

# KOOLAIR

## series

# VPK

## Passive chilled beams

ISO 9001

BUREAU VERITAS  
Certification

Sistema de Gestión



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## Passive chilled beams

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## VPK passive chilled beams



### Description

The ceiling-mounted **VPK** series passive chilled beams are used without an air supply and are used to reduce heat loads within a zone.

Passive chilled beams use water to carry cooling power to the various areas which is advantageous as the cooling pipes save on energy and space, in comparison to all-air systems.

Additionally the temperature of each room or independent area can be controlled by adding a 2- or 3-port valve to the terminal unit controlled by the respective area PIR or thermostat control.

Passive chilled beams may be installed flush with a drop ceiling or exposed in a hanging position.



### Material

**VPK** passive chilled beams comprise of a decorative housing and a battery with connection flanges.

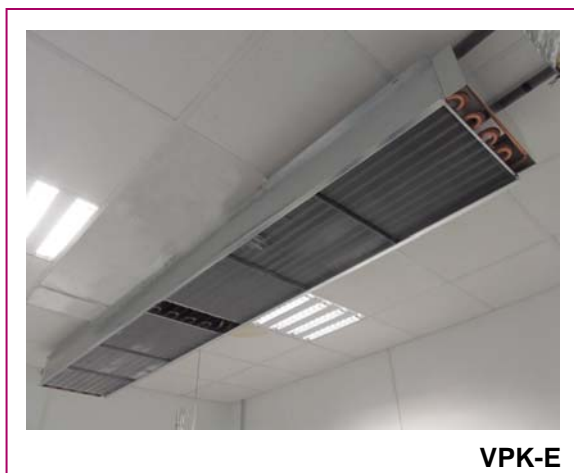
The housing and perforated face plate are manufactured from galvanised steel. The cooling battery consists of copper pipes and an aluminium fin pack, with galvanised flanges.

The **VPK-E** model does not include a perforated face plate grille; the standard installation of this beam is above a perforated ceiling (by others) (the free area must be used to determine the cooling power obtained from the battery).

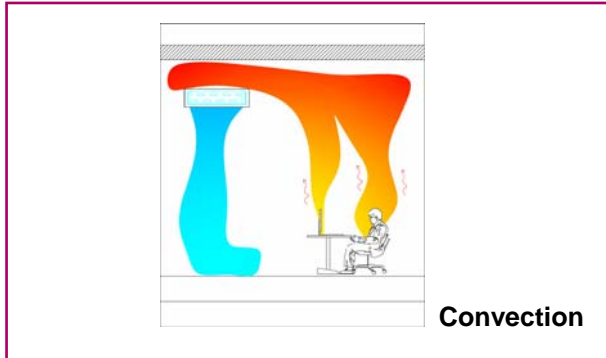
The standard surface finish is white (RAL 9010) powder coat finish. Upon request, both the face plate perforation and the colours may be modified.

In addition, light fixtures, speakers, sprinklers, etc., may be installed to create a Multi-Service beam

By request special variants can be analysed to allow adaptation to suit any customer requirements.



## Operating Principles



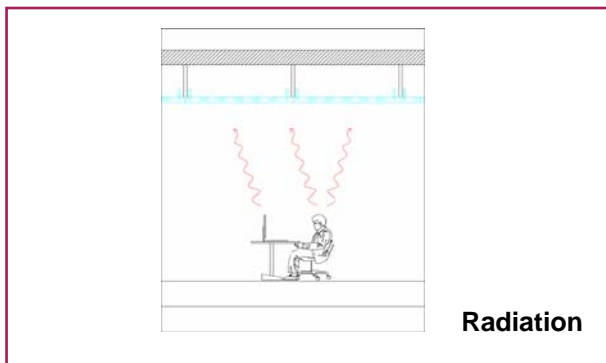
When a bodies temperature is higher than the ambient temperature, it will emit heat; this process can take place in three different ways: conduction, convection and radiation.

Heat is transferred from the passive chilled beams mainly by natural convection and only very minimally by radiation.

Hot air in contact with the cold battery surface flows downward through the beam and into the room.

Passive chilled beams are not connected to the air ventilation system, which can be supplied from either high or low level.

The air terminal layout must be carefully designed, in order to avoid interference with beam operation. The supply air must not obstruct convective flow from the beam.

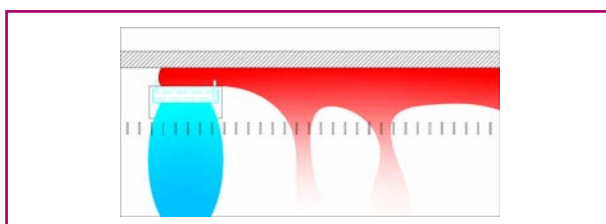


On installation of a passive beam, the distance between the beam and the ceiling is a key factor used to determine the output (cooling power) of the passive unit. There must be sufficient free space between the top of the passive chilled beams and the ceiling, in order to ensure sufficient convective air passing unrestricted over the beam.

One advantage of a passive chilled beam installation in the perimeter around glass facades / windows is to offset solar gains in the perimeter area and minimise the depth of areas with high cooling requirements.

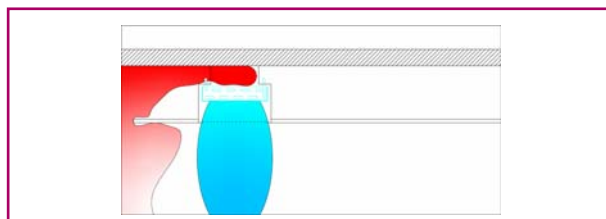
## Passive Beam Positioning

Passive chilled beams may be installed in many different kinds of ceiling; however, the path to distribute the air flow around the beam must not be obstructed.



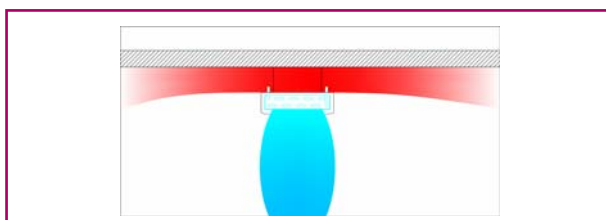
**Passive chilled beams freely suspended above the ceiling structure.**

The openings in the architectural ceiling must be large enough to ensure free circulation of air.



**Chilled beams built into drop ceiling, independent installation of adjacent drop ceiling.**

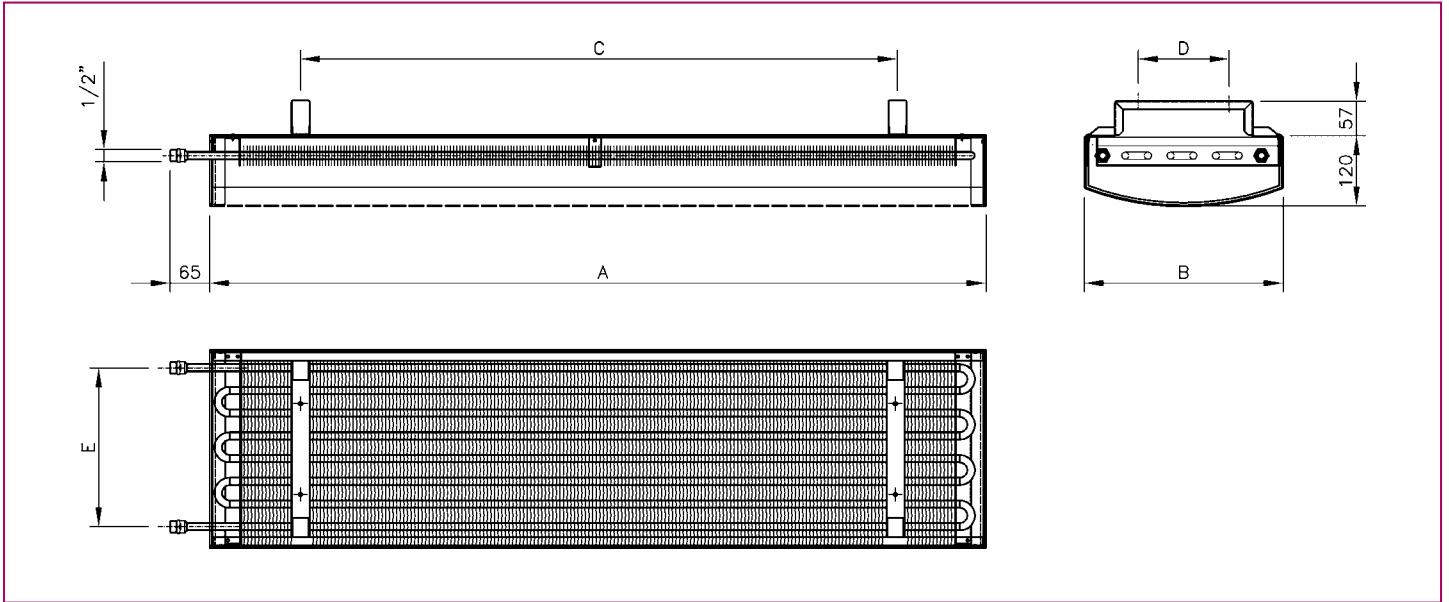
There must be space between the ceiling tiles around the beams, in order to ensure adequate ventilation.



**Suspended passive chilled beams.**

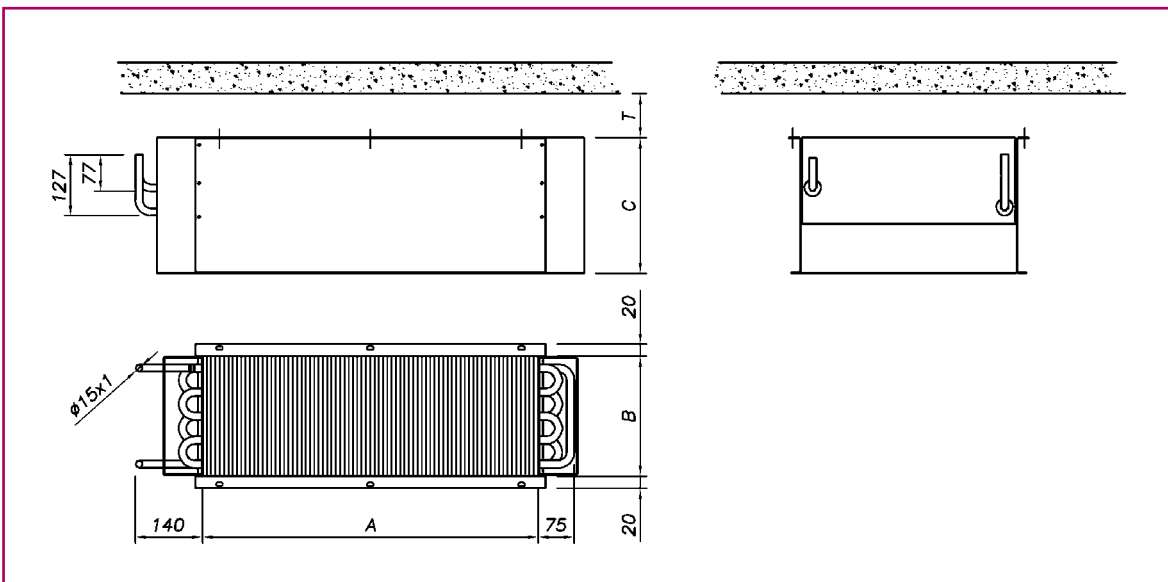
The units can be installed regardless of the type of drop ceiling.

# VPK Overall Dimensions



MODEL	A	B	C	D	E
VPK-120-330-900	900	330	600	150	263
VPK-120-330-1200	1200	330	900	150	263
VPK-120-330-1500	1500	330	1200	150	263
VPK-120-330-1800	1800	330	1500	150	263
VPK-120-330-2100	2100	330	2x900	150	263
VPK-120-330-2400	2400	330	2x1050	150	263
VPK-120-330-2700	2700	330	2x1200	150	263
VPK-120-330-3000	3000	330	2x1350	150	263

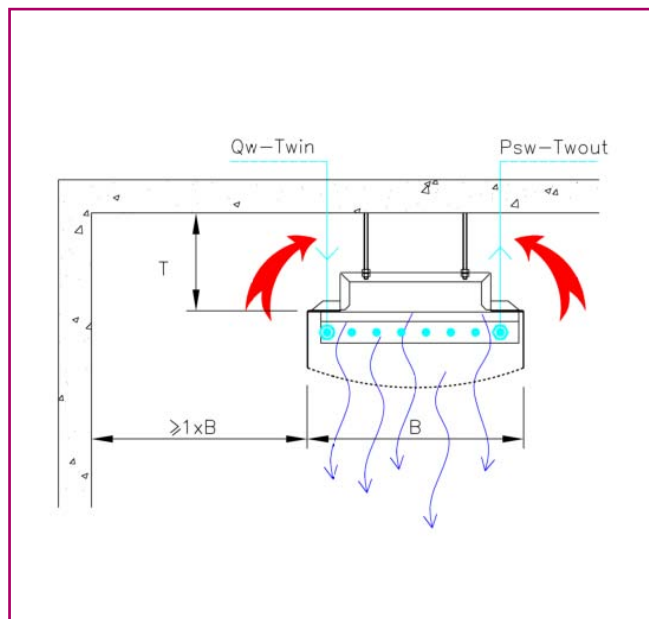
# VPK-E Overall Dimensions



A	B
1500	320
2000	
2500	
3000	450
1500	
2000	
2500	600
3000	
1500	
2000	600
2500	
3000	

## Technical data

The technical data for the passive chilled beams have been obtained from laboratory tests performed as per UNE-EN 14518.



**Symbols**

- Q (L/H) Water flow
- $T_R$  (°C) Room temperature
- $A_k$  (%) Perforated plate, free area
- P (W/m) Cooling power per metre
- $T_{win}$  (°C) Water inlet temperature
- $T_{wout}$  (°C) Water outlet temperature
- $\Delta T_{Wm}$  Mean cooling water temperature
- $\Delta T_{RWm}$  (K) Temperature difference between ambient air and mean cooling water
- $K_p$  Water pressure drop factor
- $\Delta P_W$  Pressure drop in water ( $\Delta P = Q/K_p)^2$
- A Beam length, in m
- B Beam width, in m
- C Beam height, in m
- T Beam-to-ceiling distance

**Design parameters**

Q (L/H)	110
$T_R$ (°C)	25
$\Delta T_{RWm}$ (K)	10

Model	$A_k$ (%)	P (W/m)	$\Delta P_W$ (kPa)	$K_p$
VPK	32	157	0.86	0.033
	50	178		
	100	187		

**Design parameters**

Q (L/H)	120
$T_R$ (°C)	26
$\Delta T_{RWm}$ (K)	10

Model	$A_k$ (%)	C	P (W/m)								
			B: 350			B: 450			B: 6		
VPK-E	25	200	250	300	200	250	300	200	250	300	
			148	158	170	224	240	258	269	302	325
			177	190	204	269	288	309	323	362	389
VPK-E	50	200	250	300	200	250	300	200	250	300	
			213	228	245	323	345	371	387	435	467
			177	190	204	269	288	309	323	362	389
VPK-E	100	200	250	300	200	250	300	200	250	300	
			213	228	245	323	345	371	387	435	467
			177	190	204	269	288	309	323	362	389

## Product Codes

VPK	Passive beams with perforated plate
VPK-E	Passive beams without perforated plate
VPK-MS	Multiservice passive beams

600 to 3000	Length
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RAL...-9010	Standard finish in RAL-9010 white
RAL ...	RAL finish to be defined

Example:

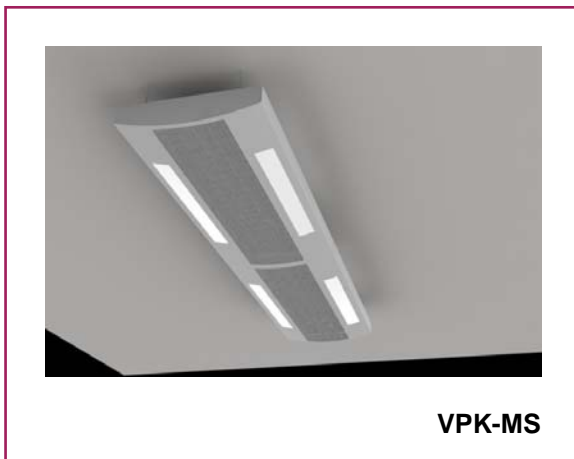
**VPK-E-2000-RAL-9010**

Passive beams without perforated plate, length 2000 mm, RAL-9010 white finish.

### VPK Technical Specifications

VPK passive chilled beams, of length L mm and width B mm, for installation in modular drop ceilings. This unit includes an interior battery in horizontal position (2 tubes) for cooling, copper pipes with gas-type threaded connections (outer diameter, 12 mm) and an aluminium fin pack. The unit is fitted with forged supports for hanging. Standard finish of gloss paint (RAL9010). Other RAL colours upon request.

## VPK-MS Multiservice Passive Chilled Beams



Depending on the installation requirements, KOOLAIR can design Multiservice Passive Chilled Beams specifically adapted to a project. This new chilled beam design allows for inclusion of different services, such as lighting (LED, linear, halogens, etc.), public-address system, smoke detectors, sprinklers, etc







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