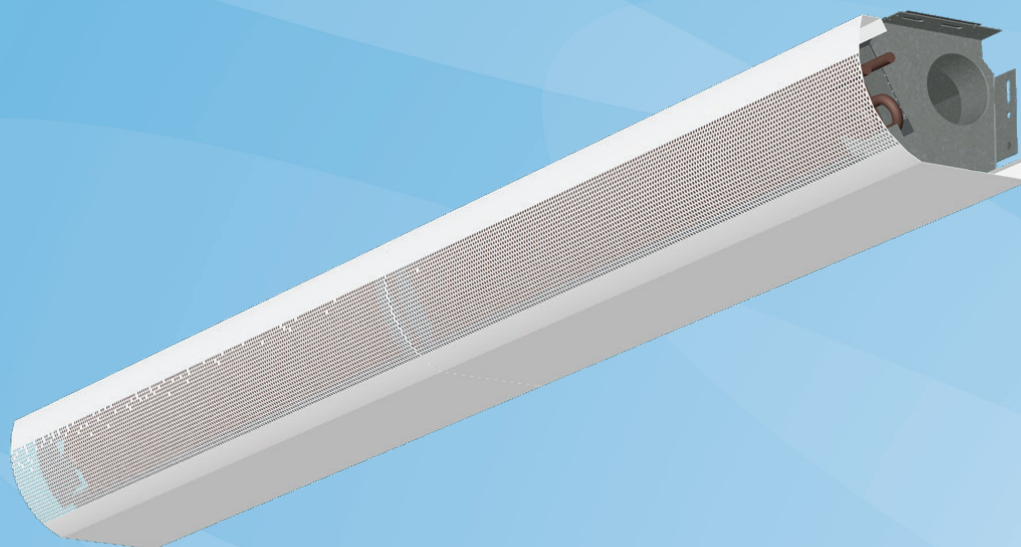


Halton CBH

Active Chilled Beam

20/CBH/3500/0606/EN



- Combined cooling, heating and supply air unit for exposed wall installation
- Well suited for hotel guest rooms with high requirements for thermal comfort and room acoustics
- Ideal also for other buildings where good indoor environmental quality and individual room control are appreciated
- Limited need for maintenance, due to simple and hygienic principle of operation

Product Models and Accessories

- Model with combined cooling and heating coil
- Options for chilled/hot water pipe connection locations
- Coil with air venting valve

Material and finishing

Cooling/heating water pipe connections are Cu15/Cu10 with a wall thickness of 1.0 mm fulfilling the European Standard EN 1057:1996. The maximum operating pressure of chilled/hot water pipework is 1.0 MPa. The supply air ductwork connection is D100 mm.

MATERIAL AND FINISHING

| PART | MATERIAL | FINISHING | NOTE |
|-------------------|------------------------------|--|---|
| Front panel | Pre-painted galvanised steel | Polyester-painted White RAL 9010/ 20 % gloss | Special colours available Polyester-epoxy-painted |
| Supply air plenum | Galvanised steel | | |
| Supports | Galvanised steel | | |
| Brackets | Galvanised steel | | |
| Coil pipes | Copper | | |
| Coil fins | Aluminium | | |

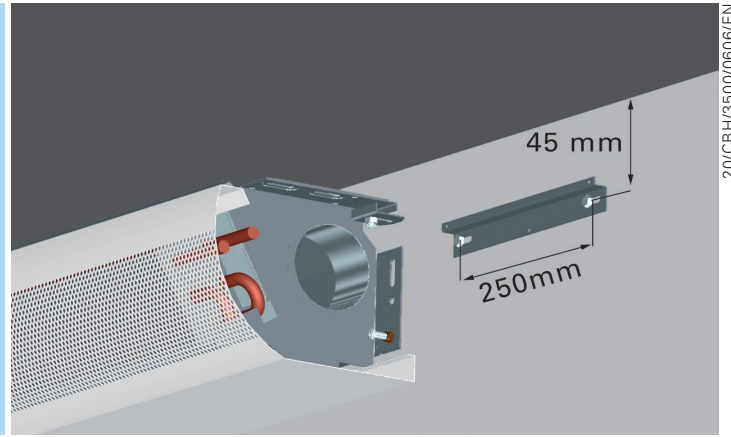
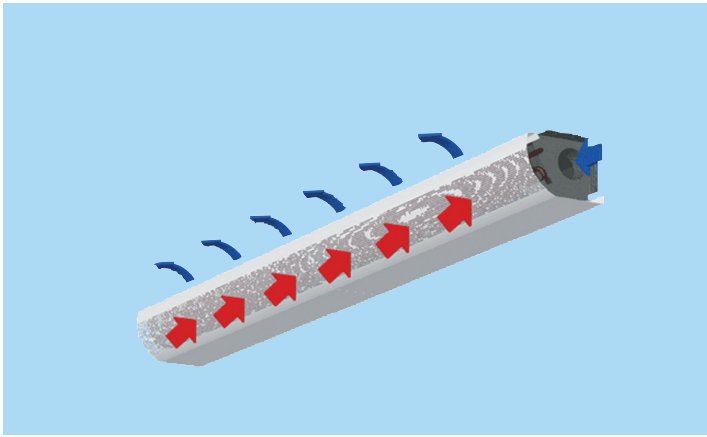
QUICK SELECTION

| qv | Pa | 50 | 72 | 108 | 144 | 180 | 216 |
|-------------|----------------------|------|------|-------|-------|-------|-------|
| | l/s | 7 | 10 | 15 | 20 | 25 | 30 |
| | m ³ /h | 25,2 | 36 | 54 | 72 | 90 | 108 |
| Leff | | | | | | | |
| 1400 | Pw | | 252 | 356 | | | |
| | NZ/ ΔP_{tot} | | G/46 | G/104 | | | |
| | Ld | | 2,2 | 3,4 | | | |
| 1700 | Pw | | 326 | 377 | 478 | | |
| | NZ/ ΔP_{tot} | | F/68 | G/72 | G/128 | | |
| | Ld | | 2 | 2,6 | 3,6 | | |
| 2000 | Pw | | 341 | 393 | 504 | | |
| | NZ/ ΔP_{tot} | | F/49 | G/53 | G/94 | | |
| | Ld | | 1,8 | 2,4 | 3 | | |
| 2300 | Pw | | 353 | 406 | 524 | 632 | |
| | NZ/ ΔP_{tot} | | F/36 | G/41 | G/72 | G/113 | |
| | Ld | | 1,4 | 2 | 2,6 | 3,4 | |
| 2600 | Pw | | 363 | 520 | 541 | 656 | 764 |
| | NZ/ ΔP_{tot} | | F/28 | F/63 | G/57 | G/90 | G/129 |
| | Ld | | 1,2 | 2 | 2,4 | 3 | 3,6 |
| 2900 | Pw | | | 536 | 556 | 678 | 790 |
| | NZ/ ΔP_{tot} | | | F/51 | G/47 | G/73 | G/106 |
| | Ld | | | 2 | 2 | 2,6 | 3,2 |
| 3200 | Pw | | | 549 | 704 | 695 | 814 |
| | NZ/ ΔP_{tot} | | | F/41 | F/74 | G/62 | G/89 |
| | Ld | | | 1,6 | 2,2 | 2,4 | 3 |
| 3500 | Pw | | | 562 | 722 | 711 | 835 |
| | NZ/ ΔP_{tot} | | | F/35 | F/62 | G/53 | G/76 |
| | Ld | | | 1,4 | 2 | 2 | 2,6 |
| 3800 | Pw | | | 571 | 740 | 725 | 837 |
| | NZ/ ΔP_{tot} | | | F/29 | F/52 | G/46 | G/66 |
| | Ld | | | 1,4 | 2 | 2 | 2,4 |
| 4100 | Pw | | | | 754 | | |
| | NZ/ ΔP_{tot} | | | | F/45 | | |
| | Ld | | | | 1,6 | | |

| | | | |
|------------------|--|--|------------|
| Leff | Effective length, length of cooling coil, mm | Room temperature (Tr) | = 24 °C |
| Pa | Supply air capacity, W | Chilled water inlet temperature (Twin) | = 15 °C |
| Pw | Coil capacity, W | Chilled water outlet temperature (Twout) | = 17 °C |
| NZ | Nozzle type | Supply air temperature (Ta) | = 18 °C |
| ΔP_{tot} | Chilled beam chamber pressure, Pa | A-weighted sound pressure level, reduced by total equivalent absorption surface of 10m ² , dB(A) red 10m ² sab | < 35 dB(A) |
| Ld | Distance where supply air jet detaches from the ceiling, m | | |

PRODUCT MODELS AND ACCESSORIES

| ACCESSORY MODEL | CODE | DESCRIPTION | NOTE |
|---------------------------------------|--|---|--|
| Combined cooling and heating coil | TC = H or E | H = Coil with hot water circulation. E = Coil with hot water circulation and air venting valves. | Cooling/heating copper water pipe connections are \varnothing 15/10 mm |
| Coil equipped with valves for venting | TC= D or E | D = Coil with cold water circulation E = Coil with hot water circulation and air venting valves. | Cooling/heating copper water pipe connections are \varnothing 15/10 mm |
| Water pipe connections | WD = S or O | S = straight connection O = pipe connection of the heat exchanger at the opposite end from the supply air connection | |
| Duct cover | Made upon request, please contact Halton for details | Lengths: 800, 900, ...2500 mm | Pre-painted galvanised steel, Polyester painted RAL 9010 20% gloss |



20/CBH/3500/0606/EN

Function

The supply air enters the plenum of the active chilled beam, from which it is diffused into the room through nozzles and the supply slot located on the top of the beam.

The air nozzle jets efficiently induce flow of ambient room air through the heat exchanger, where it is either cooled or heated.

The supply air jet is directed horizontally along the ceiling surface.

Two different nozzle sizes are available to enable different supply airflow rates.

The cooling and heating capacities of the chilled beam are controlled by regulating the water flow rate according to the control signal of the room temperature controller.

The CBH active chilled beam is designed for exposed installation next to the wall.

Installation

Fasten the unit to the wall using two assembly brackets, included in the delivery.

Adjust the beam horizontally and vertically to the desired position by using the two adjustment screws.

The beam installation can be secured with screws through pre-drilled holes in the beam.

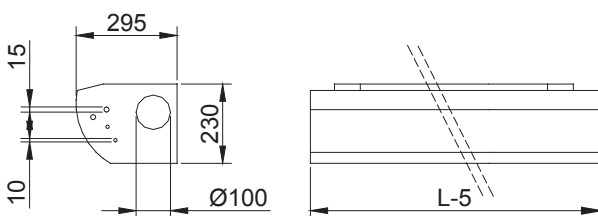
Install the main pipelines of the cooling and heating water loops above the level of the chilled beam to enable the venting of the pipework.

The supply air duct and pipe connection locations are specified when the product is ordered.

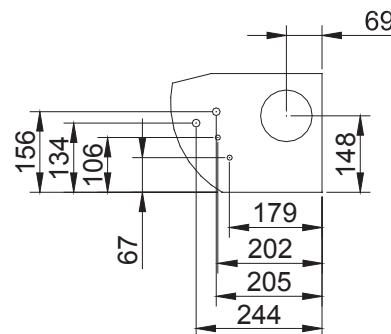
However, due to the symmetrical design, the supply air duct and pipe connection locations can be, when necessary, changed at the installation site:

- remove the access plug and remount it in the other end of the beam
- loosen the four fixing screws, then turn around and reassemble the heat exchanger, finally screwing in the fixing screws.

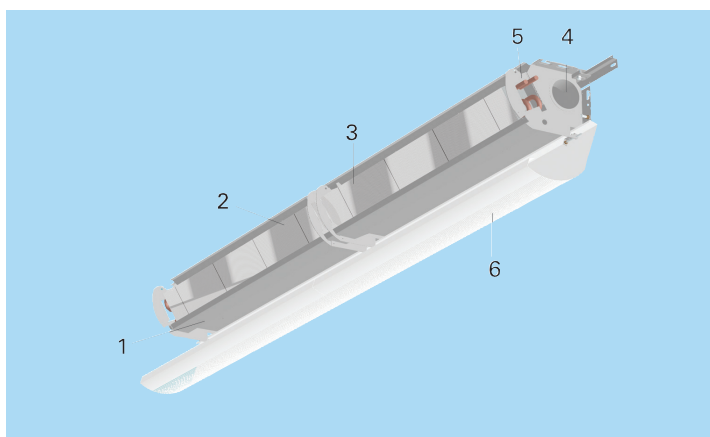
DIMENSIONS AND WEIGHT



| | |
|-------------|------------------|
| Coil length | 1500,1600...4700 |
| L-5 | 1795,1895...4995 |
| kg/m | 10 |



Location of the pipe connections



| CODE | DESCRIPTION |
|------|------------------------------|
| 1 | Front panel |
| 2 | Supply air plenum |
| 3 | Heat exchanger |
| 4 | Female supply air connection |
| 5 | Pipe connections |
| 6 | Duct cover |

Servicing

The active chilled beam CBH with its openable construction facilitates fast and easy cleaning of the supply air plenum and heat exchanger. In beams longer than 2500 mm, the front panel can be opened in two sections.

Clean the front panel using a damp cloth.

Clean the heat exchanger using a vacuum cleaner, taking care not to damage the aluminium fins of the coil.

The supply air plenum has an access plug on the back end of the beam for cleaning the plenum.

Adjustment

Cooling

The recommended cooling water mass flow rate is 0.03...0.10 kg/s, resulting in a temperature rise of 1...3 °C in the heat exchanger.

To avoid condensation, the recommended inlet water temperature of the heat exchanger is 14...16 °C.

Heating

The recommended heating water mass flow rate is 0.01...0.04 kg/s, resulting in a temperature drop of 5...15 °C in the heat exchanger.

The recommended inlet water temperature of the heat exchanger is 35...45 °C.

Balancing and control of water flow rates

The water flow rates of the beam are balanced by installing the balancing valves in the outlet water pipes of the cooling and heating water circuits.

Cooling and heating output of the beam are controlled by regulating water mass flow rates. The mass flow rate can be controlled with either an ON/OFF valve or proportionally with a 2- or 3-way valve.

Adjustment of supply airflow rate

Each beam is equipped with a measurement tap for static pressure measurement, which enables fast and accurate measurement of the supply airflow rate. The airflow rate is calculated with the formula below.

$$q_v = k * I_{\text{eff}} * \sqrt{\Delta p_m}$$

| MODEL | NOZZLE | k |
|--------------|--------|------|
| CBH/F, CBH/K | 3 | 0,73 |
| CBH/G, CBH/M | 4 | 1,04 |

CBH selection tables**Cooling: nozzle F**

| qv | l/s | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|------|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| Leff | m ³ /h | 50 | 54 | 58 | 61 | 65 | 68 | 72 | 76 | 79 | 83 | 86 |
| 3500 | ΔP_{tot} | 30 | 35 | 39 | 44 | 50 | 56 | 62 | 68 | 75 | 81 | 89 |
| | Pw | 527 | 562 | 595 | 628 | 661 | 691 | 722 | 753 | 783 | 813 | 837 |
| | Pt | 627 | 670 | 710 | 750 | 790 | 828 | 866 | 904 | 941 | 978 | 1009 |
| | LpA | 12 | 14 | 15 | 16 | 17 | 18 | 19 | 21 | 22 | 23 | 24 |
| | Ld | 1,4 | 1,4 | 1,4 | 1,8 | 1,8 | 2 | 2 | 2 | 2,2 | 2,4 | 2,4 |
| 3900 | ΔP_{tot} | | | 32 | 36 | 40 | 45 | 50 | 55 | 60 | 66 | |
| | Pw | | | 610 | 644 | 679 | 712 | 745 | 777 | 808 | 837 | |
| | Pt | | | 725 | 766 | 808 | 848 | 889 | 928 | 966 | 1002 | |
| | LpA | | | 16 | 16 | 17 | 17 | 18 | 19 | 19 | 20 | |
| | Ld | | | 1,4 | 1,4 | 1,6 | 1,6 | 1,8 | 2 | 2 | 2 | |
| 4300 | ΔP_{tot} | | | | 30 | 33 | 37 | 41 | 45 | 50 | 54 | |
| | Pw | | | | 658 | 695 | 729 | 764 | 798 | 830 | 837 | |
| | Pt | | | | 780 | 824 | 865 | 907 | 948 | 988 | 1002 | |
| | LpA | | | | 16 | 17 | 17 | 18 | 18 | 19 | 19 | |
| | Ld | | | | 1,4 | 1,4 | 1,4 | 1,6 | 1,6 | 1,8 | 2 | |
| 4700 | ΔP_{tot} | | | | | | 31 | 35 | 38 | 42 | | |
| | Pw | | | | | | 744 | 780 | 815 | 837 | | |
| | Pt | | | | | | 880 | 923 | 966 | 994 | | |
| | LpA | | | | | | 17 | 17 | 18 | 18 | | |
| | Ld | | | | | | 1,4 | 1,4 | 1,4 | 1,6 | | |

Heating: nozzle F

Recommended maximum linear meter heating capacity in 80-120 Pa pressure level is 180 W/m.

Cooling: nozzle G

| qv | l/s | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
|------|-------------------|-----|-----|-----|-----|-----|------|------|------|------|
| Leff | m ³ /h | 83 | 86 | 90 | 94 | 97 | 101 | 104 | 108 | 112 |
| 3500 | ΔP_{tot} | 45 | 48 | 53 | 57 | 61 | 66 | 71 | 76 | 81 |
| | Pw | 658 | 685 | 711 | 736 | 761 | 786 | 810 | 835 | 837 |
| | Pt | 823 | 857 | 890 | 922 | 955 | 987 | 1018 | 1050 | 1059 |
| | LpA | 20 | 20 | 21 | 21 | 22 | 22 | 22 | 23 | 23 |
| | Ld | 2 | 2 | 2 | 2,2 | 2,4 | 2,4 | 2,4 | 2,4 | 2,6 |
| 3900 | ΔP_{tot} | | | 44 | 47 | 51 | 55 | 59 | 63 | |
| | Pw | | | 728 | 754 | 782 | 807 | 833 | 837 | |
| | Pt | | | 907 | 941 | 975 | 1008 | 1041 | 1052 | |
| | LpA | | | 21 | 22 | 22 | 22 | 23 | 23 | |
| | Ld | | | 2 | 2 | 2 | 2 | 2,2 | 2,4 | |
| 4300 | ΔP_{tot} | | | | | | 46 | 50 | | |
| | Pw | | | | | | 825 | 837 | | |
| | Pt | | | | | | 1026 | 1045 | | |
| | LpA | | | | | | 22 | 22 | | |
| | Ld | | | | | | 2 | 2 | | |
| 4700 | ΔP_{tot} | | | | | | | | | |
| | Pw | | | | | | | | | |
| | Pt | | | | | | | | | |
| | LpA | | | | | | | | | |
| | Ld | | | | | | | | | |

Heating: nozzle G

Recommended maximum linear meter heating capacity in 80-120 Pa pressure level is 210 W/m.

Notations of the selection tables

LpA values presented with room attenuation 4 dB (red 10m² - sab).
When using room attenuation 8 dB (red 25m² - sab): LpA - 4dB.

| | |
|-------------------|--|
| L _{eff} | Effective length, length of cooling coil, mm |
| ΔP _{tot} | Chilled beam chamber pressure, Pa |
| P _w | Coil capacity, W |
| P _t | Total capacity, W |
| LpA | A-weighted sound pressure level, reduced by total equivalent absorption surface of 10m ² , dB(A) red 10m ² - sab |

L_d Distance from the supply unit, at which air jet detaches from ceiling, m

| | |
|--|---------|
| Room temperature (Tr) | = 24 °C |
| Chilled water inlet temperature (T _{in}) | = 15 °C |
| Chilled water outlet temperature (T _{out}) | = 18 °C |
| Supply air temperature (T _a) | = 18 °C |

Water pressure drop

$$\Delta p_w = k_{coil} * q_{mw} * z$$

$$k_{coil} = a + b * L_{eff}$$

| Factor | Unit | Description |
|-------------------|--------|--------------------------------------|
| Δp _w | [kPa] | Pressure drop of water flow |
| q _{mw} | [kg/s] | Water flow rate |
| L _{eff} | [mm] | Effective length of the chilled beam |
| k _{coil} | [] | k value |
| a,b | [] | Parameters for the selected beam |

| Beam | Cooling b | Cooling a | Z | Heating b | Heating a | Z |
|------|-----------|-----------|------|-----------|-----------|------|
| CBH | 0.2293 | 87.07 | 1.87 | 0.7464 | 275.21 | 1.87 |

Water flow range

| Beam | Cooling | Heating |
|------|--------------------|--------------------|
| CBH | 0.030 – 0.100 kg/s | 0.010 – 0.040 kg/s |

Suggested specifications

The active chilled beam shall have an integral uni-directional air supply. The supply air plenum is to be manufactured as a single construction free from joints.

The front panel shall be openable and detachable for cleaning without using any special tools.

The active chilled beam shall be 295 mm wide and 230 mm high, with an inlet duct diameter of 100 mm.

The front panel shall be made of galvanised steel plate to a thickness of 0.75 mm. All visible parts shall be white RAL 9010, 20 % gloss.

The cooling heat exchanger shall consist of a coil with aluminium fins and six 15-mm pipes connected in series.

All joints shall be fully soldered and factory pressure tested. Connection pipes shall be manufactured from copper, with a wall thickness of 1.0 mm.

Heating shall be incorporated within the heat exchanger by two 10-mm pipes connected in series.

The pipework's maximum rated operation pressure is 1.0 MPa. Each beam shall be protected by a removable plastic coating. The duct connection and pipe ends shall be sealed during transit.

Each beam is to be identifiable by a serial number printed on a label attached to the beam.

Product code

CBH/S-E-L-C

S = Direction of supply patterns & nozzle type

F F=Uni-directional / Right / Nozzle 3

K K=Uni-directional / Left / Nozzle 3

G G=Uni-directional / Right / Nozzle 4

M M=Uni-directional / Left / Nozzle 4

E = Duct direction/size/damper

S1N Straight / 100 /Without damper

L = Beam length

1800,+100,...,5000

C = Length of cooling coil

L-1500,+100,...,L-300

Specifics and accessories

WD = Water connection direction

S Straight

O Opposite

TC = Type of coil

C Cooling

H Cooling and Heating

D Cooling only,venting valves

F Cooling+Heating,venting valves

CO = Colour

W White

X Special colour

FP = Front panel type

C Standard

Code example

CBH/F-S1N-1800-1500, WD=S,TC=C,CO=W,FP=C