EFFI

hydronic ceiling climate panels

Contents:

Overview

"We check the usage regularly. Normally there is a number of heat coils fans in these shops and the savings in hot water by using EFFI FERRUM climate panels instead of fan coils is 50-54%.

It gives good indications of savings. Very good. We also have to consider the savings in no maintenance of fan coils, low noise level, less wiring and so on."

Thor Einarsson
chief operating engineer
Bonus supermarkets chain

EFFI Supermarket, Reykjavik, Iceland

EFFI FERRUM climate panels offer a versatile way to keep indoor spaces comfortable. They provide efficient heating and cooling, making them a great year-round solution for any season.

Human comfort depends on how heat or cold is received. Basking in the sun during winter or stepping into a cool cave on a hot day feels natural. EFFI FERRUM climate panels recreate these effects, delivering thermal energy the same way.

Thermal radiation spreads through the air without losing energy, heating only the surfaces it touches or absorbing heat from warmer objects in cooling mode.

A key benefit of the climate panels is their ability to work with any heat or cold water source—heat pump, gas, electric boiler, solid fuel, or centralized heating. There's no need to rely on a single energy source, allowing you to choose the most cost-effective option.

The climate panels are particularly effective in high-ceiling spaces, starting at 3 m and above, such as production facilities, warehouses, hangars, distribution and shopping centers, exhibition halls, indoor sports arenas, car dealerships, and concert stages.

Safe and reliable, they can be used in areas with high fire and explosion risks, yet they are also suitable for hospitals, schools, and daycare centers.

Operating Principles

EFFI FERRUM climate panels use a hydronic system to transfer energy from any heating or cooling source, such as a heat pump or any type of boiler.

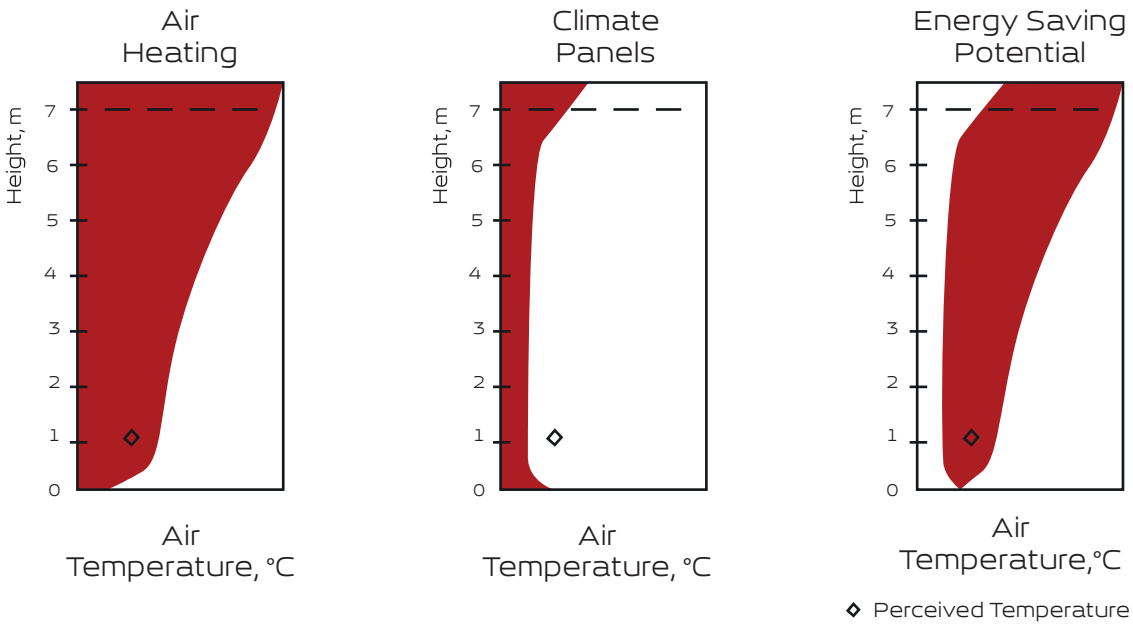
The panels then distribute thermal energy throughout the space, radiating it efficiently and warming or cooling the surfaces and objects they meet, with minimal energy loss.

A key benefit of EFFI FERRUM climate panels is that they primarily affect objects, surfaces, and bodies rather than directly heating or cooling the air.

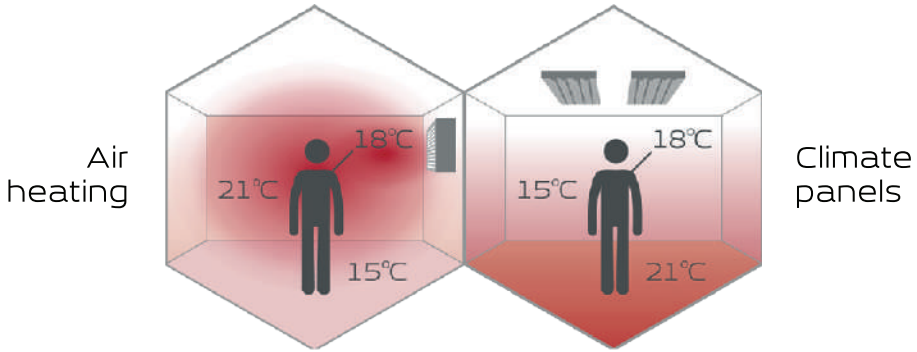
They function similarly to how the sun's direct thermal radiation provides warmth even on a cold, clear day. This is the most natural way for humans to receive warmth.

Just as objects absorb infrared radiation, they also emit it toward cooler surfaces. Chilled ceiling panels absorb infrared radiation from warmer objects and people in the room, effectively cooling them down.

Energy Saving Potential



Heating systems comparison:



EFFI FERRUM climate panels operate by transferring energy through infrared radiation.

Air is transparent to this radiation, allowing direct heating or cooling of solid objects and surfaces within a room.

In heating mode, they emit infrared energy to warm bodies and surfaces, while in cooling mode, they absorb infrared radiation from warmer objects in the space.

This approach enhances thermal comfort by roviding an optimal perceived temperature. It also allows for a lower air temperature and minimizes air movement, leading to significant energy savings.

Benefits

Up to 50% energy savings compared to air-based systems Infrared radiation efficiently transfers thermal energy with minimal loss, as air remains transparent to it.

No electricity needed for fan operation
The system does not rely on convection or forced air distribution, reducing energy consumption.

Silent operation
EFFI climate panels provide completely silent heating and cooling.

No drafts and no dust circulation
Panels warm objects and bodies directly rather than heating the air, liminating air movement and reducing dust circulation.

Uniform room temperature
Temperature variation between the floor and ceiling is only 2–4°C, ensuring even comfort.

EFFI DB Schenker Logistics Center, Stockholm, Sweden.

Benefits

Low operating temperature
Climate panels are an excellent match for heat pumps, operating efficiently with a low water temperature source starting from 35°C.

Maximized usable space
Mounted on the ceiling, climate panels do not take up valuable room space.

Independent temperature zones
Enables precise temperature control for different zones within the same room.

Maintenance-free
The system requires no maintenance, and the panels are easy to install.

Compatible with any heating/cooling source
Works with heat pumps, gas, electric, and solid fuel boilers.

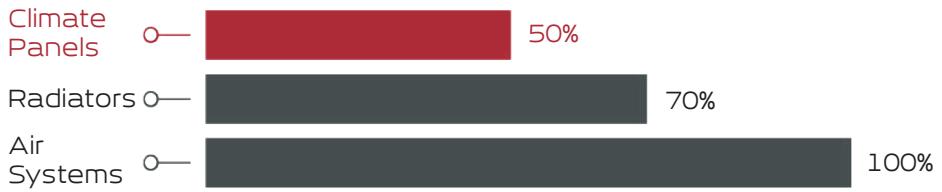
The Key Benefit

The key benefit of our products: Greater Energy Efficiency.

EFFI FERRUM eco-friendly climate panels use significantly less energy than traditional climate systems.

By investing in this energy-efficient solution, you can lower costs while improving the overall efficiency of your enterprise.

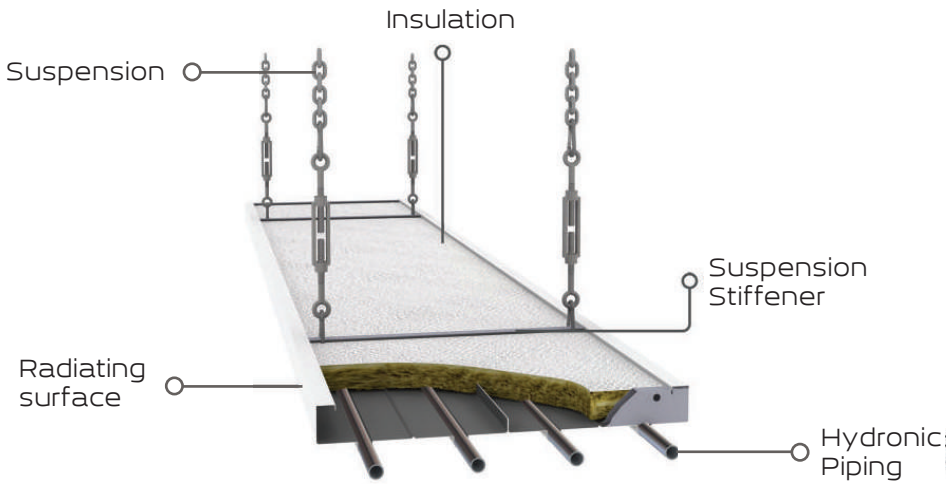
Comparison of Heating and Cooling Costs:*



* according to EN 15316-2-1:2011

Components

EFFI FERRUM climate panel scheme



The EFFI FERRUM climate panel is made of a shaped steel sheet with four galvanized steel pipes inside.

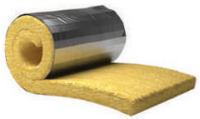
A layer of insulation, either mineral wool or special thermal insulation for wet areas, is placed on top.

The panel has a built-in mounting stiffener with pre-drilled holes for easy installation.

Press fittings connect the panels to each other and to the manifolds.

Press Fitting

Connects the panels to each other and to the manifolds.



Insulation

Protects from energy loss.

Joint Cover

Improves efficiency and enhances the appearance of connection points.

Manifold

Connects the panels to the pipeline system.

The Anti-ball Protective Grid

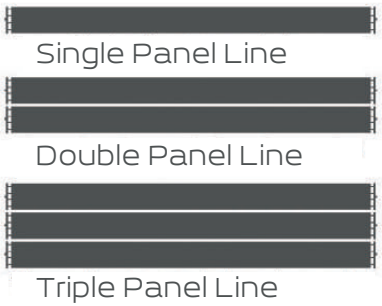
Prevents sports equipment from getting stuck and protects the panel from damage.

U-shaped Fitting

Allows you to avoid using manifolds and place the feed and return on one side.

Specifications

Possible Installation



For maximum flexibility and efficiency, EFFI FERRUM climate panels can be installed in a single line or in up to three parallel lines, with a spacing of 70 mm between them.

The maximum length of a climate panel line is 60 m, with a maximum pressure drop of 0,3 bar (30 kPa).

EFFI FERRUM climate panels are offered in five standard lengths, from 2 to 6 m.

Standard Module Length

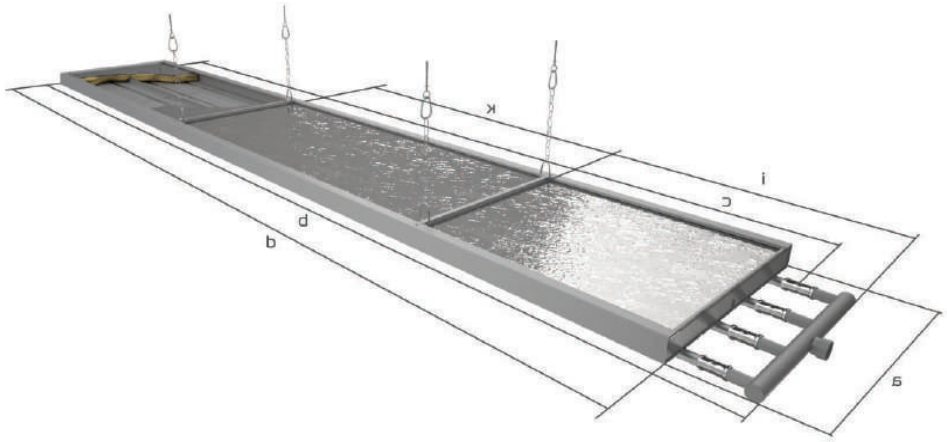
For tailored solutions, custom lengths up to 6 m are available upon request.

Specifications

Description	Size
Installation width	396 mm
Number of pipes	4 pcs
Pipe size	15 mm
Climate panel and pipe material	Steel galvanized from outside
Distance between the pipe centers	99 mm
Number of suspension points on the stiffener	2
Distance between the suspension points on the stiffener	323 mm
Maximum operating temperature	120 °C
Maximum operating pressure	16 bar (1600 kPa)
Weight without water, with insulation	3.9 kg/m
Insulation weight	0.28 kg/m
Water content	0.53 l/m
Operating weight with water and insulation	4.7 kg/m
Heating power at ΔT heat = 55 K	208 W/m
Cooling power at ΔT cool = 10 K	37 W/m

The pressure resistance and heating performance of EFFI climate panels are tested in accordance with EN 14037-1:2016 and EN 14037-2:2016 by the accredited laboratory WSP Labat Stuttgart, Germany.

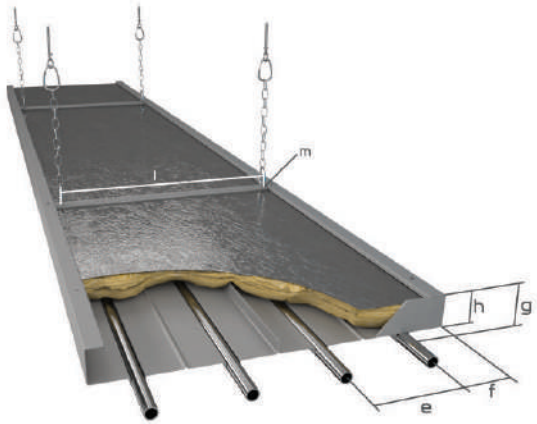
Dimensions



Dimensions of a Standard 6-m-long Panel

	Description	Size (mm)
a	Total width	396
b	Total length with manifolds	6290
c	Length of pipes	6000
d	Radiation surface length	5840
e	Distance between pipe centers	99
f	Distance from the pipe center to the edge	49.5
g	Total height	53.3
h	Edge elevation	40
i	Distance from collector to suspension stiffener	570
k	Distance between suspension stiffeners	1215
l	Distance between suspension points	323
m	Diameter of mounting holes	9

EFFI FERRUM climate panels are offered in five standard lengths: 2, 3, 4, 5, and 6 m.
For tailored solutions, custom lengths up to 6 m are available upon request.



Manifold Dimensions

Description	Size
Total length	400 mm
Total width	160 mm
Total height	110 mm
Inlet size	1"
Manifold outlet port size	15 mm
Manifold outlet port length	80 mm

Fitting Dimensions

Description	Size
Total length	53 mm
Maximum fitting diameter	22 mm
Distance between pipes inside the fitting	10 mm

Power

EFFI FERRUM Climate Panels Heating Power

ΔT heat (K)	Panel (W/m)	Pair of manifolds (W/m)	ΔT heat (K)	Panel (W/m)	Pair of manifolds (W/m)
80	321	92	48	178	46
78	311	89	46	170	44
76	302	86	44	161	41
74	293	83	42	153	39
72	284	80	40	145	36
70	275	77	38	136	34
68	266	74	36	128	31
66	257	71	34	120	29
64	248	68	32	112	27
62	239	65	30	104	24
60	230	62	28	96	22
58	222	60	26	88	20
56	213	57	24	80	18
55	208	55	22	73	16
54	204	54	20	65	14
52	195	51	18	58	12
50	187	49	16	51	10

Calculation of the Temperature Differential in Heating and Cooling:

$$t_R = \frac{(t_E + t_A)}{2}$$

$$\Delta t_{heat} = \frac{(t_F + t_{Re})}{2} - t_R$$

$$\Delta t_{cool} = t_R - \frac{(t_F + t_{Re})}{2}$$

The heating power of EFFI climate panels is tested in accordance with EN 14037-2:2016 by the accredited laboratory WSP Lab, Stuttgart, Germany.

EFFI FERRUM Climate Panels Cooling Power

Panel with insulation		Panel without insulation	
ΔT cool (K)	(W/rm)	ΔT cool (K)	(W/rm)
15	60	15	71
14	56	14	65
13	52	13	61
12	48	12	57
11	43	11	51
10	40	10	47
9	36	9	42
8	31	8	37
7	28	7	32
6	23	6	28
5	19	5	23

Heating and cooling power is shown as a function of temperature differential.

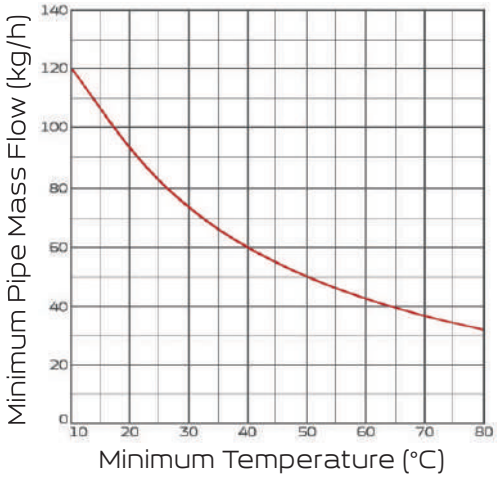
Removing insulation enhances cooling capacity; however, for optimal performance, free air circulation around the panels is essential in this case.

LEGEND:

t_A - air temperature (°C)
t_E - average surrounding surface temperature (°C)
t_R - resulting temperature (°C)
t_F - supply pipeline temperature(°C)
t_{Re} - return pipeline temperature (°C)
ΔT_{heat} - heating temperature differential (°C)
ΔT_{cool} - cooling temperature differential (°C)

Minimum Mass Flow and Temperature Limits

Minimum Mass Flow



To achieve the required power, turbulent flow must be maintained in the pipes of the climate panels.
The minimum water flow rate is determined by the lowest system temperature.

If turbulence is not achieved in each pipe, the total system power may decrease by approximately 15%.

Temperature Limits

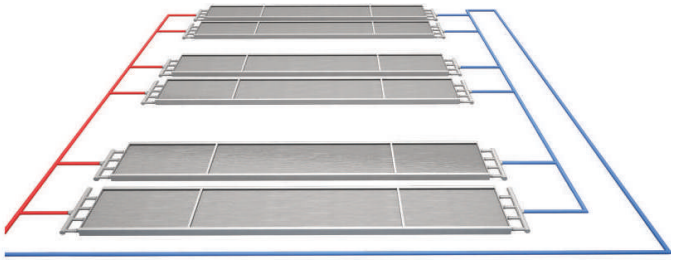
Height	Ceiling area covered with climate panels					
m	10%	15%	20%	25%	30%	35%
	Average Heating Carrier Temperature (°C)					
≤ 3	73	71	68	64	58	56
4			91	78	67	60
5				83	71	64
6				87	75	69
7				91	80	74
8					86	80
9						87
10						94

During operation, the heating carrier temperature must stay below the limits listed in the table.

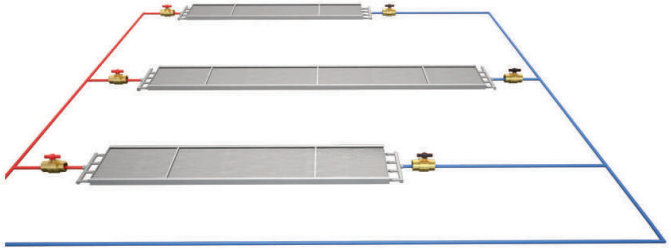
Hydraulic Balancing

Balancing

To ensure the climate panel system operates efficiently, the heat or cold carrier must be properly distributed.
When installing panels of equal length, the Tichelmann system for the pipelines is recommended.



When using climate panels of varying lengths and power, hydraulic balancing is required, which can be achieved with balancing valves.



Automatic Control Components

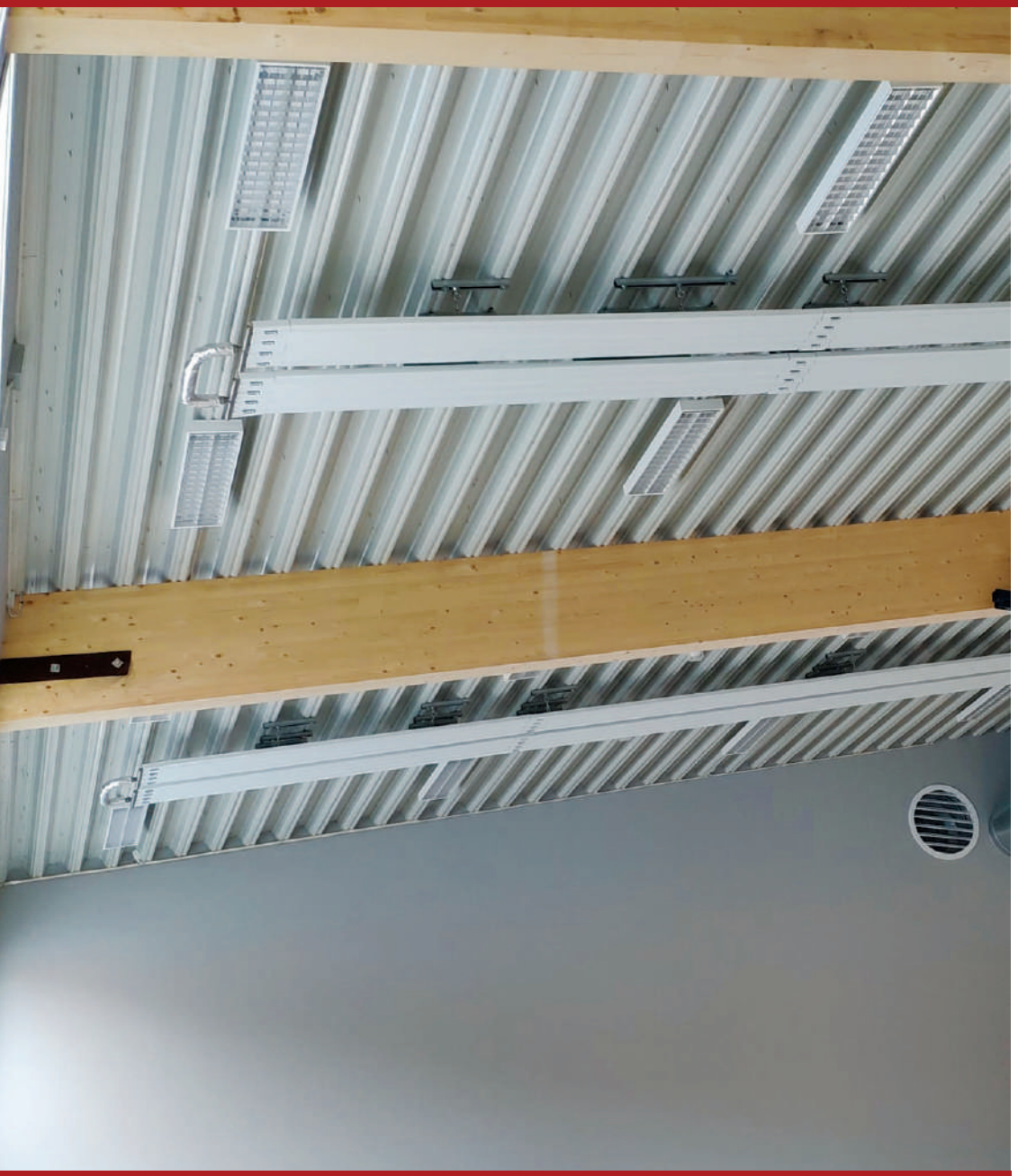
The following items can be used for the automatic control of the climate panel system:

Black Bulb Temperature Sensor

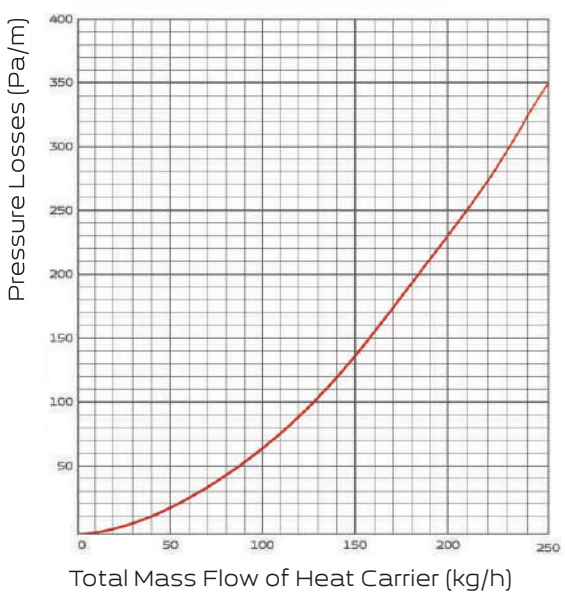
Pressure Independent Balancing Control Valves

Temperature Controller

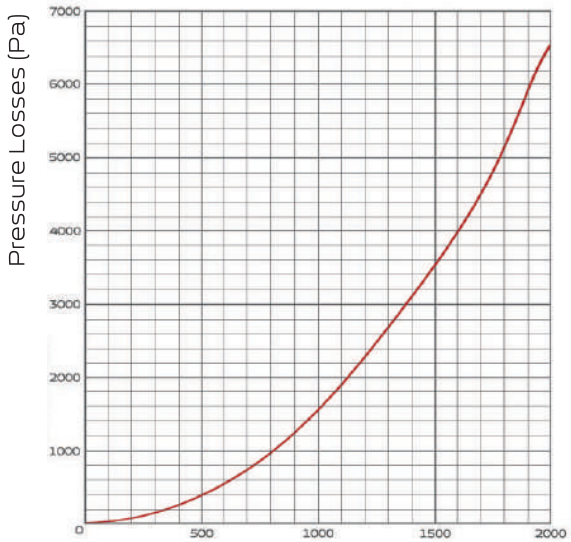
Pressure Losses



Pressure Losses In Each Pipe



Pressure Losses in the Manifold Pair



Pressure Loss Calculation

The pressure losses of EFFI FERRUM climate panels are the sum of the losses in the pipes and the manifolds.

When balancing valves are used, their pressure losses must also be considered.

Calculation Example

EFFI Manufacturing Facility, Thorup, Denmark

The heat load of the room is calculated according to the existing norms.
With increased air exchange in the room, the supply air must be preheated.
Climate panels cannot be used as air curtains at gates or doors in the room.

EFFI FERRUM Climate Panels Calculation

This example focuses on a pavilion-style room. The objective is to calculate the heat load based on an indoor temperature 20 °C and the following building parameters:

Length: 40 m
Width: 15 m
Height: 7 m
Outdoor air temperature: - 22 °C
General normalized heat loss: 63 985 W/h
Supply temperature: 80 °C
Return temperature: 60 °C

According to page 13 calculations in this document:
t_E = 20 °C,
t_A = 20 °C | t_R = (20+20) ÷ 2 = 20 °C.
t_F = 80 °C,
t_{Re} = 60 °C,
t_R = 20 °C | ΔT_{heat} = (80 + 60) ÷ 2 - 20 = 50 K.

We find that the temperature differential in our environment is ΔT_{heat} = 50 K.
With the heating power of the climate panels at this temperature differential being 187 W per linear meter of panel.
Each manifold pair has a heating power of 49 W.

Calculation Example

Panel Line Calculation:

Since each panel is 6 m long, we can fit approximately 6.7 panels along the 40-m building length: 40 ÷ 6 ≈ 6.7 panels.

Therefore, to cover the room length, we would need either 6 full panels, totaling 36 m, leaving a small gap.

The heating power of one line consisting of 6 panels, including the manifold pair, is calculated as follows:
36 x 187 + 49 = 6 781 W/h

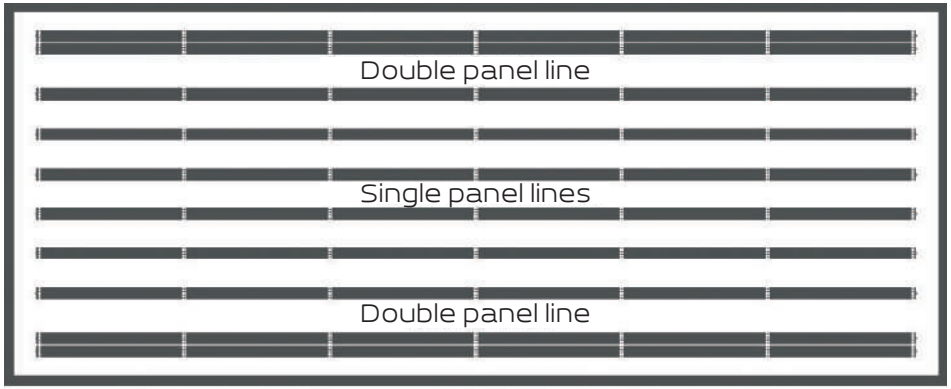
To determine the total number of lines needed, we divide the total heat loss by the power of a single line:
63 985 ÷ 6 781 = 9.44 lines

We round up and install 10 lines of climate panels, providing a small power reserve.
Each line consists of 6 modules, each 6 m long, plus two manifolds.

Final System Overview:

Total system length: 360 m
Total number of manifolds: 20
Total system heating power: 67 810 W/h

Panel Layout Diagram
2 double panel lines and 6 single panel lines

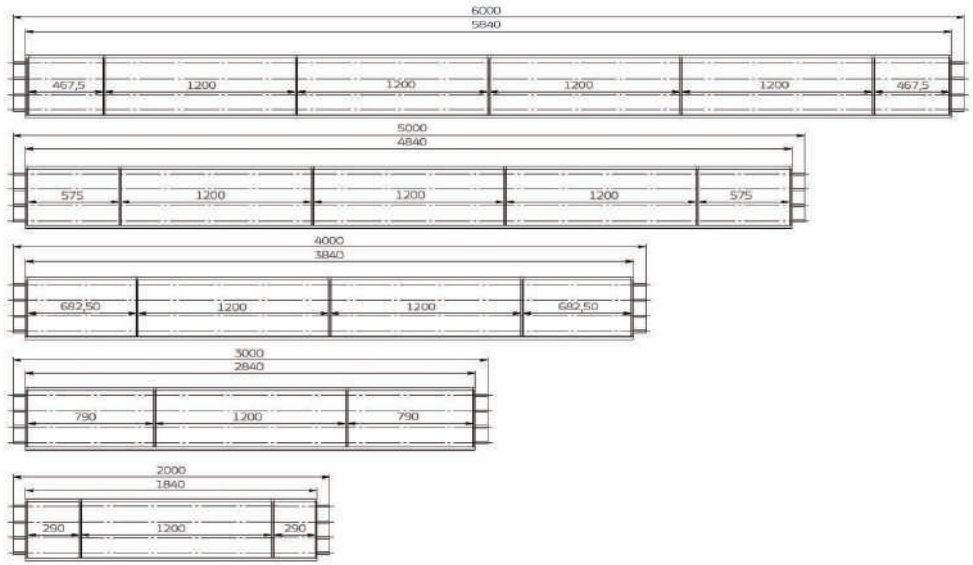


Mounting and Dimensions

Fasten suspension chains according to the building's structural arrangement plan using one of the following methods:

Concrete structures | Steel angles | Corrugated metal | Horizontal steel beams | Inclined steel beams | Directly to the ceiling

Standard EFFI FERRUM Climate Panels



Product Models and Variations

CP006

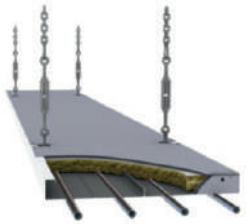
Classic EFFI Climate Panel, suitable for most rooms.

CP006W

For rooms with high humidity (e.g., car washes, swimming pools, water parks), featuring special

CP006G

A special 'anti-ball' grid prevents sports equipment from getting stuck in the climate panels. Ideal for sports gyms, arenas, and more.

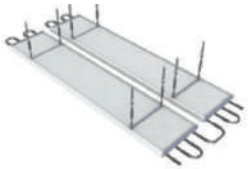


CP006S

EFFI FERRUM climate panel with thermal insulation, topped with a metal screen. The metal shield protects the thermal insulation from external elements.

CP006AGRO

This model is protected by vinyl fabric and allows for wet washing of the climate panel, making it ideal for agricultural facilities.



UB100, UB170

U-shaped connecting elements that eliminate the need for manifolds, create a 'snake' connection scheme, and place both the supply and return on the same side.

CP006HC

A model that allows you to hide the collector, ideal for rooms with high design requirements.

JC170

Cover for connections, concealing the joints between panels and the connections to the manifolds. Includes thermal insulation.

PF15S

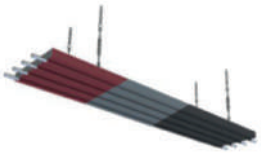
Galvanized steel type M press fitting, used for connecting panels together and to the manifolds

CR41SS

Stainless steel manifold used to connect climate panels to pipelines.

MSB2, MSB3, MSB4

Aluminum multi-suspension bar for parallel mounting of multiple panels, helping to save on mounting time and labor.



CP006-*
(* color code)

EFFI climate panels can be painted in any classic RAL color, with XXXX representing the RAL color code.

More information

effipanels.com