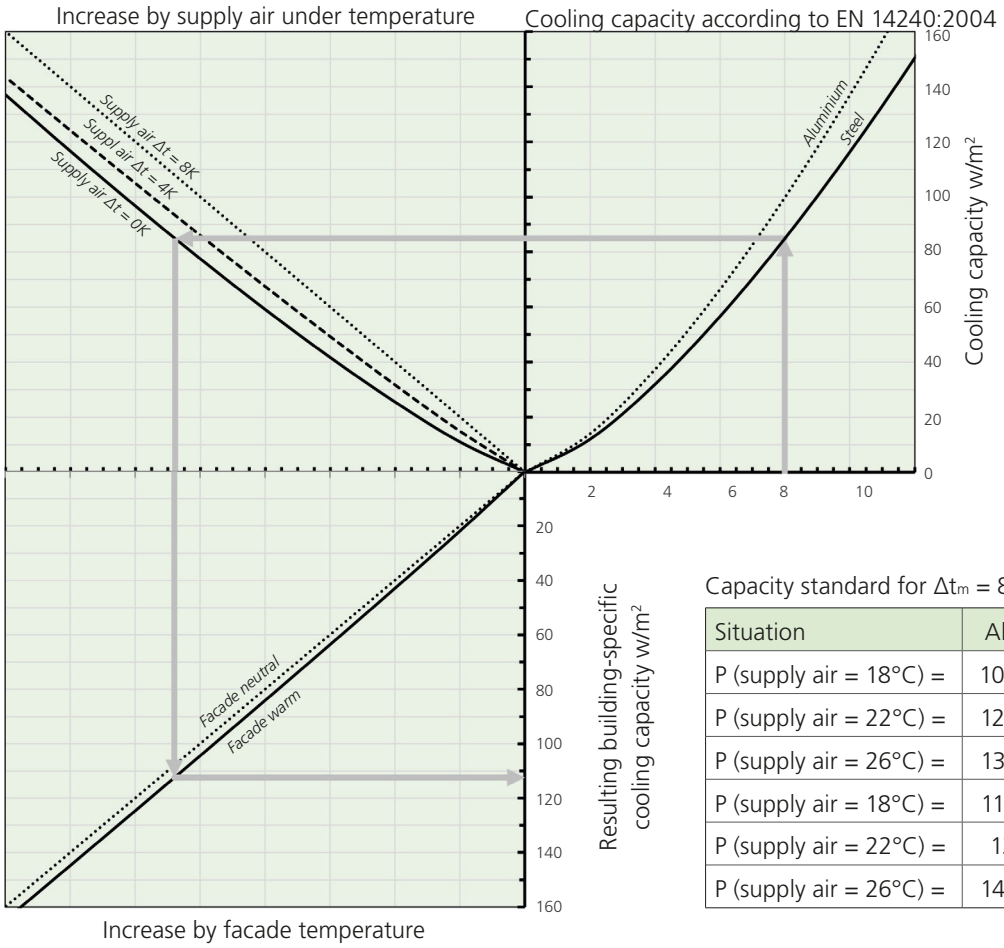


AQUILO in combination with A11-S and Convector Wings

Technical data AQUILO + A11-S / SPECTRA M-S

Capacity

Cooling

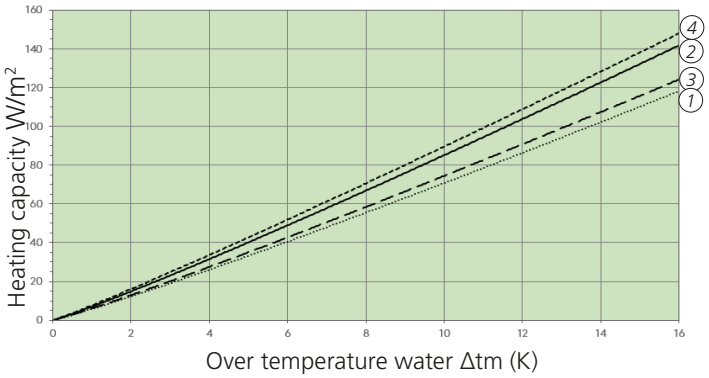


Capacity standard for Δt_m = 8 K

Situation	Aluminium	Steel	Facade
P (supply air = 18°C) =	104,8 W/m²	89,1 W/m²	neutral
P (supply air = 22°C) =	122,6 W/m²	104,3 W/m²	
P (supply air = 26°C) =	134,1 W/m²	114,1 W/m²	
P (supply air = 18°C) =	113,2 W/m²	96,2 W/m²	warm
P (supply air = 22°C) =	131 W/m²	111,5 W/m²	
P (supply air = 26°C) =	142,5 W/m²	121,2 W/m²	

Heating

EN 14037:2016



Over temperature water Δtm 15 K

Steel WLS 150	Alu WLS 150	Steel WLS 150 Zul - 2K	Alu WLS 150 Zul - 2K
·····①	– –③	——②	- - - -④
110 W/m²	115 W/m²	132 W/m²	138 W/m²

Notice

- SN EN 14240: The cooling capacity is related to the active area according to SN EN 14240:2004. The active area is calculated according to SN EN 14240 from the number of heat-conducting rails x length of heat conducting rail x distance between heat conducting rails.
- SN EN 14037: The heating capacity is related to the active area according to SN EN 14037:2016. The active area is calculated according to SN EN 14037 from the length of the ceiling panel x the width of the ceiling panel.

Technical data AQUILO + A11-C, SPECTRA M-C

Capacity

Initial data is presented below.

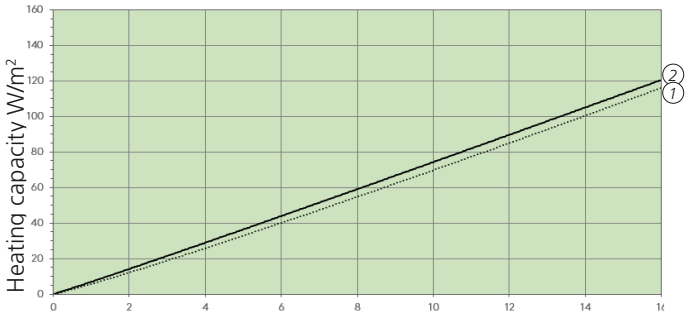
Comparison of systems	AQUILO + A11-C, SPECTRA M-C ----①	AQUILO in closed ceiling ——②
Perforation	Rg 1,5 – 11 %	Rg 1,5 – 11 %
Activation method	on metal	on metal
Acoustic inlay	fleece	fleece
Additional inlay	without	without

(Capacity information without project-specific performance-influencing factors.)

EN 14240:2004

Under temperature water Δtm (K)

EN 14037:2016



Over temperature water Δtm (K)

Version	[1) 3)] Cooling 8 K	[1) 3)] Cooling 10 K	[1) 2) 3)] Heating 15 K (without air supply)
① AQUILO + A11-C, SPECTRA M-C (WLS 150)	up to 92 W/m²	up to 113 W/m²	up to 108 W/m² (– · – · –)
② AQUILO in closed ceiling (WLS 100)	up to 114 W/m²	up to 135 W/m²	up to 113 W/m² (———)

[1)] Depending on the configuration, an additional output of 10 W/m² panel area is achieved through concrete management.
[2)] In heating mode with supply air operation, an increase in output of approx. 20 % is achieved.
[3)] By using aluminum panels, the increase in output is approx. 8 %.

Notice

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- SN EN 14037: The heating capacity is related to the active area according to SN EN 14037:2016. The active area is calculated according to SN EN 14037 from the length of the ceiling panel x the width of the ceiling panel.

Operation

Supply air volume flow maximum per linear meter

AQUILO	6 K	8 K	10 K	12 K
Typ 1-channel	35 m³/h	34 m³/h	32 m³/h	30 m³/h
Typ 2-channels	70 m³/h	68 m³/h	64 m³/h	60 m³/h
Typ 3-channels	105 m³/h	102 m³/h	96 m³/h	90 m³/h

Water (recommendations)

- Temperature
  - Cooling 16 – 18 °C
  - Heating 28 – 37 °C
- Pressure drop: 20 – 25 kPa
- Water flow: 80 – 150 l/h
- Max. operating pressure up to 9 bar
- Water quality according to: SWKI BT 102-01, BTGA 3.003, VDI 2035

Acoustics

Interpretation calculating sound power level L_{WA} and pressure drop

	Without perforated steel sheet					
	1 channel		2 channel		3 channel	
Air volume per metre & channel	Pressure drop	Sound power L_{WA}	Pressure drop	Sound power L_{WA}	Pressure drop	Sound power L_{WA}
m³/h*lm	[Pa]	[dB (A)]	[Pa]	[dB (A)]	[Pa]	[dB (A)]
15	5.1	24.3	5.5	24.4	5.9	24.7
20	5.7	24.5	6.2	24.6	6.8	25.1
25	8.2	24.6	8.9	24.8	9.6	25.4
30	10.3	25	11.4	25.4	12.5	26.2
35	15.6	26.2	17.5	26.8	19.4	28

	With perforated steel sheet					
	1 channel		2 channel		3 channel	
Air volume per metre & channel	Pressure drop	Sound power L_{WA}	Pressure drop	Sound power L_{WA}	Pressure drop	Sound power L_{WA}
m³/h*lm	[Pa]	[dB (A)]	[Pa]	[dB (A)]	[Pa]	[dB (A)]
15	6.1	24.1	6.5	24.2	6.9	24.5
20	6.9	24.2	7.5	24.4	8	24.8
25	9.7	24.3	10.4	24.5	11.1	25.1
30	13.8	24.9	14.9	25.3	16	26.1
35	18.2	27.6	20.1	28.2	22	29.4

Insertion attenuation D_t in octave band

Centre frequency f in [Hz]	63	125	250	500	1000	2000	4000	8000
D_t with fleece in [dB]	25,9	17,6	13,7	13,7	10,7	10,6	7,2	6,7
D_t without fleece in [dB]	26,9	17,8	13,9	14,0	10,6	11,3	7,6	7,6

All sound insertion attenuation tests were carried out by the Fraunhofer Institute for Building Physics in accordance with EN ISO 7235 (IBP Report P-TA 26/2016). The relevant insertion attenuation is calculated from the sound power values with and without Aquilo radiant sails.

Sound absorption according to EN ISO 11654

Ceiling panel	Soundabsorption value a_w	Sound absorption class
with acoustic fleece without acoustic strips	0,65	C
with acoustic fleece with acoustic strips at the edge	0,80	B
with acoustic fleece with acoustic strips at the edge and center	0,85	B
with acoustic fleece with acoustic strips full-surface	0,90	A

Initial data: values at installation high 200 mm.

System

Ceiling system

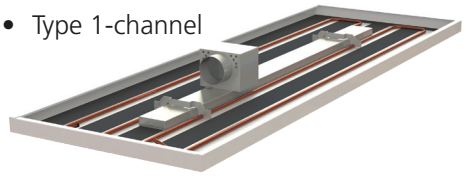
- Ceiling closed (with edge joint)
  - Rectangular panels

Installation systems

- Installation height:
  Type 1-channel : 150 – 170 mm
  Type 2-channels: 170 – 195 mm
  Type 3-channels: 195 – 220 mm
- Sail
  - Hook-on system
  - Threaded rods or ropes
- Closed ceiling
  - Square and rectangular panels

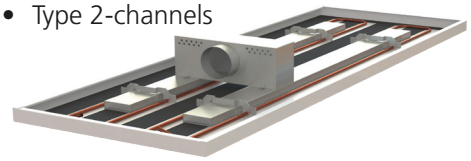
Types AQUILO

- Type 1-channel



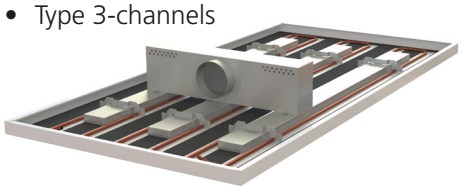
Suspension height:
140 – 160 mm
Installation height:
150 – 170 mm

- Type 2-channels



Suspension height:
160 – 185 mm
Installation height:
170 – 195 mm

- Type 3-channels



Suspension height:
185 – 210 mm
Installation height:
195 – 220 mm

Materials, weight and dimensions

Materials and weight

Material ceiling panel	Weight ceiling panel (incl. activation, water)	Weight supply air element AQUILO (Steel sheet)
Aluminum 1,00 mm	4,0 – 6,5 kg/m²	4,0 – 6,0 kg/piece
Steel 0,70 mm	A11 6,5 – 9,0 kg/m² SPECTRA M 10 – 13,3 kg/m²	

Building material class: A2-s1, d0, EN 13501-1 (depending on the acoustic solution).

Dimensions ceiling panel construction

Dimensions standard	Type 1-channel	Type 2-channels	Type 3-channels
Panel width	400 – 1200 mm	600 – 1200 mm	900 – 1200 mm
Panel lenght	800 – 3000 mm	800 – 3000 mm	800 – 3000 mm
Panel height [1]	30 – 50 mm	30 – 50 mm	30 – 50 mm
Suspension height (Minimum height 50 mm ceiling panel edge)	140 – 160 mm	160 – 185 mm	185 – 210 mm

[1] Standard: Panel edge height 40 mm, angle of bend right angle / [2] Special versions possible from 105 mm.

Dimensions supply air connection

Air channel (mm)	750	1000	1500
Type 1-channel Ø DN (mm)	80	80	100
Type 2-channels Ø DN (mm)	100	100	125
Type 3-channels Ø DN (mm)	125	125	150

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