



■ Decorative radiators ■ Comfortable indoor ventilation ■ Heating and cooling ceilings ■ Industrial air cleaning

Zehnder ZIP

Hit the ground running with peak performance

Planning document

always the best climate

A man with a beard, wearing a red t-shirt and black shorts, is climbing an indoor rock wall. He is reaching up with both hands to grasp a large, dark grey rock hold. The wall is made of light-colored wood and is covered with various colorful holds (green, blue, red, grey). The background shows a dark, industrial-style ceiling with white structural beams.

Zehnder is a renowned international supplier of sustainable, healthy and comfortable indoor climate solutions for ventilation, heating and cooling. With their state-of-the-art features and high-quality performance, Zehnder heating and cooling ceilings offer maximum energy efficiency and comfort. They are durable, maintenance-free, operate silently and can be used flexibly.

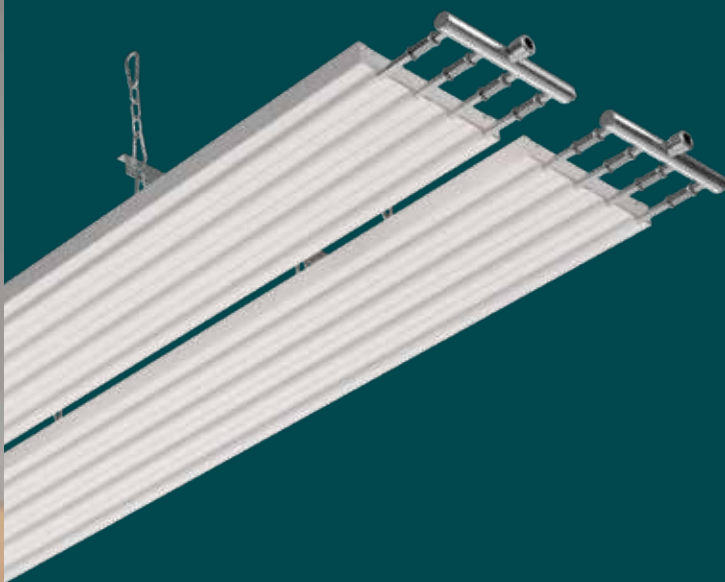
Put your trust in Zehnder heating and cooling ceilings for your project and make the right choice.



Zehnder ZIP

Maximum performance. Easy to use.

The Zehnder ZIP radiant ceiling panel enables comfortable heating and cooling from the ceiling. Their high output makes them ideal for the heating or cooling of factories and warehouses, workshops, sports halls, retail spaces and much more. The rapid reaction time of the Zehnder ZIP ensures an optimum space temperature, both in summer and winter.



Peak performance in the construction project

The Zehnder ZIP radiant ceiling panel guarantees maximum heating and cooling output. Space users experience a pleasant feeling of warmth or coolness at any time of year. Its straightforward handling during design and installation ensures that the project runs smoothly.

Our advantages

- ✓ **Maximum performance**
A pleasant temperature at any time of year that also reduces costs.
- ✓ **Easy to use**
Uncomplicated planning and installation thanks to standardised width and 5 lengths.
- ✓ **Easy to retrofit**
Its light weight means it can also be used with low roof loads.
- ✓ **Low transport costs**
More than 2 km of Zehnder ZIP panels can fit on a lorry thanks to the standardised width.





Maximum performance

Zehnder ZIP provides warm or cool space temperatures from the ceiling. The principle of radiant heat means that it is not the air that is heated, but the people and objects in the space. Consequently, people in the space feel a pleasant warmth without draughts and the air temperature is 3 K lower than what they perceive. The air temperature also remains unaffected during cooling. The heat is absorbed by the panel, which in turn makes people perceive the temperature as cooler than it actually is - a significant factor that reduces operating costs. In addition, the panel can be operated independently of the energy carrier, even with renewable energies. When operated with a heat pump, up to 40 % energy is saved compared to conventional air heaters.

Easy to use

Whether for design or installation, the Zehnder ZIP is ideal for integrating into any application. The standardised headers and collectors as well as the fixed width of 320 mm and 5 lengths significantly simplify handling on the construction site. Component mix-ups are minimised and the need for repeated checks of the construction plan is reduced. The use of multi-bars reduces the number of panel suspension points, which saves time and material. Welding is also not necessary with the Zehnder ZIP. The panels are quickly connected using crimp or threaded connections.

Easy to retrofit

Retrofitting in existing buildings is ideal with the Zehnder ZIP. Its low weight of only approx. 14.3 kg/m² with water content and insulation per Zehnder ZIP strip enables installation in almost any building, even with low roof loads.

In addition, installation is simplified due to the low weight, which is further aided by the narrow panel width of 320 mm. Existing installations such as lights, sprinklers and other building systems can be easily combined with the Zehnder ZIP design.

Low transport costs

The Zehnder ZIP's standardised panel width optimises transport. More than 2 km of material fits on one lorry. This means low transport costs for your customers.



*Riedhalle sports hall,
Steinheim a.d.M.*

Reliable operation

Thanks to the factory-fitted insulation, ZIP radiant ceiling panels ensure a consistently high heating and cooling performance. In addition, all components are galvanised and therefore protected against corrosion. The maintenance-free radiant ceiling panels from Zehnder can be relied upon to meet your requirements, whether for heating or cooling, in summer or winter.

Full galvanisation of all components

Radiant ceiling panels are an efficient solution for heating and cooling spaces. However, they can be susceptible to corrosion in environments with high humidity and temperature fluctuations as condensation can form on their surface. To counteract this problem and ensure the longevity of the radiant ceiling panels, Zehnder uses a full zinc coating for all components, effectively protecting them from corrosion. This significantly increases the service life of the radiant ceiling panels and ensures reliable protection, even in demanding environments.

Reliable thermal output and maintenance-free operation

Thanks to the factory-installed insulation, a consistently high thermal output is guaranteed. On cold days, the desired radiant heat is directed to the floor where the users of the space are located. This creates a pleasantly warm indoor climate with minimal energy loss.

Maintenance-free perfection

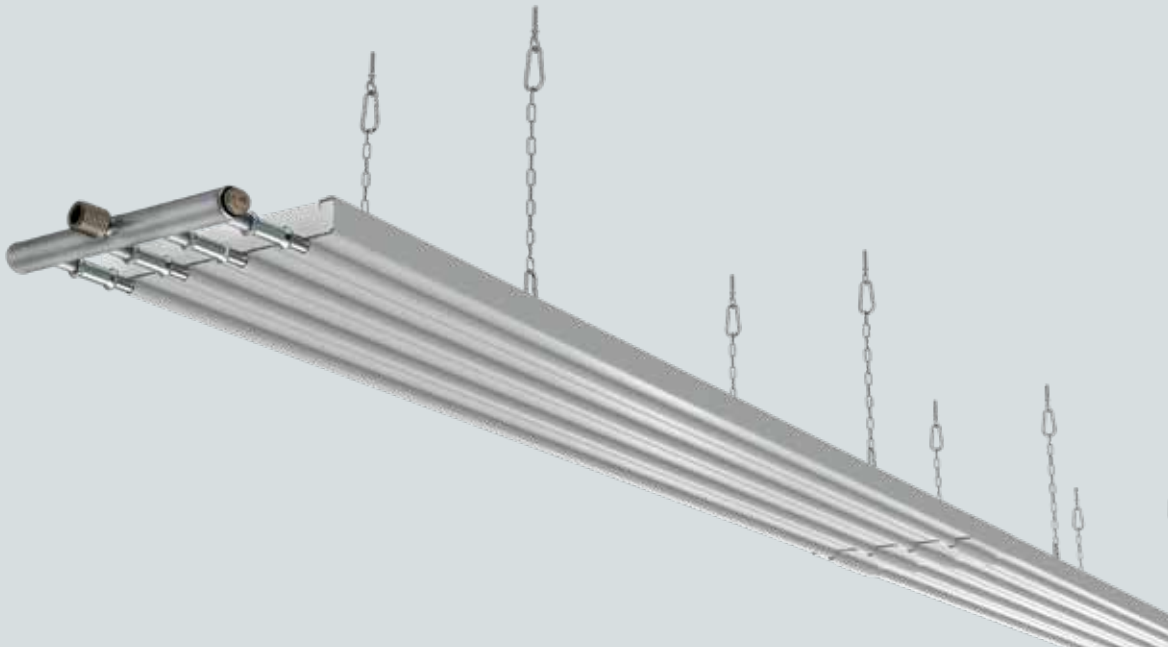
Our radiant ceiling panels are maintenance-free, which means that no regular maintenance is required and no additional costs are incurred.

Advantages for your customers

- ✓ **A pleasant indoor climate all year round with minimal energy loss**
Thanks to the factory-fitted insulation, the heat gets to where it is needed - on the floor where the users are.
- ✓ **Maintenance-free**
The panel is maintenance-free and guarantees a smooth working day without disruptions.
- ✓ **Corrosion-free**
The galvanisation of all components protects the radiant ceiling panels.
- ✓ **Sustainable and efficient**
Thanks to the constant space temperature, energy, maintenance and servicing costs are reduced.



Customised design



The surfaces of Zehnder radiant ceiling panels are coated with a high-quality powder coat finish.

As standard, our Zehnder ZIP radiant ceiling panels are available in a colour similar to RAL 9016 matt. But that's not all - you can choose from over 700 colours.

Whether you prefer a minimalist look or want to create an eye-catching impression, the wide range of colours allows you to adapt the radiant ceiling panels to your space design.

Innovative aesthetics

The ideal location of the lighting and radiant ceiling panels in the roof space allows for a perfect combination of the two systems.

Both transmit energy in the form of radiation, with Zehnder radiant ceiling panels emitting infrared radiation in the form of heat and the Zehnder LED 2.0 emitting light. A precise design that harmonises both light and heat is crucial for project solutions that combine both systems.

Zehnder offers you a comprehensive solution from a single source.

Lighting calculations from Zehnder
- customised and reliable



Our service

Consultation

- Technical consulting expertise
- Many years of practical experience
- Support available at all times

Planning

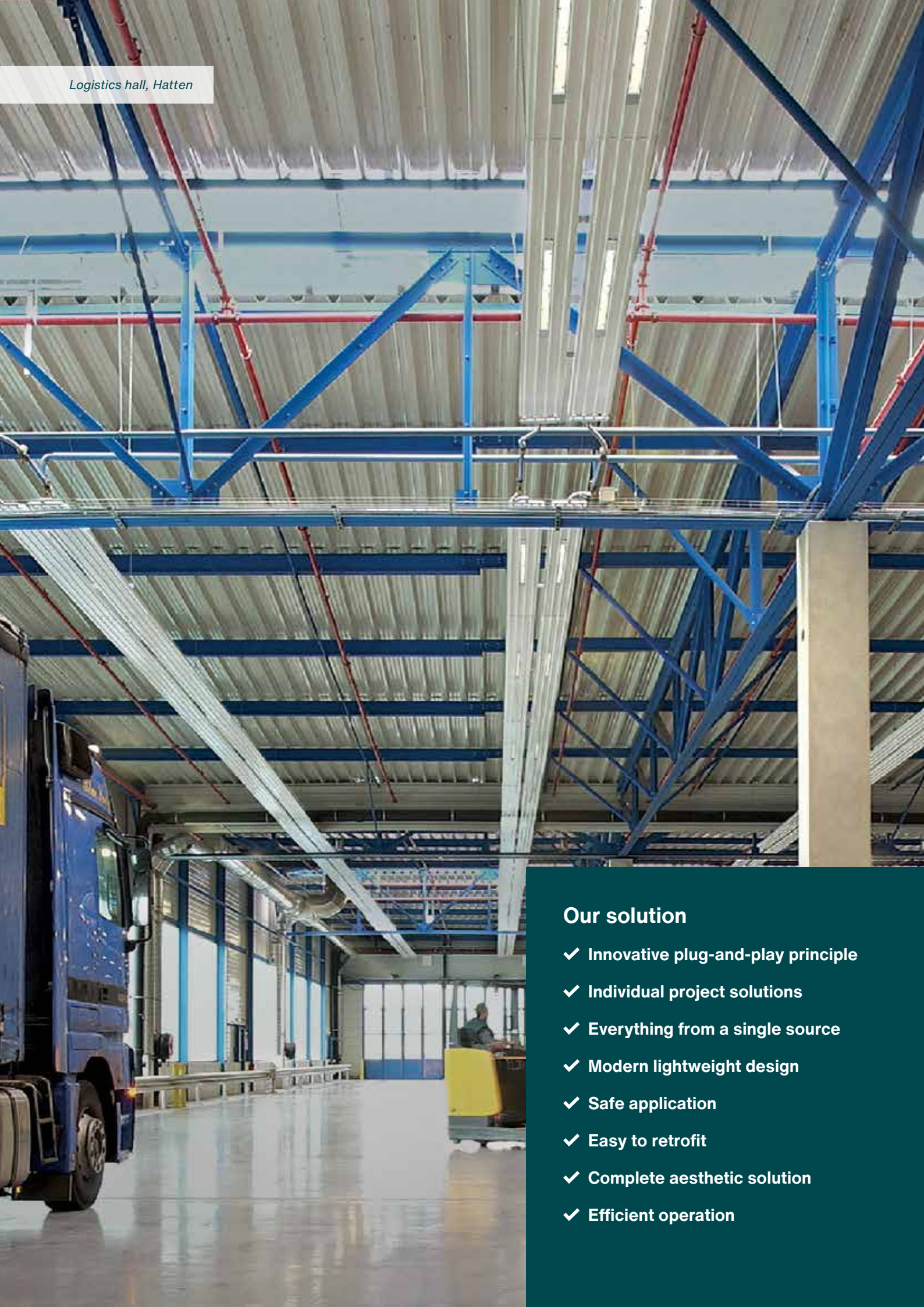
- 4 different light lengths
- 3 different lens optics
- Plug-and-play principle
- Ball impact resistance according to DIN 18032
- All components tested according to EN 60598-1

Lighting calculation

- Calculation report as a PDF
- Computational and graphical representation of the results
- List of materials
- Tender specifications



¹Electrical wiring on site



Our solution

- ✓ Innovative plug-and-play principle
- ✓ Individual project solutions
- ✓ Everything from a single source
- ✓ Modern lightweight design
- ✓ Safe application
- ✓ Easy to retrofit
- ✓ Complete aesthetic solution
- ✓ Efficient operation

always the best climate

Our mission is to provide a healthy indoor climate with top quality solutions. Living spaces are kept at a comfortable temperature by our radiators and heating & cooling ceilings whereas our ventilation solutions make sure that you can breathe fresh clean air 24/7.

zehnder



Trusted partner

We provide our customers with tailored services from planning to installation of excellent solutions for the best indoor climate since 1895.



Know what's next

Consistent focus on innovation has always been the motor for our business. We strive to provide intelligent solutions for ventilation, heating, and cooling.



Swiss quality and precision

Swiss quality and precision are reflected in all our products. Our design standards create timeless elegance in living spaces for yesterday, today, and tomorrow.



Know why, know how

It is our ongoing mission to share our expertise and know how with our customers by providing expert trainings. Our dedicated Zehnder academies bring indoor climate to life.



Dr. Hans-Peter Zehnder & Milva Inderbitzin-Zehnder

From family business to international company

From a small family-run mechanical workshop in Gränichen, Switzerland, Zehnder grew into a leading international corporation. The company roots are deeply intertwined with the entrepreneurial spirit of the Zehnder family. These are visible in Zehnder's corporate culture, the customer focus, respect, trust, curiosity, and openness.

Your global partner for indoor climate

4.000
employees

16
production
plants

more than
1.400
patents and
registered designs



Decorative radiators

Our decorative radiators do not only make a home feel cozy but have also eye-catching designs.



Comfortable indoor ventilation

Our ventilation systems ensure a healthy indoor climate but operate with high energy efficiency, boost wellbeing, and retain the property value.



Heating and cooling ceilings

Our heating and cooling ceilings are energy efficient and versatile to fit multiple environments.



Industrial air cleaning

Our clean air solutions are transforming working environments and improving the performance of businesses everywhere.

Technical data

Basic information

16 - 41

Details on the heating and cooling performance, the structure and dimensions as well as the basics of the design.



Individual solutions

42 - 59

Details on thermal insulation, suspension technology and fixing kits for project-specific requirements.



Technical specifications 60 - 63

All technical specifications at a glance as well as the Zehnder ZIP tender specification.



Heating and cooling performance

The following tables show the heating and cooling performance of the Zehnder ZIP radiant ceiling panels depending on the heating Delta T and the cooling Delta T. The heat output values are specified according to EN 14037-3, while the measurement results for the cooling output are based on DIN 4715-1. Please note: removing the insulation has a positive effect on the cooling capacity (see table). Removing the insulation increases the thermal output but can lead to heat accumulation under the ceiling. Zehnder ZIP radiant ceiling panels can be used for cooling at any time as all components are supplied in galvanised or partially galvanised versions.

$$\text{Output } \dot{Q} = K \cdot \Delta T^n$$

The excess and under temperature can be calculated arithmetically:

$$t_l = t_E = \frac{(t_U + t_L)}{2}$$

$$\Delta T_{\text{heating}} = \frac{(t_{hf} + t_{hr})}{2} - t_l$$

$$\Delta T_{\text{cooling}} = t_l - \frac{(t_{cf} + t_{cr})}{2}$$

Cooling capacity with insulation

	Individual ZIP strip	2 ZIP strips next to each other	3 ZIP strips next to each other	4 ZIP strips next to each other
K	3.283	6.566	9.849	13.132
n	1.034	1.034	1.034	1.034
ΔT_{cool} (K)	W/m	W/m	W/m	W/m
15	54	108	162	216
14	50	101	151	201
13	47	93	140	186
12	43	86	129	171
11	39	78	118	157
10	36	71	107	142
9	32	64	96	127
8.5	30	60	90	120
8	28	56	85	113
7	25	49	74	98
6	21	42	63	84
5	17	35	52	69

Legend

t_{air}	Air temperature (°C)
t_s	Surrounding surface temperature (°C) = average radiant temperature = average surface temperature of all surrounding surfaces (°C)
$t_i = t_p$	Indoor temperature (°C) = perceived temperature (°C)
t_{hf}	Heating flow temperature (°C)
t_{hr}	Heating return temperature (°C)
t_{cf}	Cooling flow temperature (°C)
t_{cr}	Cooling return temperature (°C)
ΔT_{heat}	Heating Delta T (K)
ΔT_{cool}	Cooling Delta T (K)
K	Constant
n	Exponent
$\dot{Q}$	Output
$\dot{Q}_g$	Total thermal output
s	Inclination correction factor

Physical units

Degree centigrade (°C)
Kelvin (K)
Cubic metre (m ³)
Metre (m)
Millimetre (mm)
Pascal (Pa)
Kilogram (kg)

Cooling capacity without insulation

	Individual ZIP strip	2 ZIP strips next to each other	3 ZIP strips next to each other	4 ZIP strips next to each other
K	3.960	7.920	11.880	15.840
n	1.0265	1.0265	1.0265	1.0265
ΔT_{cool} (K)	W/m	W/m	W/m	W/m
15	64	128	191	255
14	59	119	178	238
13	55	110	165	220
12	51	102	152	203
11	46	93	139	186
10	42	84	126	168
9	38	76	113	151
8.5	36	71	107	142
8	33	67	100	134
7	29	58	88	117
6	25	50	75	100
5	21	41	62	83

Heating and cooling performance

Thermal output with insulation

	Individual ZIP strip		2 ZIP strips next to each other		3 ZIP strips next to each other		4 ZIP strips next to each other	
K n	2.0871 1.1489	0.2456 1.3524	4.1742 1.1489	0.4912 1.3524	6.2613 1.1489	0.7368 1.3524	8.3484 1.1489	0.9824 1.3524
ΔT_{heat} (K)	W/m	W/MP	W/m	W/MP	W/m	W/MP	W/m	W/MP
80	321	92.0	641	184	962	276	1283	368
78	311	88.9	623	178	934	267	1246	356
76	302	85.9	605	172	907	258	1209	343
74	293	82.8	586	166	879	248	1173	331
72	284	79.8	568	160	852	239	1136	319
70	275	76.8	550	154	825	230	1100	307
68	266	73.9	532	148	798	222	1064	296
66	257	71.0	514	142	771	213	1028	284
64	248	68.1	496	136	744	204	992	272
62	239	65.2	478	130	718	196	957	261
60	230	62.4	461	125	691	187	922	249
58	222	59.6	443	119	665	179	886	238
56	213	56.8	426	114	638	170	851	227
55	208	55.4	417	111	625	166	834	222
54	204	54.1	408	108	612	162	816	216
52	195	51.4	391	103	586	154	782	206
50	187	48.7	374	97.5	561	146	747	195
48	178	46.1	357	92.3	535	138	713	185
46	170	43.5	340	87.1	509	131	679	174
44	161	41.0	323	82.0	484	123	645	164
42	153	38.5	306	77.0	459	116	612	154
40	145	36.0	289	72.1	434	108	578	144
38	136	33.6	273	67.3	409	101	545	135
36	128	31.3	256	62.5	384	93.8	512	125
34	120	28.9	240	57.9	360	86.8	480	116
32	112	26.7	224	53.3	336	80.0	448	107
30	104	24.4	208	48.9	312	73.3	416	97.7
28	96.0	22.3	192	44.5	288	66.8	384	89.0
26	88.1	20.1	176	40.3	264	60.4	353	80.5

MP = manifold pair

Thermal output with insulation

	Individual ZIP strip		2 ZIP strips next to each other		3 ZIP strips next to each other		4 ZIP strips next to each other	
K_n	2.0871	0.2456	4.1742	0.4912	6.2613	0.7368	8.3484	0.9824
	1.1489	1.3524	1.1489	1.3524	1.1489	1.3524	1.1489	1.3524
ΔT_{heat} (K)	W/m	W/MP	W/m	W/MP	W/m	W/MP	W/m	W/MP
24	80.4	18.1	161	36.1	241	54.2	322	72.3
22	72.8	16.1	146	32.1	218	48.2	291	64.2
20	65.2	14.1	130	28.2	196	42.4	261	56.5
19	61.5	13.2	123	26.3	184	39.5	246	52.7
18	57.8	12.2	116	24.5	173	36.7	231	49.0
17	54.1	11.3	108	22.7	162	34.0	216	45.3
16	50.5	10.4	101	20.9	151	31.3	202	41.8
15	46.9	9.6	93.7	19.1	141	28.7	187	38.3
14	43.3	8.7	86.6	17.4	130	26.1	173	34.9
13	39.8	7.9	79.5	15.8	119	23.7	159	31.5
12	36.3	7.1	72.5	14.1	109	21.2	145	28.3
11	32.8	6.3	65.6	12.6	98.4	18.9	131	25.2
10	29.4	5.5	58.8	11.1	88.2	16.6	118	22.1
9	26.1	4.8	52.1	9.6	78.2	14.4	104	19.2
8	22.8	4.1	45.5	8.2	68.3	12.3	91.0	16.4
7	19.5	3.4	39.0	6.8	58.6	10.2	78.1	13.7
6	16.4	2.8	32.7	5.5	49.1	8.3	65.4	11.1
5	13.3	2.2	26.5	4.3	39.8	6.5	53.0	8.7

MP = manifold pair

Temperature limits

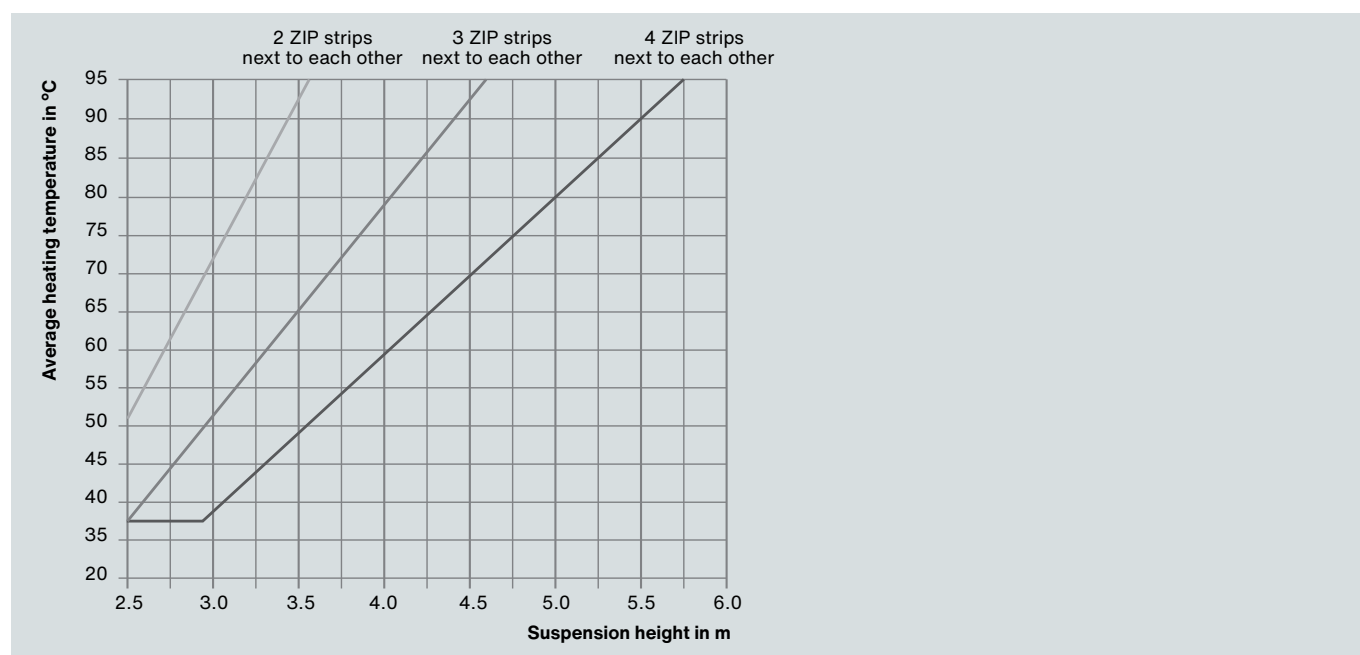
The right design temperature must be selected so that the radiant system can maintain a comfortable indoor climate. This can be checked in two steps using the following table (**step 1**) and the adjacent diagram (**step 2**).

The design temperature must be lower than the limit temperature (average heating temperature). Higher temperature limits can be used for spaces and corridors where people do not spend a great deal of time.

Temperature limits

Height	Proportion of the ceiling surface covered by Zehnder ZIP radiant ceiling panels					
m	10 %	15 %	20 %	25 %	30 %	35 %
	Average heating temperature in °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					92	87
10						

Step 1: Ceiling coverage. The design temperature must not exceed the defined thresholds.



Step 2: Radiant panel width. The design temperature must not exceed the defined thresholds. This is a view directly under the panel.

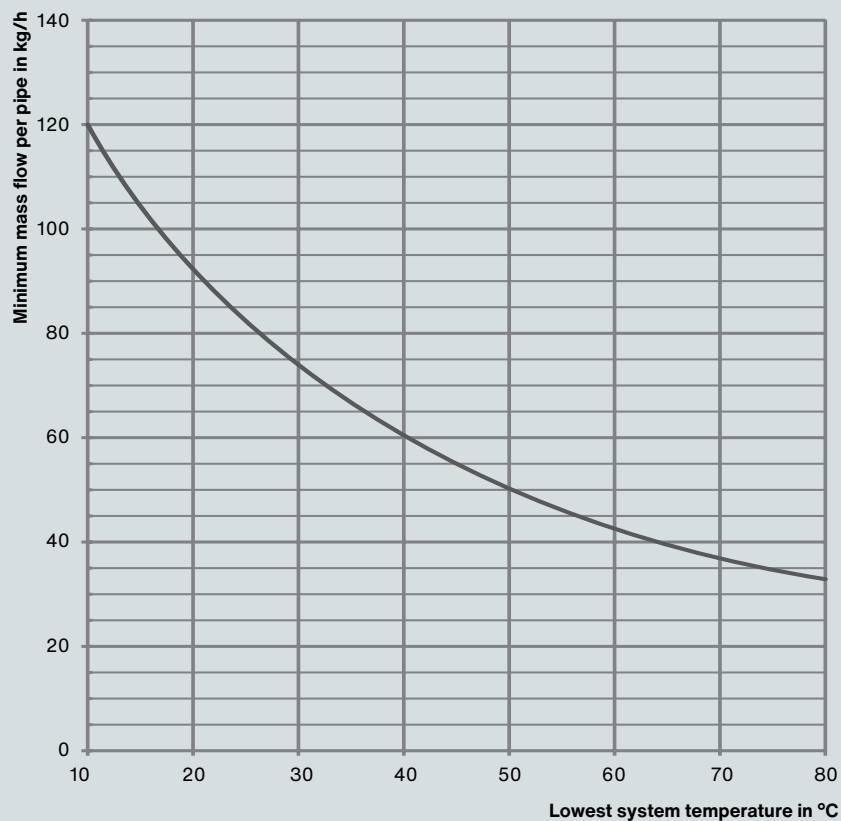
The specifications are approximate. A detailed calculation can be performed according to ISO 7730.

Minimum mass flow

To maintain the output shown in the tables, a turbulent flow must be ensured within the pipes in the radiant panel system. This minimum mass flow depends on the lowest system temperature.

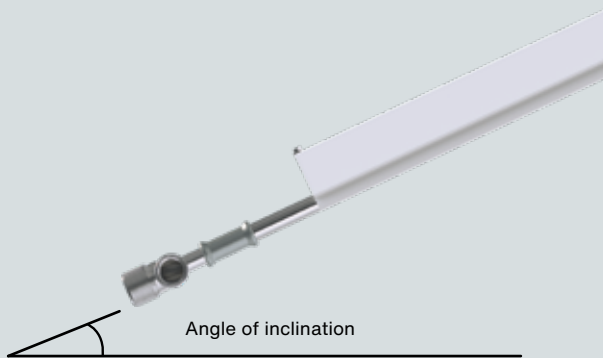
When heating, this corresponds to the return temperature. When cooling or in a combined cooling/heating mode, this corresponds to the cold water flow temperature. If the minimum mass flow per pipe is not achieved, this can result in a drop in performance of up to 15 %.

Minimum mass flow



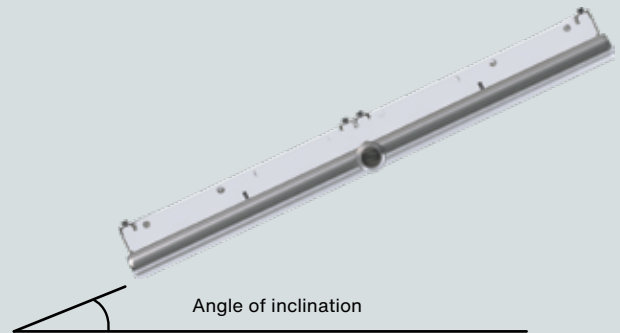
Inclination

Depending on the design of the ceiling, radiant ceiling panels can be inclined in the lateral or longitudinal direction. If the radiant ceiling panel is inclined, the output increases according to the formula $\dot{Q}_g = \dot{Q}_g \cdot s$. This increase in output must be taken into account when determining the mass flow rate. The maximum permitted angles of inclination depend on the suspension technology.



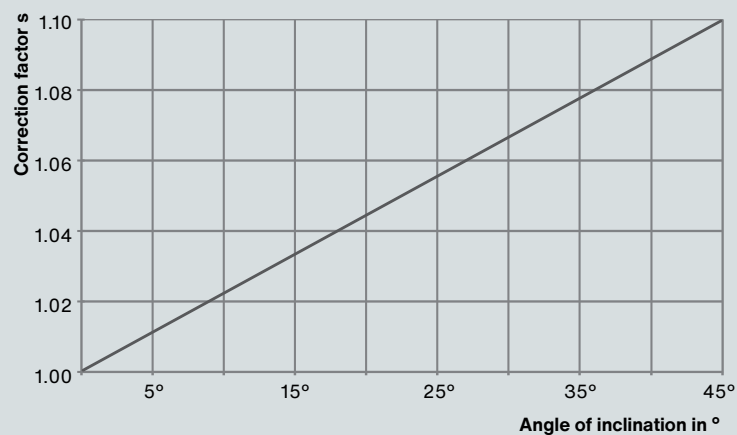
Angle of inclination

Radiant ceiling panel inclined in the longitudinal direction



Angle of inclination

Radiant ceiling panel inclined in the lateral direction



Increase in total thermal output $\dot{Q}_g$ with inclined radiant ceiling panels

Warehouse and halls, Ursapharm

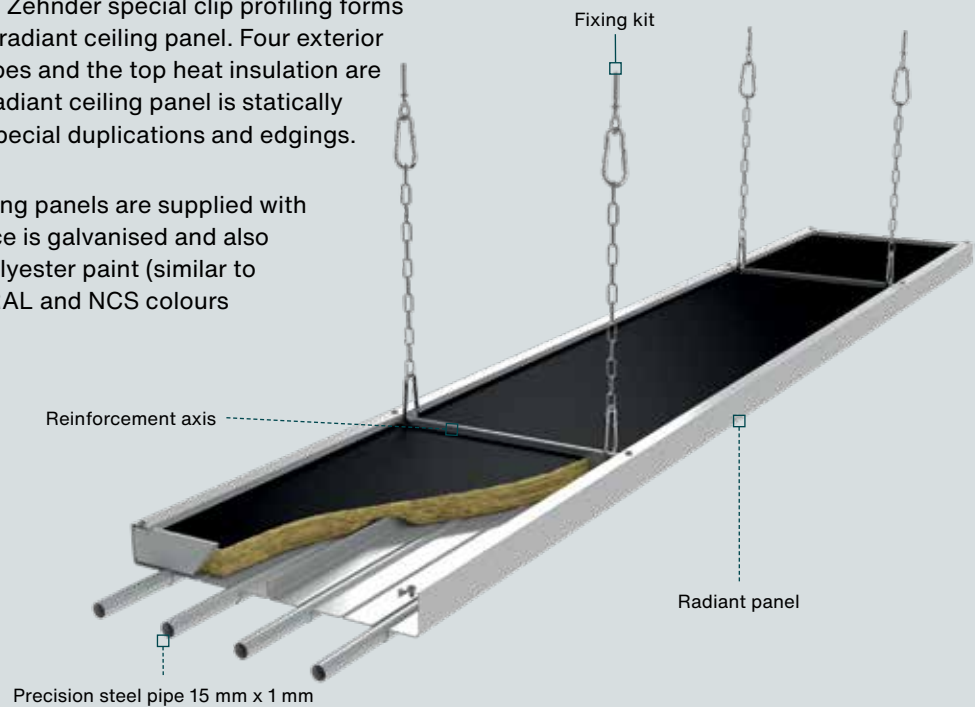


Structure and dimensions

Structure of the module

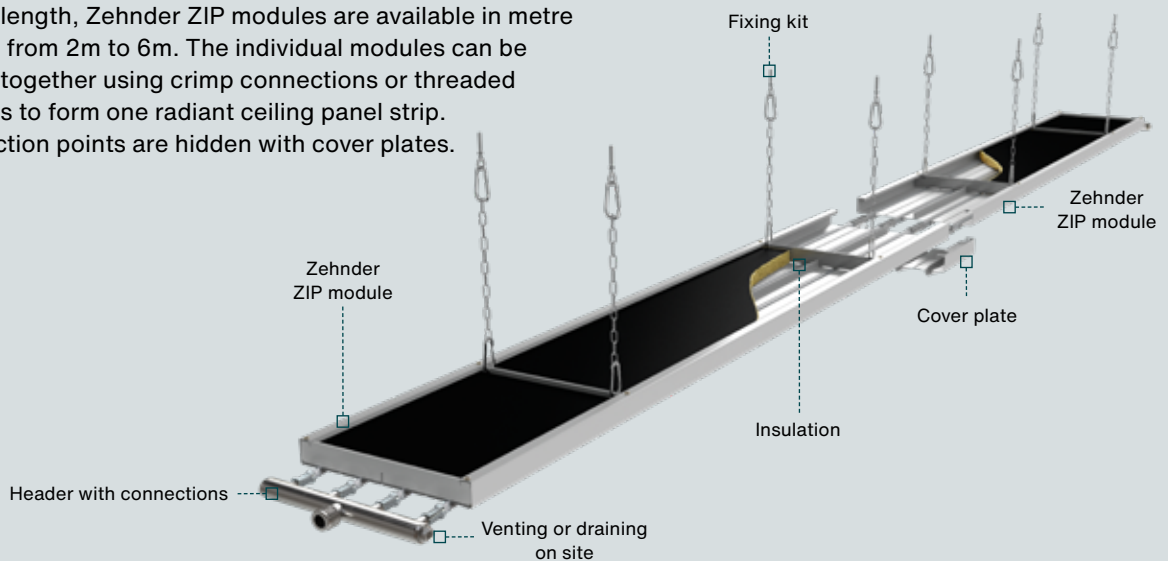
A galvanised steel sheet with Zehnder special clip profiling forms the basis of the Zehnder ZIP radiant ceiling panel. Four exterior galvanised precision steel pipes and the top heat insulation are then embedded into it. The radiant ceiling panel is statically reinforced using chamfers, special duplications and edgings.

The Zehnder ZIP radiant ceiling panels are supplied with a smooth surface. The surface is galvanised and also coated with a high-quality polyester paint (similar to RAL 9016 matt). Additional RAL and NCS colours available upon request.



Design

Zehnder ZIP modules are 320 mm wide. In terms of length, Zehnder ZIP modules are available in metre increments from 2m to 6m. The individual modules can be connected together using crimp connections or threaded connections to form one radiant ceiling panel strip. The connection points are hidden with cover plates.



Standard lengths

Zehnder ZIP modules are available in standard lengths of 2, 3, 4, 5 and 6 m.

Longer strips can be created by connecting multiple modules in a row.

Special lengths and colours are available on request.



Length 6 m



Length 5 m



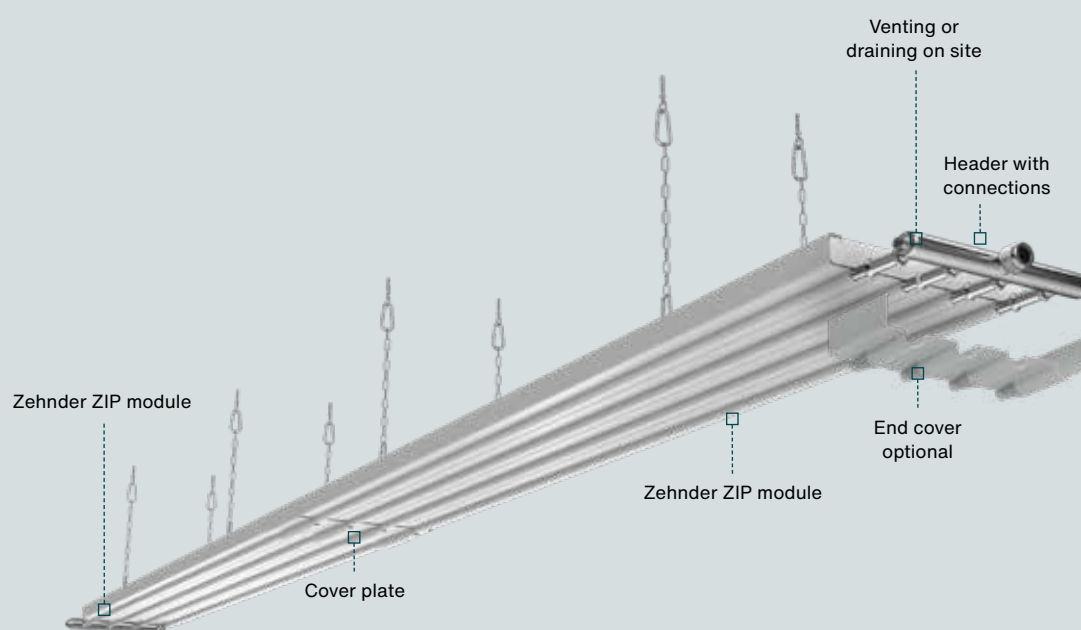
Length 4 m



Length 3 m

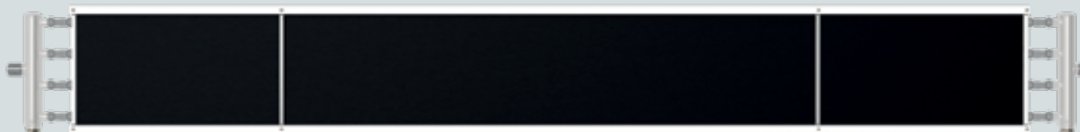


Length 2 m

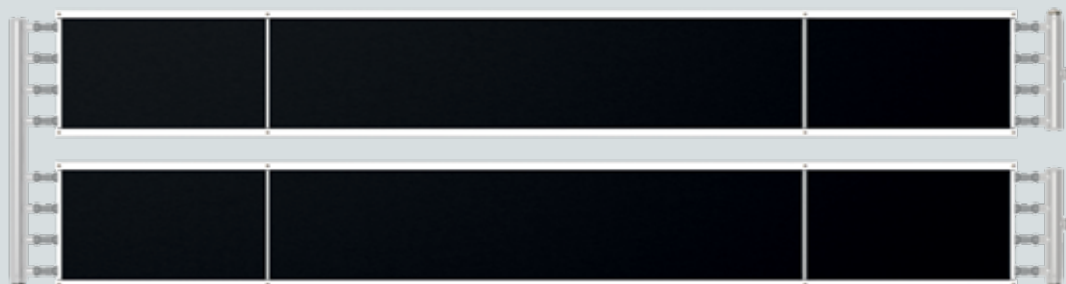


Combination options

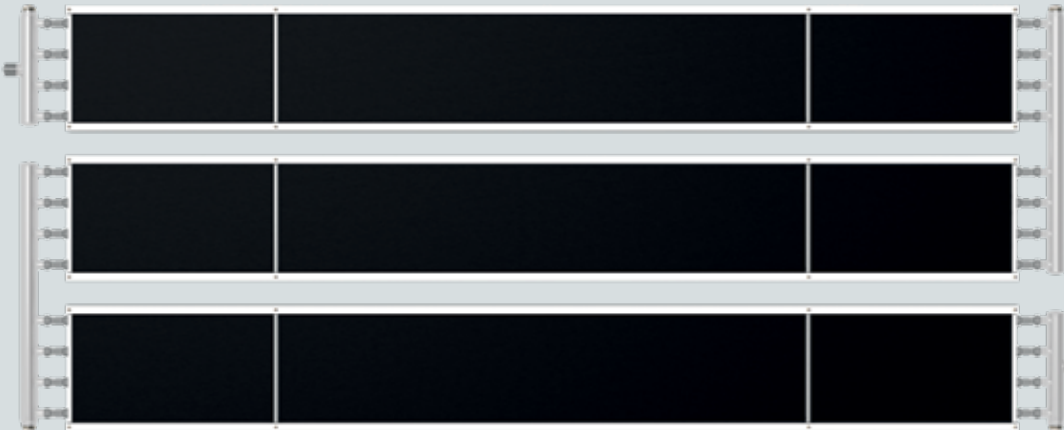
The Zehnder ZIP radiant ceiling panels can be installed individually or with up to four strips next to each other. Depending on the application, the water channelling can be adapted individually by selecting the available headers and collectors. In doing so, it should be noted that turbulent flows must be achieved in the pipes at the given temperatures and with the resultant output.



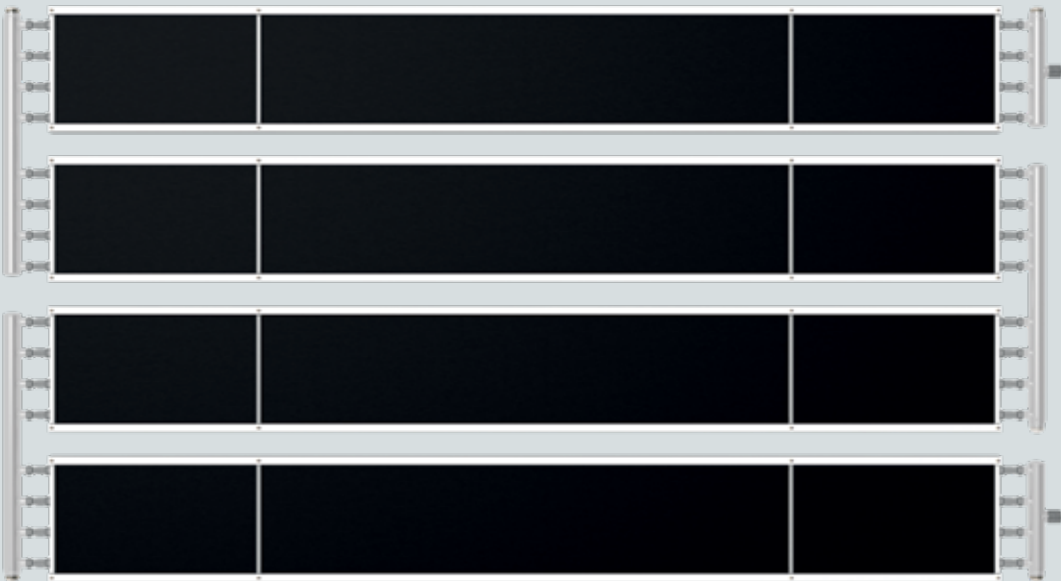
Individual
Zehnder ZIP strip



2 Zehnder ZIP strips
next to each other

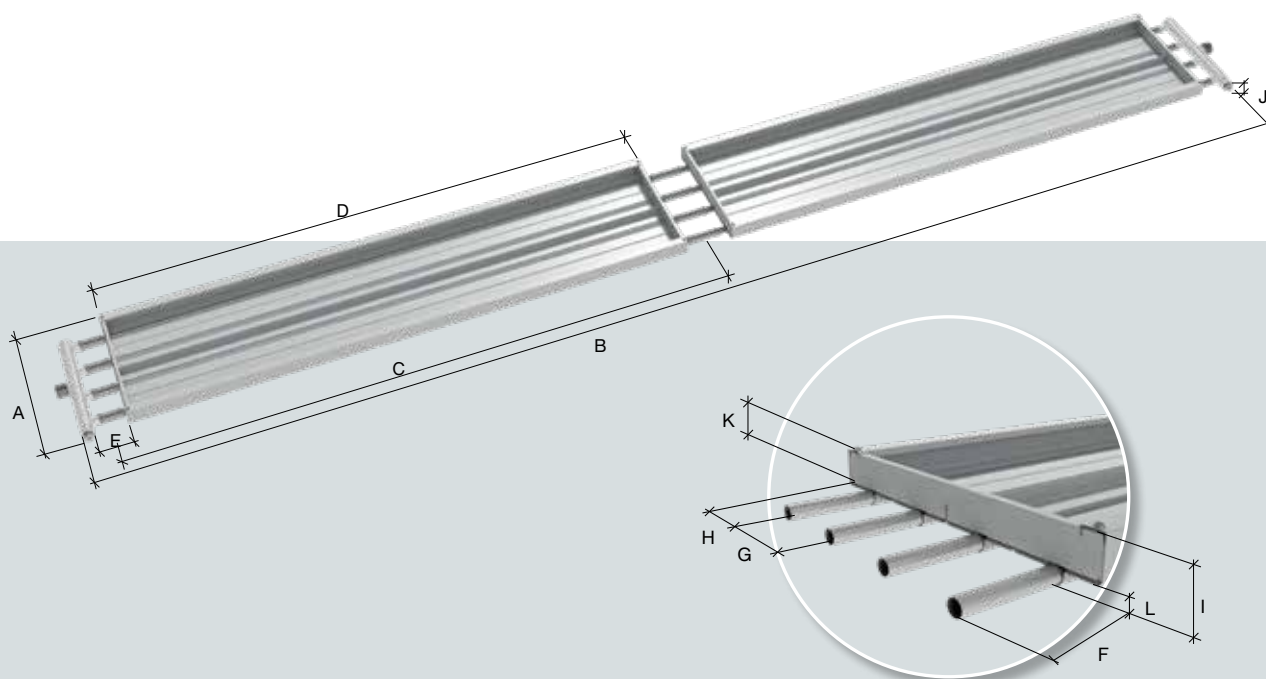


3 Zehnder ZIP strips
next to each other



4 Zehnder ZIP strips
next to each other

Module dimensions



Module dimensions

Item	Description	Dimension in mm	Min. dimension in mm	Max. dimension in mm	Note
A	Overall width	320	-	-	-
B	Overall length (without connections)	Variable	2140	- ¹⁾	Grid size: 1000 mm
C	Length of individual element/length of pipe	Variable	2000	6000	Grid size: 1000 mm
D	Radiant panel length of individual section	Variable	1830	5830	Grid size: 1000 mm
E	Distance of pipe projection from header	125	-	-	-
F	Distance of pipe projection from connection piece	85	-	-	-
G	Distance between two pipes	80	-	-	-
H	Distance from pipe to side lip	40	-	-	-
I	Overall height (without suspension)	55	-	-	-
J	Diameter of header	32	-	-	-
K	Height of side lip	42	-	-	-
L	Height of pipe beading	13	-	-	-

¹⁾ The overall length of the Zehnder ZIP strip depends on the operating conditions and the permitted pressure loss.

Connector technology

The Zehnder ZIP modules are assembled into the desired configuration by means of crimp or threaded connections and the connection points are then hidden under a cover plate. The headers are painted as standard (similar to RAL 9016). So all you see is great design!

Crimp connection

Item no. 502280

Max. operating temperature: 120 °C

Max. operating pressure: 12 bar

Fitting length: 48 mm



Threaded connection

Item no. 633010

Max. operating temperature: 95 °C

Max. operating pressure: 5 bar

Fitting length: 66 mm



Berlin, Sportforum



Headers and collectors

The galvanised or galvanised and painted headers and collectors are pressed or bolted together with the externally galvanised pipes (as per DIN EN 10305-3) of the Zehnder ZIP modules.

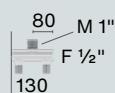
Headers and collectors are delivered with Zehnder crimp connections (48mm) or Zehnder threaded connections (66mm).

Connection size of header

Header 2

511870

Outer size of header

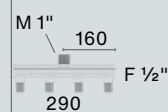


Connection size of header

Header 4

511880

Outer size of header

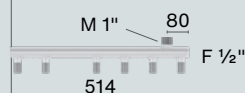


Connection size of header

Header 6

511890

Outer size of header

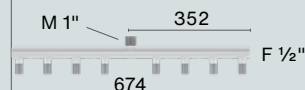


Connection size of header

Header 8

511900

Outer size of header

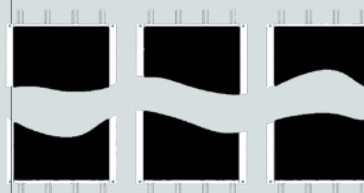
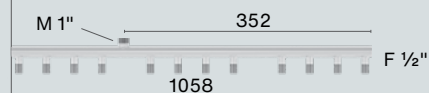


Connection size of header

Header 12

511860

Outer size of header



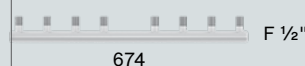
Collector 12

511910



Collector 8

511950



Collector 6

511940



Collector 4

Special ¹⁾

511930



Collector 4

511920



¹⁾ apply to all modules

F = female thread

M = tapered male thread

Zehnder accepts no liability for the use of other connections.

Layout basics

The heat load of the space is calculated according to the applicable standard. If the air exchange rate of a space is above the usual level achieved with gap ventilation (max. 1 1/h), particularly with extraction systems, the air fed into the space must be pre-heated. Radiant heating systems alone cannot prevent infiltration of cold air at doors or loading areas. Strip curtains or air curtains, for example, must be used to help rectify this situation.

Example of layout and arrangement

The following example shows the layout of a hall.

Objective

To achieve an even indoor temperature (18 °C) throughout the entire space

Specifications

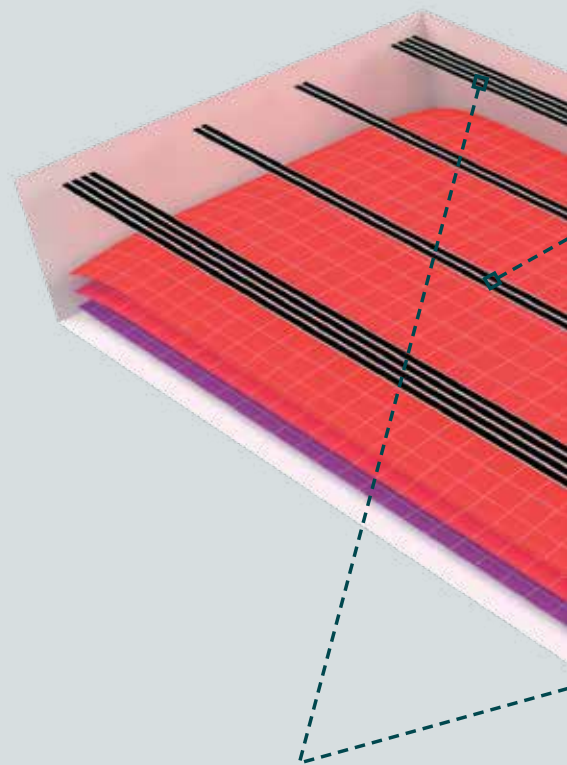
Detached hall:	Length 50 m
	Width 20 m
	Height 8 m
Air exchange:	0.3 1/h
Outdoor temperature:	-8 °C

Heat load

Design transmission heat loss:	20000 W
Design ventilation heat loss:	21000 W
Design heat loss:	<u>41000 W</u>

Layout of the radiant ceiling panels

Flow temperature:	45 °C
Return temperature:	35 °C

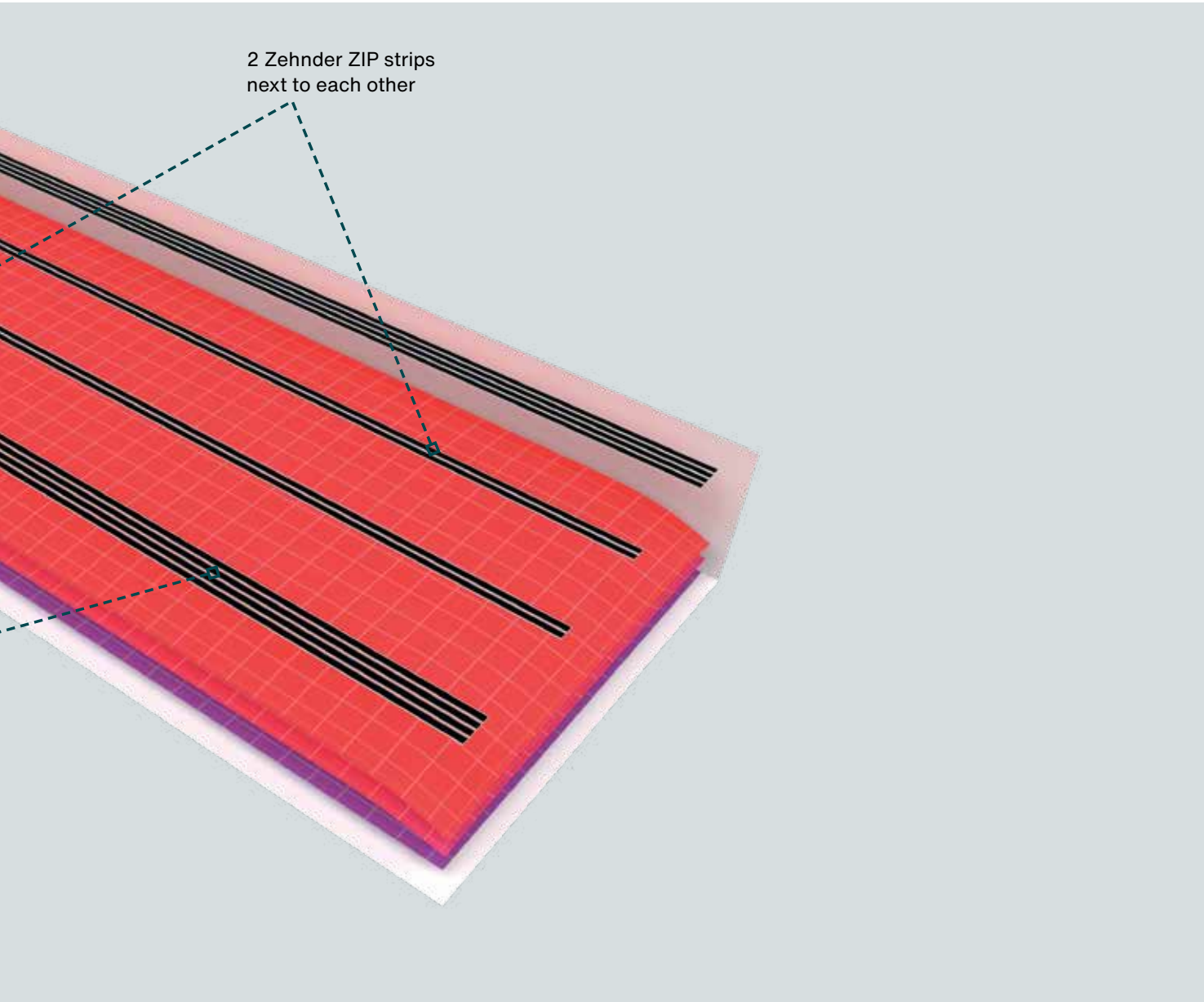


4 Zehnder ZIP strips
next to each other

Thermal output calculation

Type	Length in m	Excess temperature in K	Output in W/m	Output in W/ manifold pair	Quantity	Total heat output in W	Mass flow per strip in kg/h
4 ZIP strips next to each other	48	22	291	64	2	28064	1207
2 ZIP strips next to each other	48	22	146	32	2	14080	605

42144 W



Layout basics

The heat load of the space is calculated according to the applicable standard. If the air exchange rate of a space is above the usual level achieved with gap ventilation (max. 1 1/h), particularly with extraction systems, the air fed into the space must be pre-heated. Radiant heating systems alone cannot prevent infiltration of cold air at doors or loading areas. Strip curtains or air curtains, for example, must be used to help rectify this situation.

Example of layout and arrangement

The following example shows the layout of a hall.

Objective

To achieve an even indoor temperature (20 °C) throughout the entire space.

Specifications

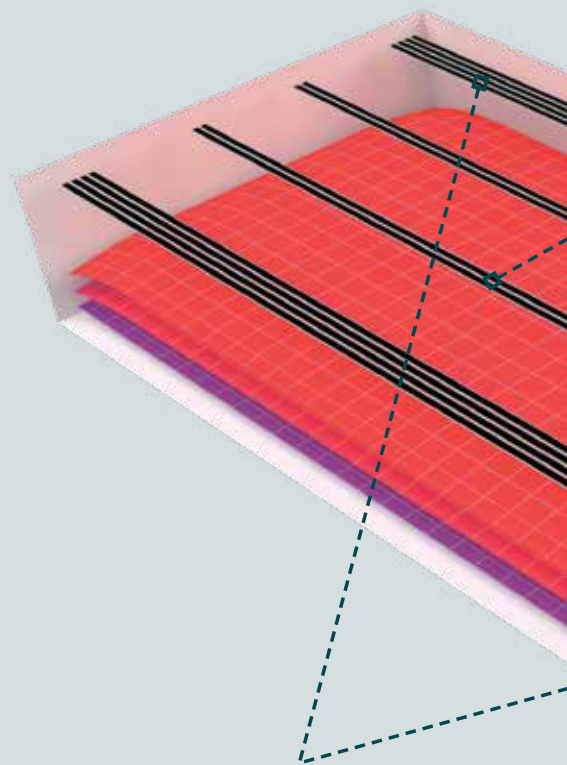
Detached hall:	Length 50 m
	Width 20 m
	Height 8 m
Air exchange:	0.3 1/h
Outdoor temperature:	-12 °C

Heat load

Design transmission heat loss:	57250 W
Design ventilation heat loss:	26112 W
Design heat loss:	83362 W

Layout of the radiant ceiling panels

Flow temperature:	70 °C
Return temperature:	50 °C

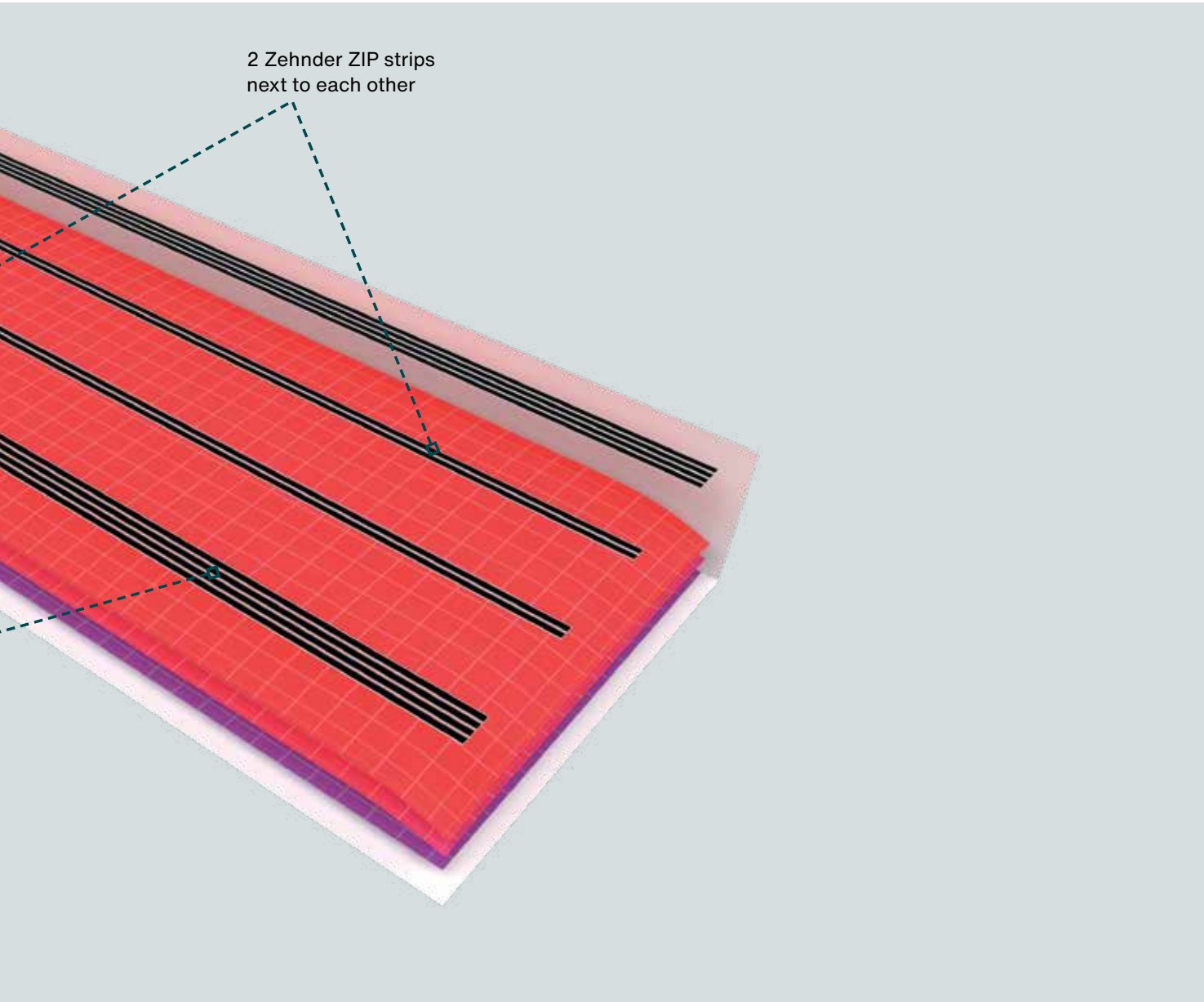


4 Zehnder ZIP strips
next to each other

Thermal output calculation

Type	Length in m	Excess temperature in K	Output in W/m	Output in W/ manifold pair	Quantity	Total heat output in W	Mass flow per strip in kg/h
4 ZIP strips next to each other	48	40	578	144	2	55776	1199
2 ZIP strips next to each other	48	40	289	72	2	27888	600

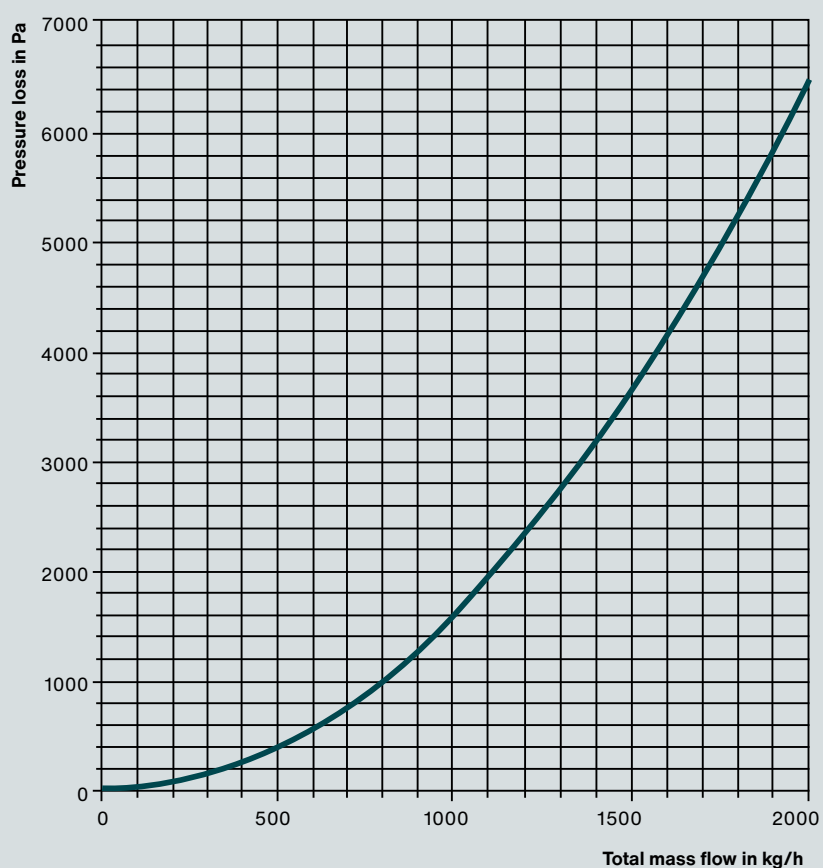
83664 W



Pressure loss calculation

The pressure loss for Zehnder ZIP radiant ceiling panels is calculated as a total of the pressure loss in the pipe and the pressure loss in the headers. When using Zehnder volume flow controllers, the additional pressure loss for the volume flow controllers should be added to this.

Pressure loss of the pair of headers including connections



Determining the pressure loss:



e.g. 2 Zehnder ZIP strips
next to each other; 48 m

1. Calculate total mass flow of the radiant ceiling panel in question.
 $\dot{m} = 601 \text{ kg/h}$

Calculation formula:

$$\dot{m} = (\dot{Q} * 0.86) / \Delta T$$

$\dot{Q}$ = power (W)

ΔT = temperature difference (K)

$\dot{m}$ = mass flow (kg/h)

2. Refer to the graph for the pressure loss of the pair of headers.
e.g. $\Delta p = 600 \text{ Pa/pair of headers}$. Since the heating water flows into and out of a header twice, the value should be multiplied by two.

3. Refer to the graph for the pressure loss of the pipe.

The mass flow is calculated by dividing the total mass flow by the number of pipes with parallel flow.

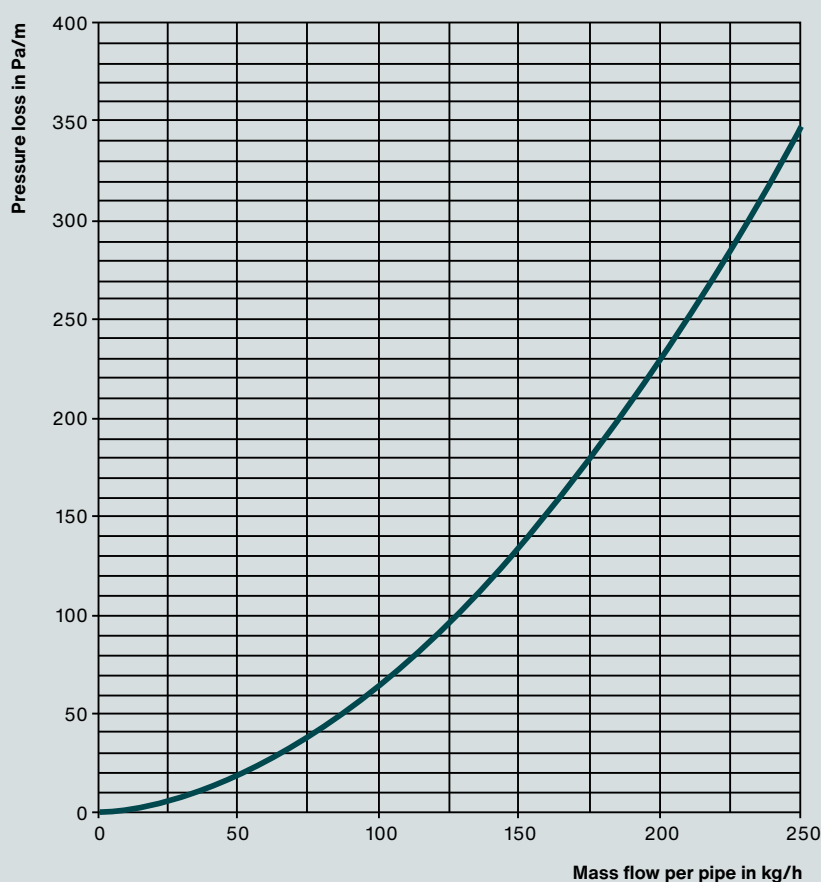
e.g. $601 \text{ kg/h} : 4 \text{ parallel pipes} = 150 \text{ kg/h}$

$$\Delta p = 135 \text{ Pa/m} * 48 \text{ m} * 2$$

(for outward and inward) = 12960 Pa

4. The total pressure loss for the radiant ceiling panel is simply the sum of the individual pressure losses calculated previously.

Pressure loss per pipe



Hydraulic balancing of radiant ceiling panels

The correct water flow distribution for the heating water flow is important for operating any branched heating or cooling system efficiently. (it must also be possible to fill, shut off and empty all radiant ceiling panel strips separately).

For systems where the radiant ceiling panels and the volume flows are identical, laying pipes according to the Tichelmann system (two-pipe system with reverse return, **see Fig. 1**) will provide a perfect hydraulic solution. However, the third pipe results in a considerable increase in costs where space heating systems are concerned and is not advisable in many instances if panels of different sizes are used.

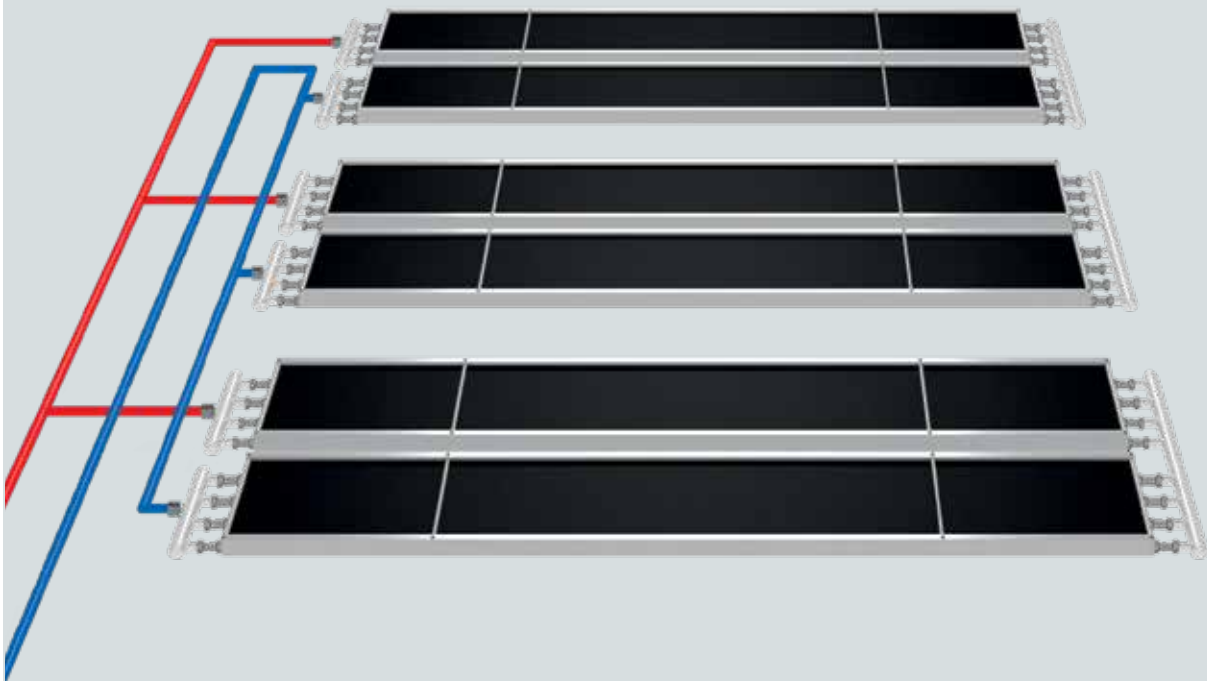


Fig. 1: Pipe positioning according to the Tichelmann system (two-pipe system with reverse return)

Systems where the individual panels have different outputs must be subjected to hydraulic balancing by means of piping calculations and adjustments. This process, however, demands a large investment in terms of time and money. Hydraulic balancing is made easier with the Zehnder volume flow control combination (VSRK) (**Fig. 2**).

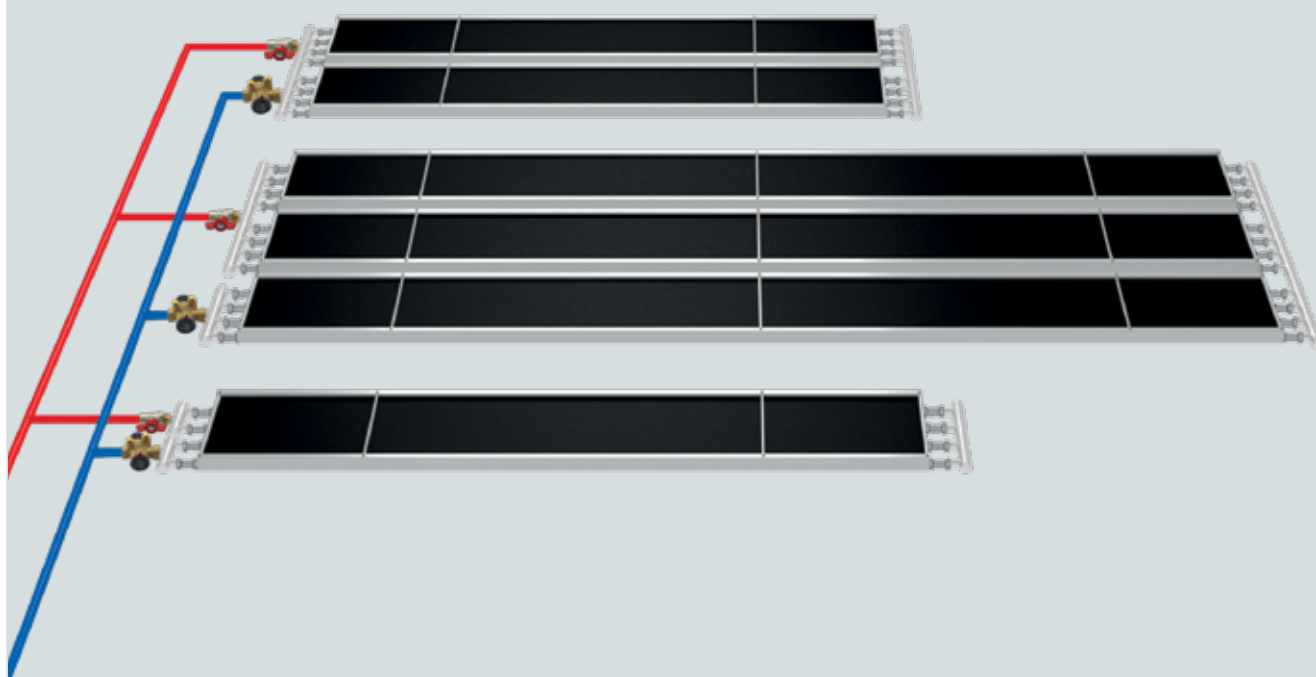


Fig. 2: Simplified pipe layout with Zehnder volume flow control combination (VSRK)

Volume flow control combination

The VSRK is a complete set consisting of a volume flow controller and isolating valves. The controller is set to the volume flow of the strip ex works. This removes the need for any time-consuming adjustment work on site.

Other advantages of the VSRK:

- Constant heating medium flow even when there is a high differential pressure
- Hydraulic balancing even for radiant panels of different sizes

Longer-size panels need to have a flexible connection (armoured hose).

The Zehnder volume flow control combination is suitable for an operating temperature of -10 °C up to a maximum of 120 °C and a maximum operating pressure of 16 bar.

DN15				DN25		DN32	
30-210 kg/h		150-700 kg/h		300-2000 kg/h		600-3600 kg/h	
Mass flow (kg/h)	Minimum differential pressure (kPa)	Mass flow (kg/h)	Minimum differential pressure (kPa)	Mass flow (kg/h)	Minimum differential pressure (kPa)	Mass flow (kg/h)	Minimum differential pressure (kPa)
30	10.0	150	13.0	300	15.0	600	15.0
60	10.8	200	13.5	350	15.3	700	15.3
90	11.7	250	13.9	400	15.6	800	15.7
120	12.5	300	14.4	450	15.9	900	16.0
150	13.3	350	14.8	500	16.2	1000	16.3
180	14.2	400	15.3	550	16.5	1100	16.7
210	15.0	450	15.7	600	16.8	1200	17.0
		500	16.2	650	17.1	1300	17.3
		550	16.6	700	17.4	1400	17.7
		600	17.1	750	17.6	1500	18.0
		650	17.5	800	17.9	1600	18.3
		700	18.0	850	18.2	1700	18.7
				900	18.5	1800	19.0
				950	18.8	1900	19.3
				1000	19.1	2000	19.7
				1050	19.4	2100	20.0
				1100	19.7	2200	20.3
				1150	20.0	2300	20.7
				1200	20.3	2400	21.0
				1250	20.6	2500	21.3
				1300	20.9	2600	21.7
				1350	21.2	2700	22.0
				1400	21.5	2800	22.3
				1450	21.8	2900	22.7
				1500	22.1	3000	23.0
				1550	22.4	3100	23.3
				1600	22.6	3200	23.7
				1650	22.9	3300	24.0
				1700	23.2	3400	24.3
				1750	23.5	3500	24.7
				1800	23.8	3600	25.0
				1850	24.1		
				1900	24.4		
				1950	24.7		
				2000	25.0		

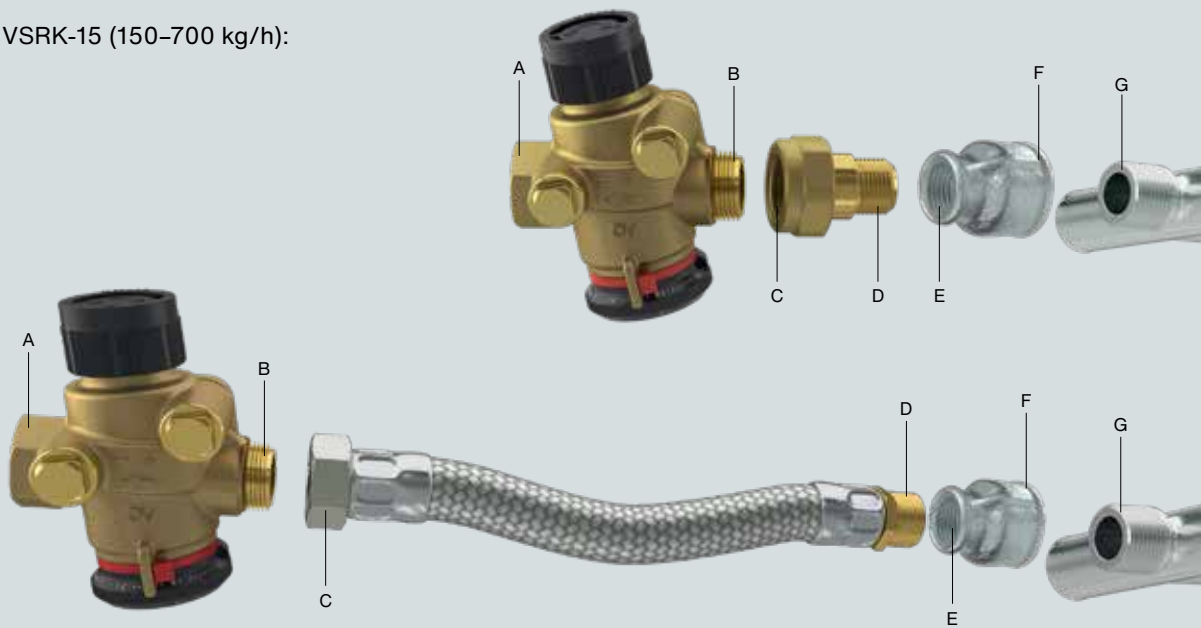
Item numbers:

VSRK-15 combination, 30-210 kg/h	513800
VSRK-15 combination, 150-700 kg/h	513810
VSRK-25 combination, 300-2000 kg/h	513820
VSRK-32 combination, 600-3600 kg/h	513830
VSRK special 15/15/15, 30-210 kg/h	513840
VSRK special 15/15/15, 150-700 kg/h	513850
VSRK special 25/15/15, 300-2000 kg/h	513860
VSRK special 25/25/25, 300-2000 kg/h	513870
VSRK special 32/25/25, 600-3600 kg/h	513880
VSRK special 32/32/32, 600-3600 kg/h	513890
Controller, separate DN15, 30-210 kg/h	513900
Controller, separate DN15, 150-700 kg/h	513910
Controller, separate DN25, 300-2000 kg/h	513920
Controller, separate DN32, 600-3600 kg/h	513930
Flow, separate DN15	513940
Flow, separate DN25	513950
Flow, separate DN32	513960
Armoured hose DN15	509260 / 513430
Armoured hose DN25	509280 / 513440
Armoured hose DN32	509310 / 513450
Reducing sleeve 1" x 1/2"	501170
Sleeve 1"	501190
Reducing sleeve 5/4" x 1"	501180
Coupler screw connection 3/4" x 1/2"	514000

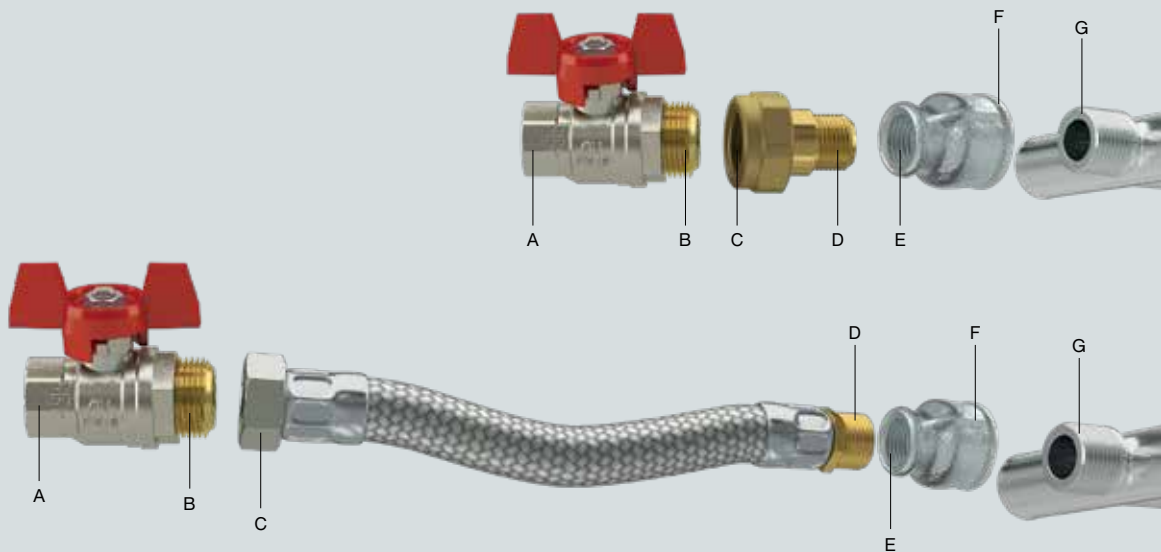
Connection size for Zehnder volume flow control combinations

VSRK dimensions	Controller or ball valve		Flat-sealing coupler screw connection	Hose / screw connection Male thread	Female thread of straight connector	Female thread of straight connector	Tapered male thread of header
	A	B					
DN15 (30-210 kg/h)	Rp 1/2"	G 3/4"	Rp 3/4"	R 1/2"	Rp 1/2"	Rp 1"	R 1"
DN15 (150-700 kg/h)	Rp 1/2"	G 3/4"	Rp 3/4"	R 1/2"	Rp 1/2"	Rp 1"	R 1"
DN25 (300-2000 kg/h)	Rp 1"	G 1 1/4"	Rp 1 1/4"	R 1"	Rp 1"	Rp 1"	R 1"
DN32 (600-3600 kg/h)	Rp 1 1/4"	G 1 1/2"	Rp 1 1/2"	R 1 1/4"	Rp 1 1/4"	Rp 1"	R 1"

Example of VSRK-15 (150–700 kg/h):
Return



Example of VSRK-15 (150–700 kg/h):
Flow



Standard fixing kits

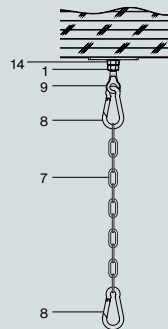
There are twelve standard fixing kits for installing the radiant ceiling panels in the roof space. In addition, Zehnder offers a number of customised solutions on request.

Wooden ceiling



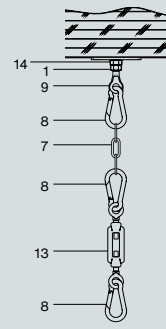
KN 52*

Minimum suspension height without link chain: 154 mm
Item number: 513520



KN 82*

Minimum suspension height without link chain: 392 mm
Item number: 513530

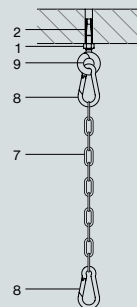


Concrete ceiling



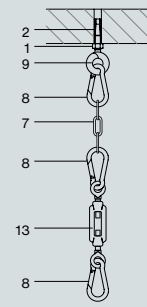
KN 53

Minimum suspension height without link chain: 141 mm
Item number: 505160



KN 83

Minimum suspension height without link chain: 379 mm
Item number: 505260

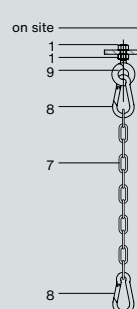


Steel profile



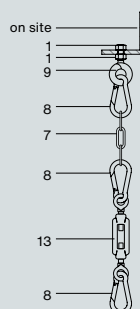
KN 54

Minimum suspension height without link chain: 141 mm
Item number: 505170

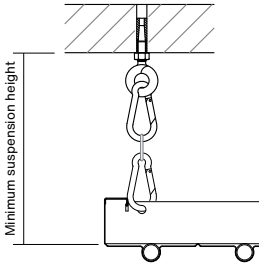


KN 84

Minimum suspension height without link chain: 379 mm
Item number: 505270



*Screws for fixing the brackets to the structure must be purchased by the customer



Key

- 1 Hexagon nut M8
- 2 Steel dowel M8
- 3 Girder clamp M8
- 4 Retaining cord
- 5 Flat leaf screw M8
- 6 Trapezoidal hanger M8
- 7 Link chain 4 mm
- 8 Carabiner hook 5 x 50
- 9 Eyelet screw M8
- 10 Washer M8
- 11 Hexagon screw M8 x 40
- 12 Hexagon screw M8 x 110
- 13 Turnbuckle M6 x 110
- 14 Support plate M8

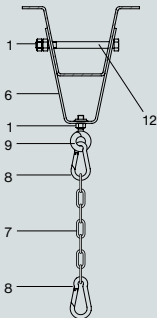
Item number:

- 506080
- 961120
- 506030
- 506100
- 506050
- 506020
- 509960
- 506010
- 506040
- 959020
- 506070
- 501500
- 506120
- 513500

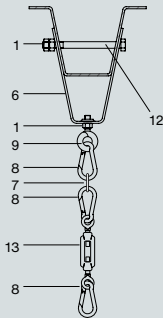
Trapezoidal sheet metal



KN 56
Minimum suspension height without link chain: 183 mm
Item number: 505210



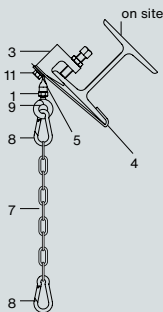
KN 86
Minimum suspension height without link chain: 421 mm
Item number: 505280



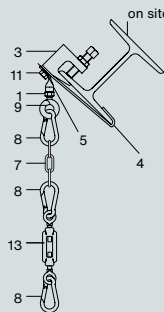
Inclined steel girder



KN 57
Minimum suspension height without link chain: 172 mm
Item number: 505220



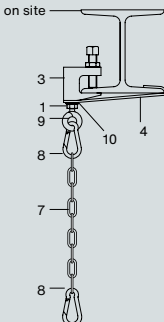
KN 87
Minimum suspension height without link chain: 410 mm
Item number: 505290



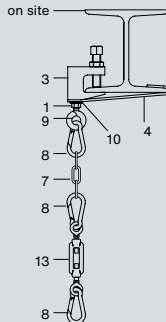
Horizontal steel girder



KN 58
Minimum suspension height without link chain: 151 mm
Item number: 505230



KN 88
Minimum suspension height without link chain: 389 mm
Item number: 505340



Wire cable suspension

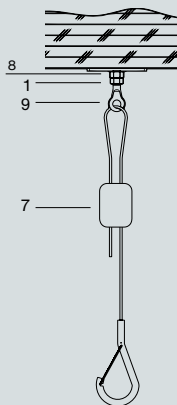
There are six wire cable suspension solutions for installing the radiant ceiling panels in the roof space. In addition, Zehnder offers a number of customised solutions on request.

Wooden ceiling

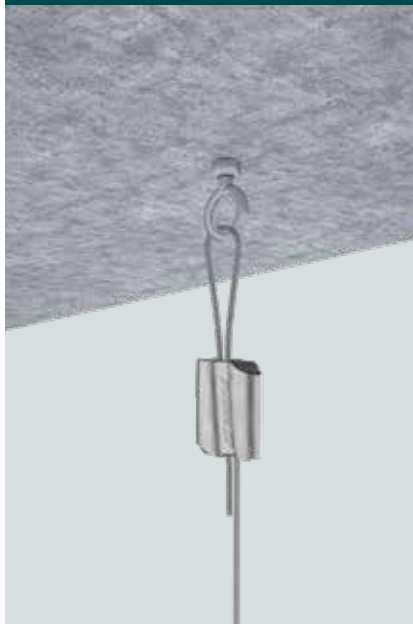


KN 62*

Minimum suspension height: 180 mm
Item number: 518000

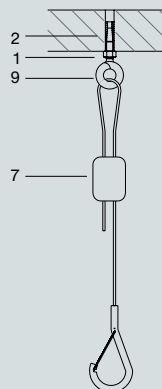


Concrete ceiling



KN 63

Minimum suspension height: 167 mm
Item number: 518010

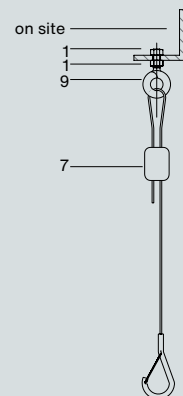


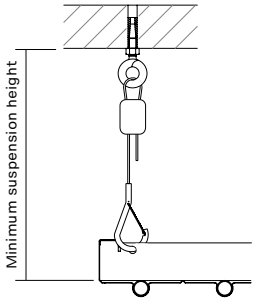
Steel profile



KN 64

Minimum suspension height: 167 mm
Item number: 518030



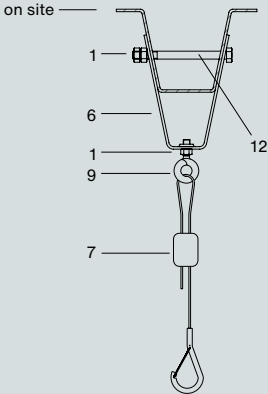


Key	Item number:
1 Hexagon nut M8	506080
2 Steel dowel M8	961120
3 Girder clamp M8	506030
4 Retaining cord	506100
5 Flat leaf screw M8	506050
6 Trapezoidal hanger M8	506020
7 Wire cable suspension with carabiner and height adjustment	517980
8 Support plate M8	513500
9 Eyelet screw M8	506040
10 Washer M8	959020
11 Hexagon screw M8 x 40	506070
12 Hexagon screw M8 x 110	501500
13 Turnbuckle M6 x 110	506120

Trapezoidal sheet metal



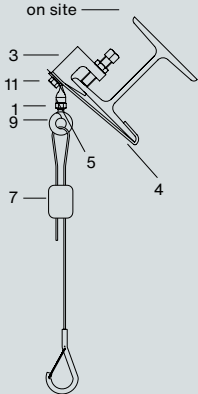
KN 66
Minimum suspension height:
209 mm
Item number: 518040



Inclined steel girder



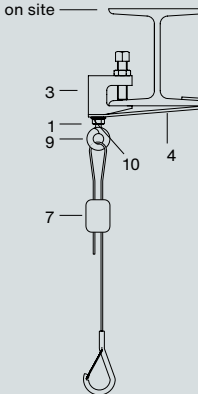
KN 67
Minimum suspension height:
198 mm
Item number: 518050



Horizontal steel girder



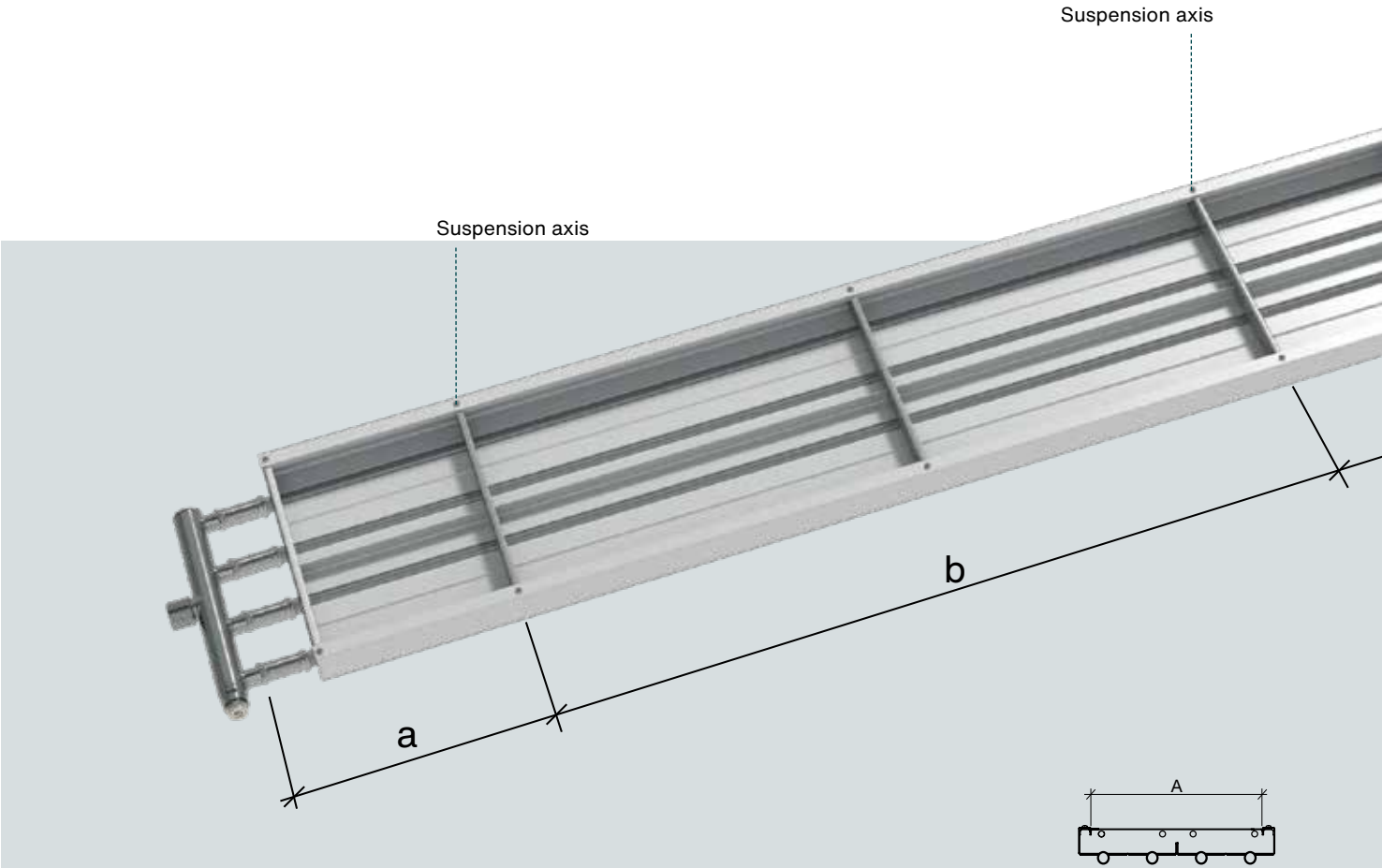
KN 68
Minimum suspension height:
177 mm
Item number: 518060



Suspension technology with reinforcement axes

Zehnder ZIP modules are delivered as standard with fixed reinforcement axes. These can be used as suspension axes for ceiling installation. The reinforcement axes enable an angled fitting of 45° across the length and 30° across the width.

The suspension distances can be adjusted during installation as required, using additional variable axes.
The variable axes are installed on site.

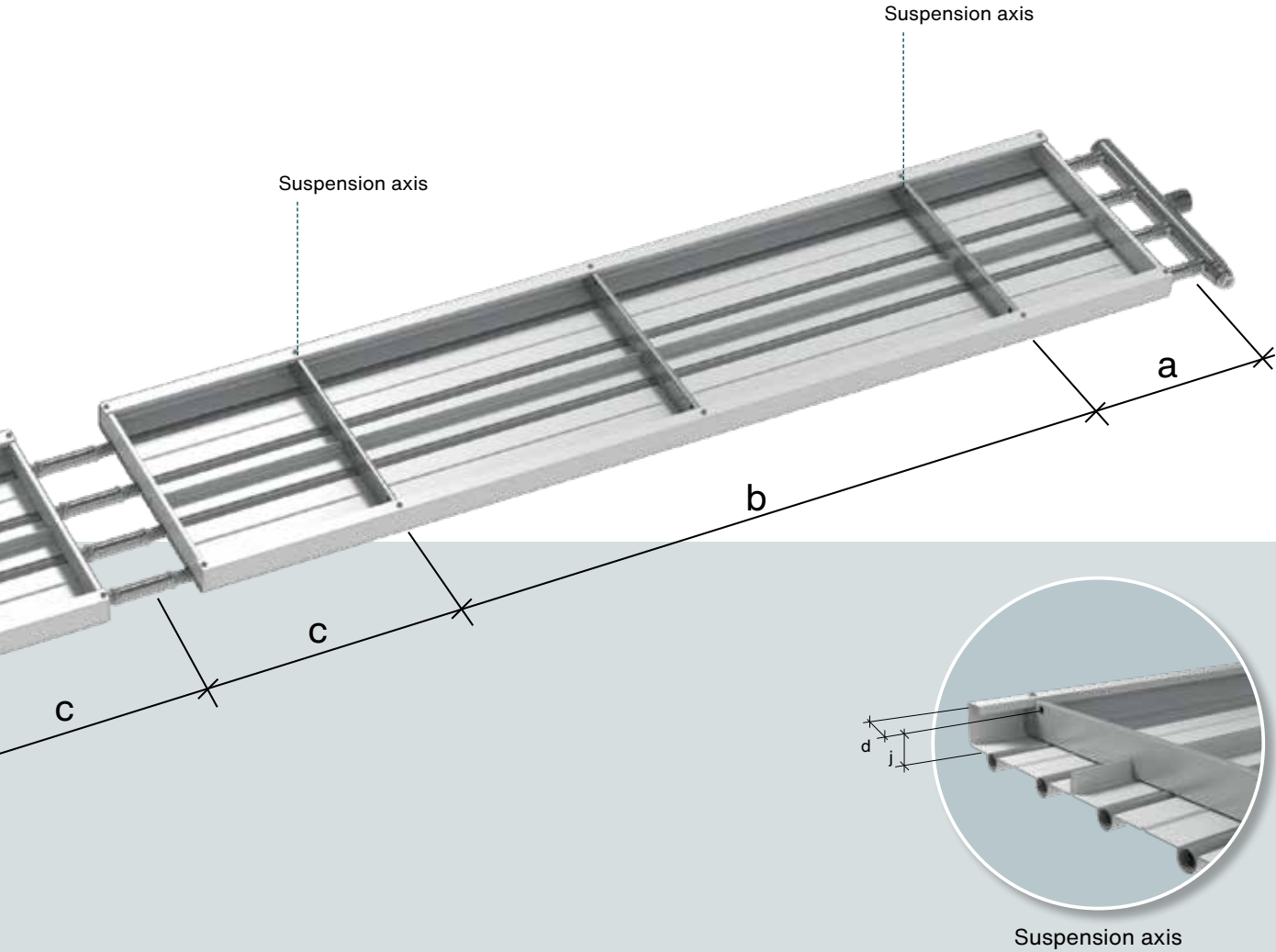


Recommended number of suspension axes per module

Module length	Quantity
2000 mm	2
3000 mm	2
4000 mm	2
5000 mm	3
6000 mm	3

Suspension point for fixing kits per reinforcement axis

Type	Quantity Fixing kits	Distance Suspension points A
Individual Zehnder ZIP strip	2	256 mm



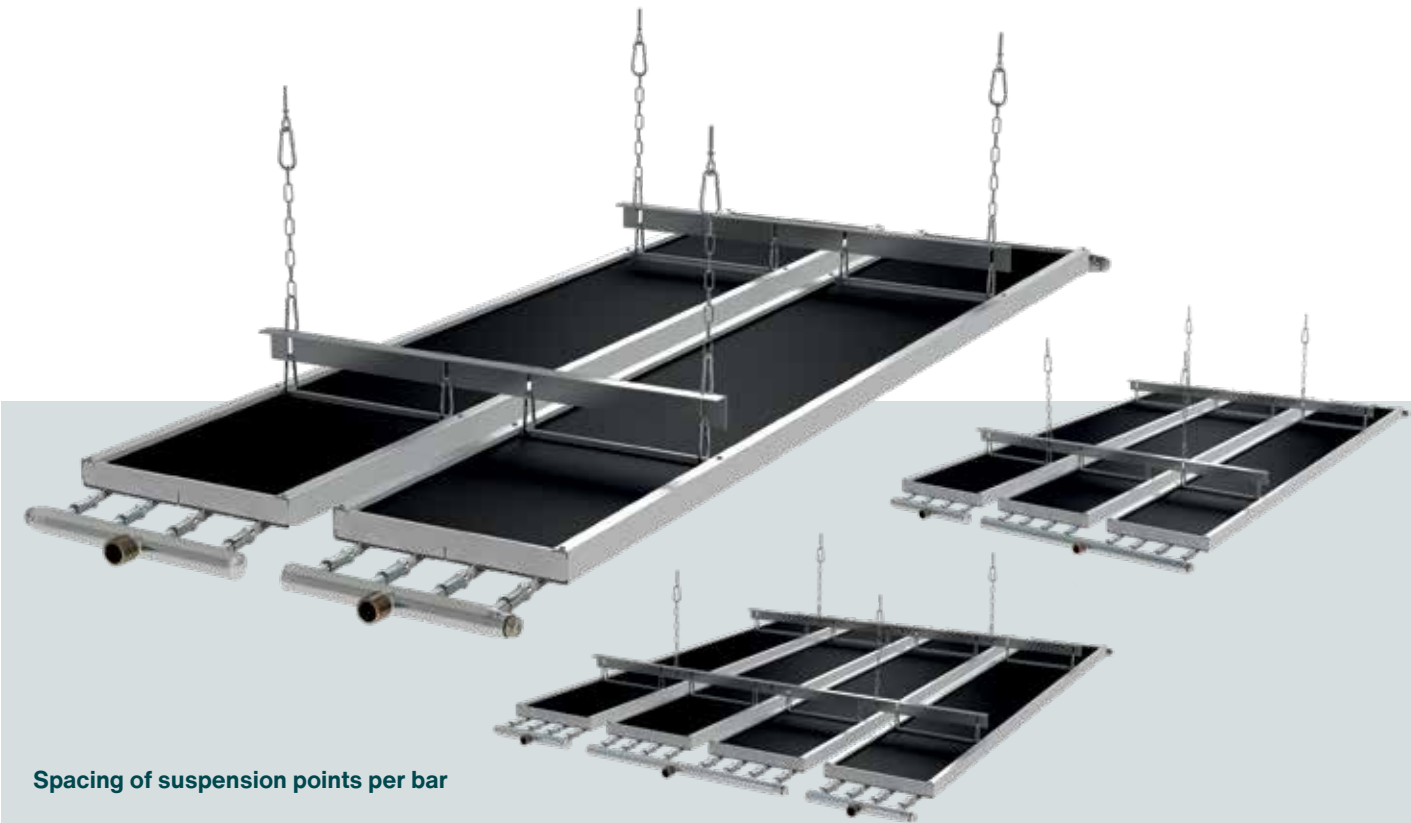
Dimensions

Item	Description	Dimension in mm	Min. dimension in mm	Max. dimension in mm
a	Header – suspension axis	500	-	-
b	Suspension axis – suspension axis ^{1) 2)}	Variable	1000	3000
c	Suspension axis – connection point	Variable	500	2500
d	Outer edge of module – centre of 1 st Suspension point	32	-	-
j	Bottom edge of radiant panel – upper edge of suspension point	37	-	-

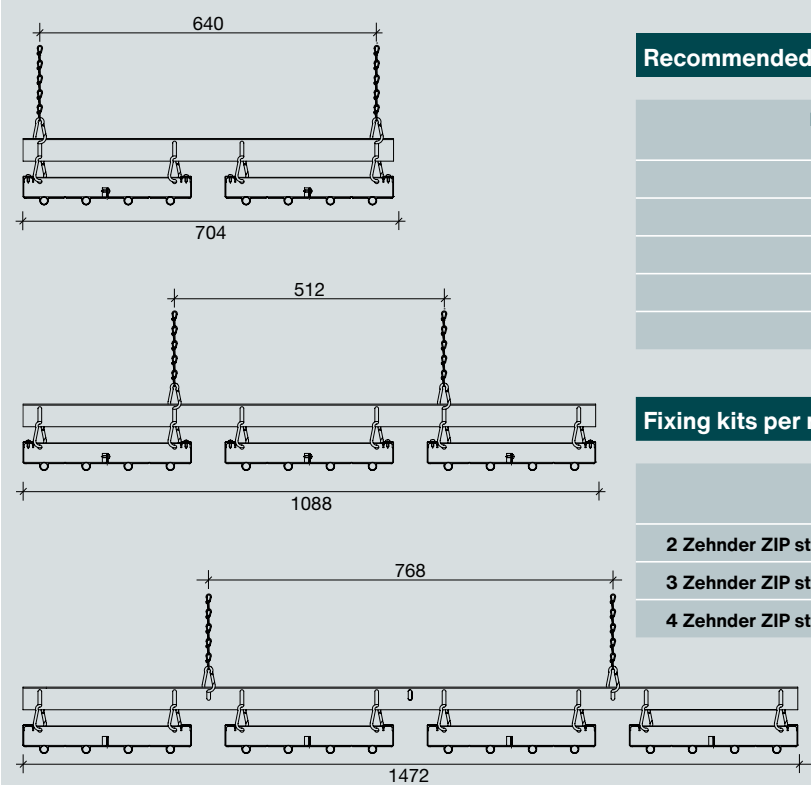
¹⁾ Grid of reinforcement bars 1000mm (special dimensions available upon request)

²⁾ On request: additional suspension axes, delivered separately - Item no. 506250

Suspension technology with multiple suspension bars



Spacing of suspension points per bar



Recommended number of multiple suspension bars per module

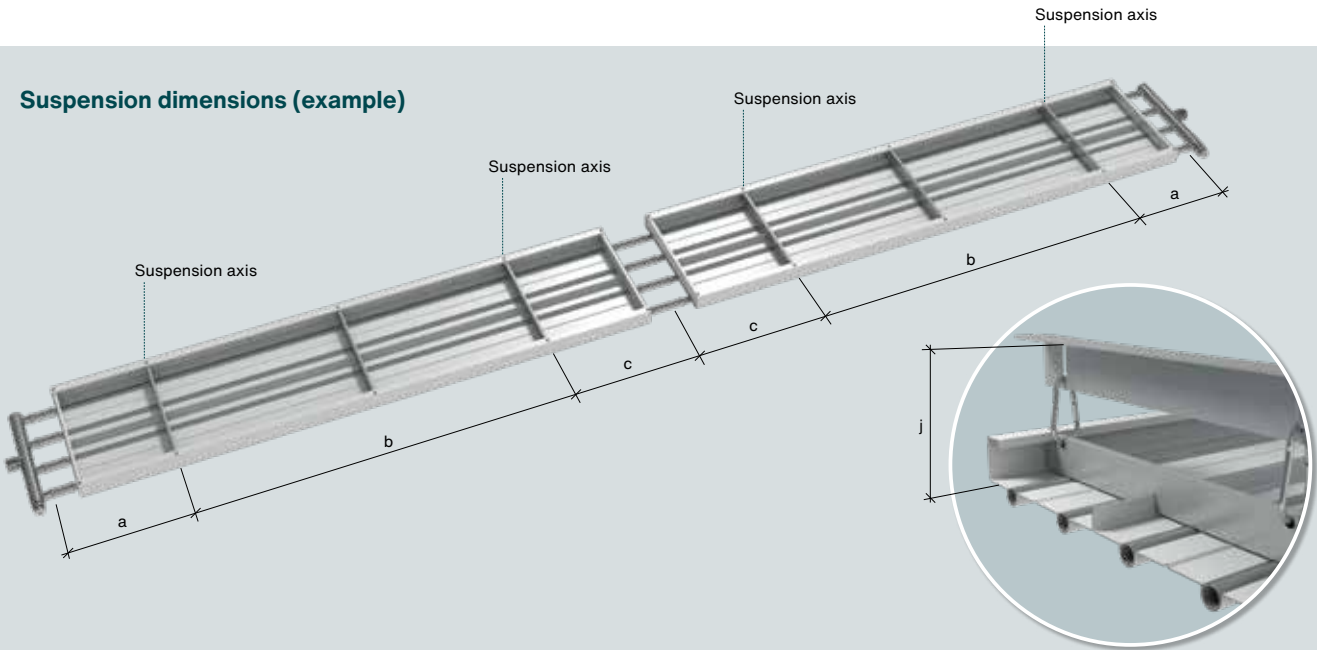
Module length	Quantity
2000 mm	2
3000 mm	2
4000 mm	2
5000 mm	3
6000 mm	3

Fixing kits per multiple suspension bar

Type	Quantity Fixing kits	Quantity Suspension points
2 Zehnder ZIP strips next to each other	2	640 mm
3 Zehnder ZIP strips next to each other	2	512 mm
4 Zehnder ZIP strips next to each other	2	768 mm

By using multiple suspension bars, up to four Zehnder ZIP strips can be installed next to each other. Arranging several Zehnder ZIP modules next to one another reduces the number of fixing kits required. Carabiner hooks, which are required to connect a Zehnder ZIP module to the multiple suspension bar, are included in the scope of delivery. Angle for fitting up to 45° across the length and up to 30° across the width is possible.

Suspension dimensions (example)



Dimensions

Item	Description	Dimension in mm	Min. dimension in mm	Max. dimension in mm
a	Header – suspension axis	500	-	-
b	Suspension axis – suspension axis ^{1) 2)}	Variable	1000	3000
c	Suspension axis – connection point	Variable	500	2500
j	Bottom edge of radiant panel – upper edge of suspension point	111	-	-

¹⁾ Grid of reinforcement bars 1000mm (special dimensions available upon request)
²⁾ On request: additional suspension axes, delivered separately - Item no. 506250

Item numbers

Multiple suspension bar 2, including carabiners	506220
Multiple suspension bar 3, including carabiners	506230
Multiple suspension bar 4, including carabiners	506240

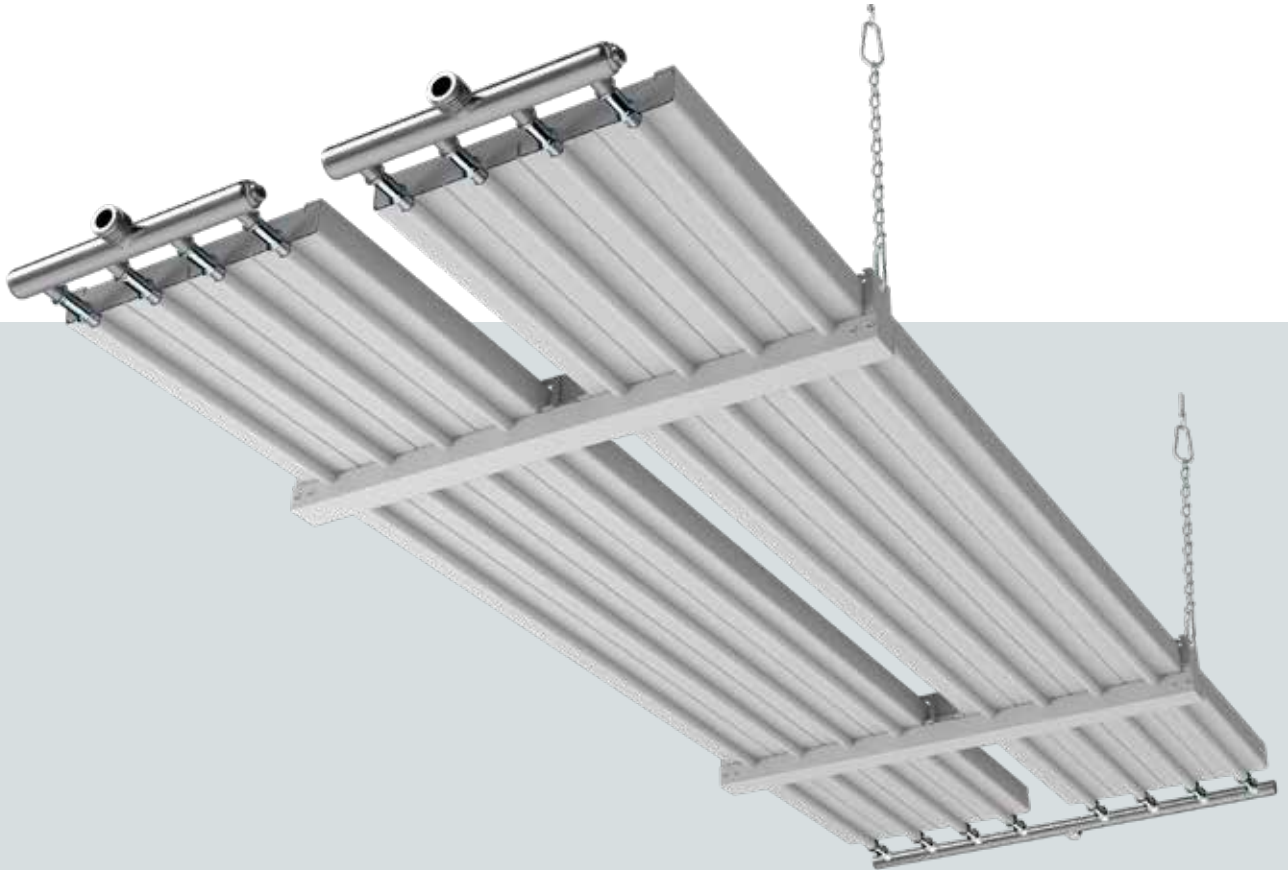
Suspension technology with support tracks

One fixing option is support tracks, on which the Zehnder ZIP modules are positioned.

The distance between the tracks can be up to 3 m. The suspension height of the support tracks is variable – a very low suspension height is possible.

The support tracks enable long strips close to the ceiling with Zehnder ZIP modules.

An angled fitting is not possible.

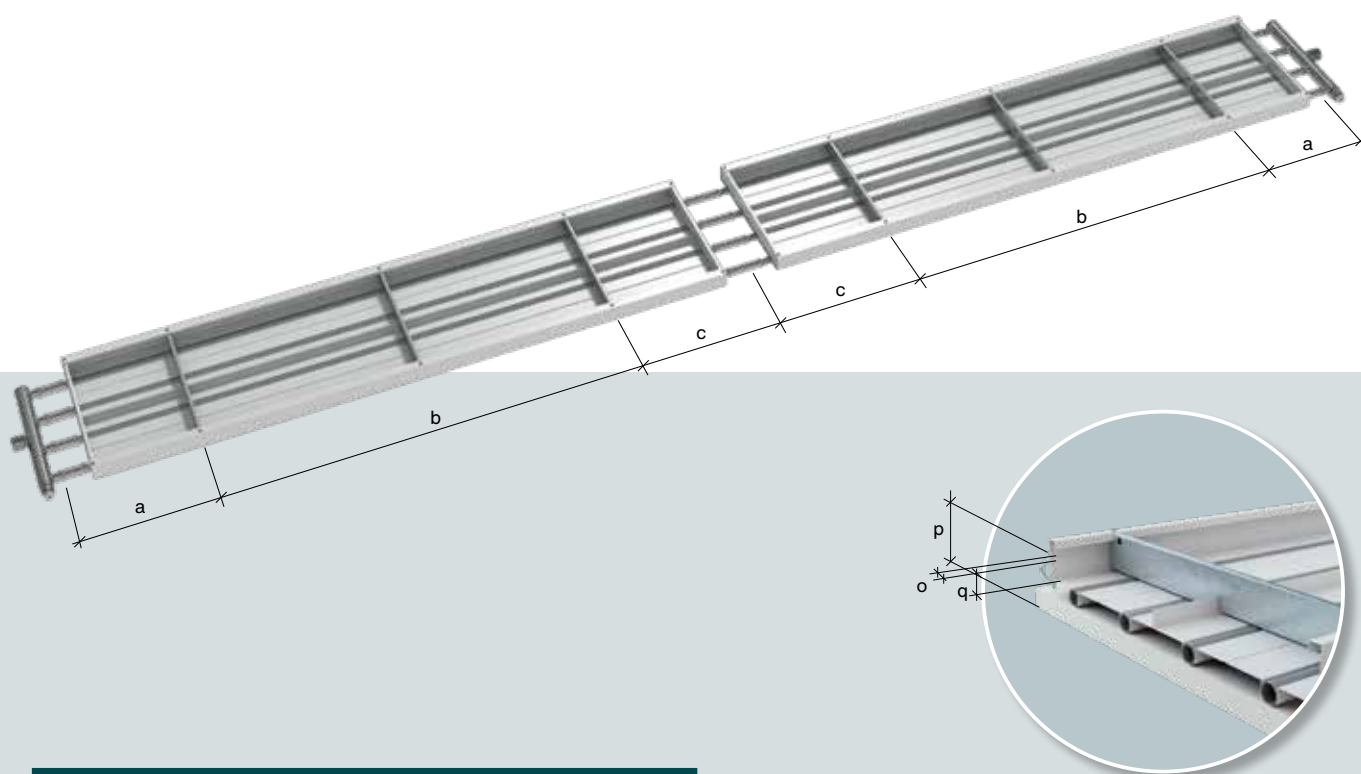


Recommended number of support tracks per module

Module length	Quantity
2000 mm	2
3000 mm	2
4000 mm	2
5000 mm	3
6000 mm	3

Fixing kits per support track

Type	Quantity Fixing kits	Distance Suspension points
Individual Zehnder ZIP strip	2	362 mm
2 Zehnder ZIP strips next to each other	2	746 mm
3 Zehnder ZIP strips next to each other	2	1130 mm
4 Zehnder ZIP strips next to each other	-	-



Item numbers

Item numbers	Model	A
Support track 1	506610	403 x 30 x 20 mm
Support track 2	506620	787 x 30 x 20 mm
Support track 3	506630	1171 x 30 x 20 mm
Support track 4	517790	1555 x 30 x 20 mm

Dimensions

Item	Description	Dimension in mm	Min. dimension in mm	Max. dimension in mm
a	Header – support track	500	-	-
b	Support track – support track	Variable	1000	3000
c	Support track – connection point	Variable	100	2500
o	Outer edge of module – centre of 1 st Suspension point	21	-	-
p	Bottom edge of support track – upper edge of suspension point	34	-	-
q	Bottom edge of radiant panel – upper edge of suspension point	14	-	-

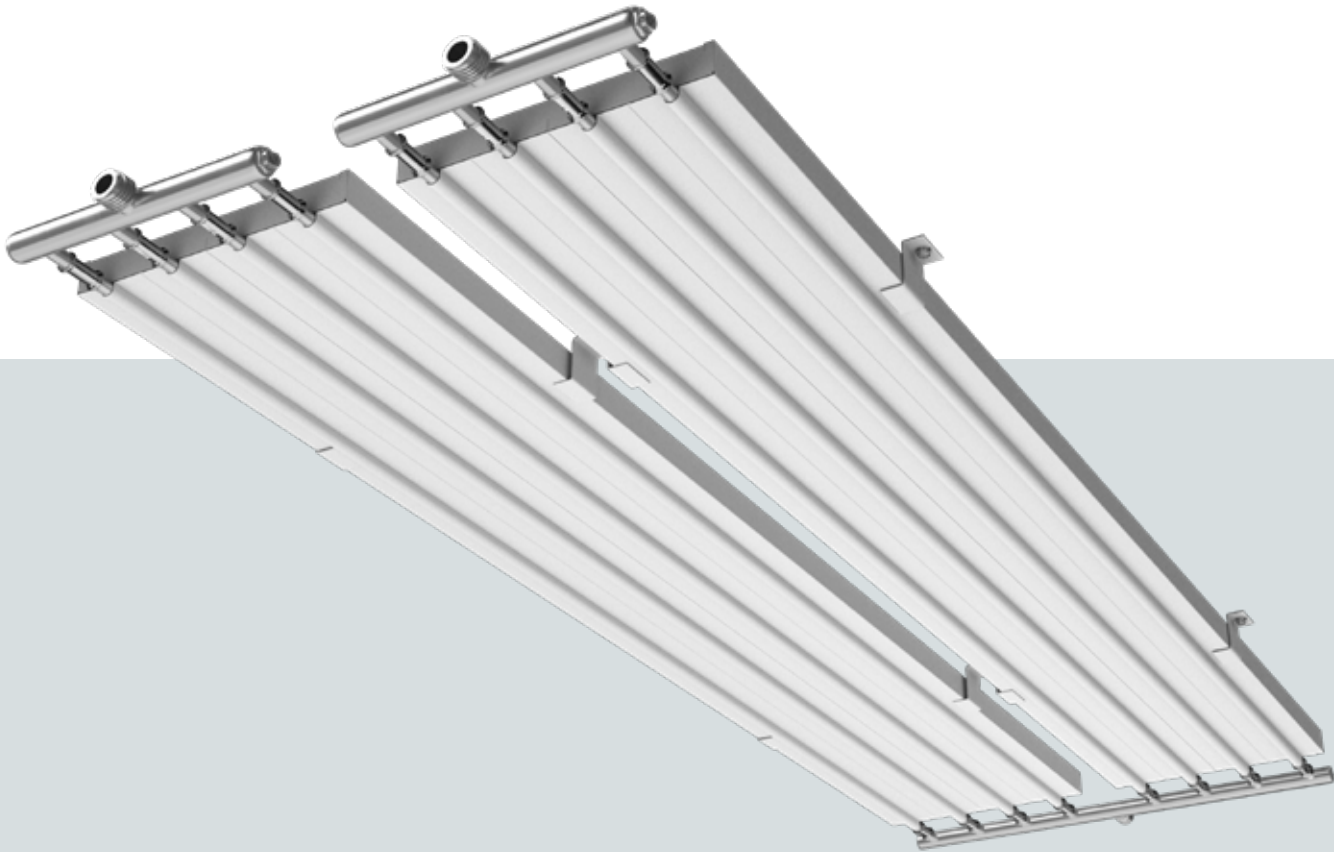
Minimum suspension height

Description	Dimension in mm	Description	Dimension in mm
KN52	146	KN82	384
KN53	133	KN83	371
KN54	133	KN84	371
KN56	175	KN86	413
KN57	164	KN87	402
KN58	143	KN88	381

Suspension technology with Z profiles

Zehnder ZIP modules can be fixed close to the ceiling using Z profiles.
They also enable an angled fitting across the width of up to 45°.
An angled fitting is not possible across the length.

ZZ profiles make it possible to install parallel Zehnder ZIP strips next to each other.

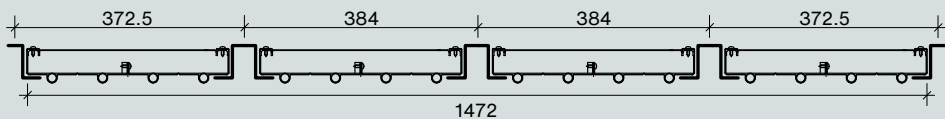
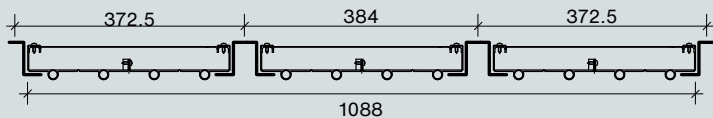
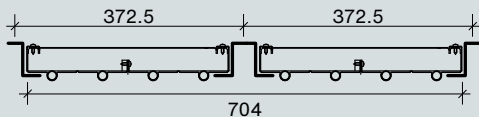
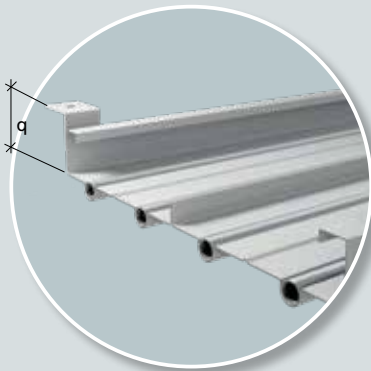
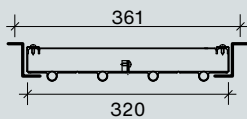
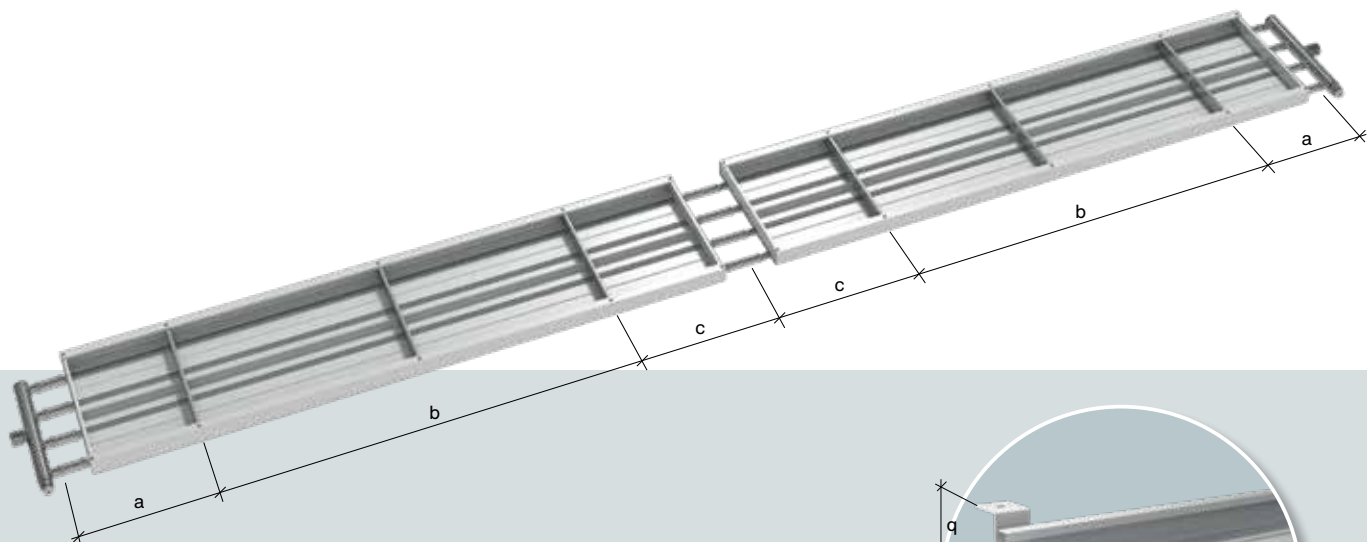


Item numbers

Item numbers	Model
Z profile	506710
ZZ profile	506720

Recommended number of Z profiles or ZZ profiles per module

Module length	Number of ZIP strips next to each other							
	1		2		3		4	
	Z	ZZ	Z	ZZ	Z	ZZ	Z	ZZ
2000 mm	4	-	4	2	4	4	4	6
3000 mm	4	-	4	2	4	4	4	6
4000 mm	4	-	4	2	4	4	4	6
5000 mm	6	-	6	3	6	6	6	9
6000 mm	6	-	6	3	6	6	6	9

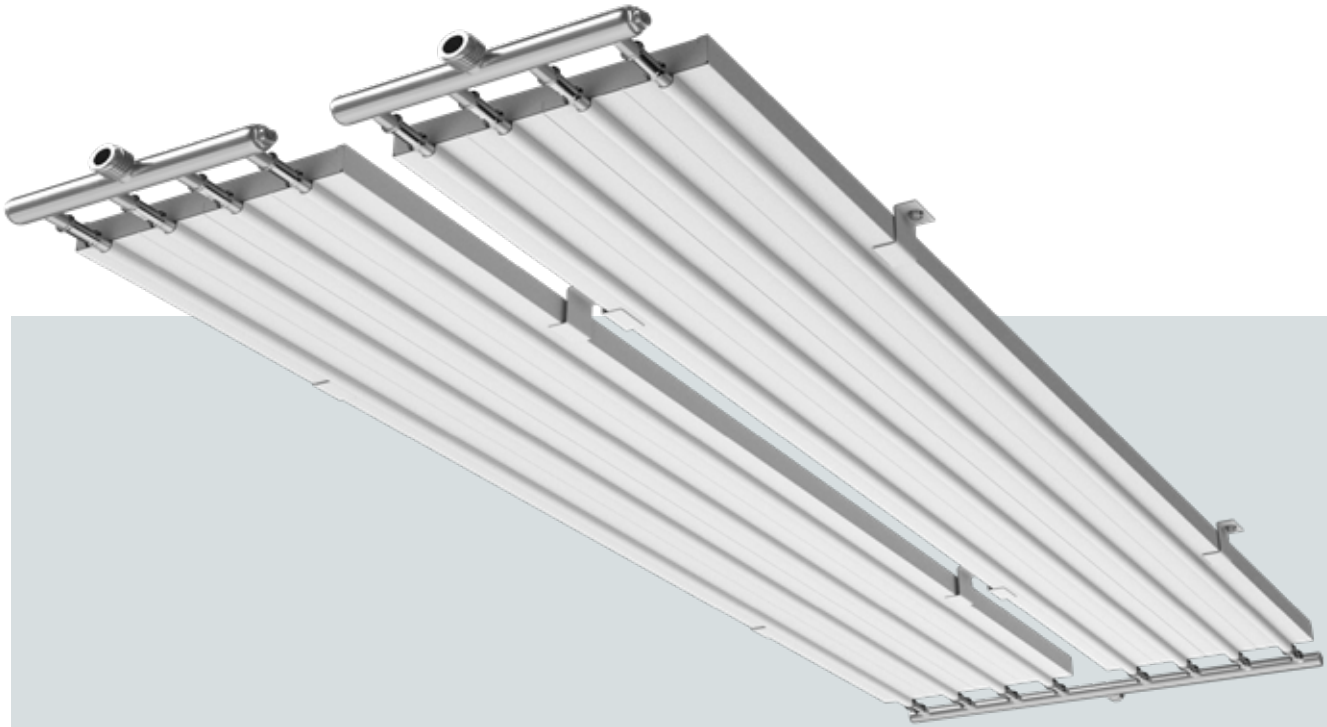


Dimensions

Item	Description	Dimension in mm	Min. dimension in mm	Max. dimension in mm
a	Header – Z profile	Variable	85	915
b	Z profile – Z profile	Variable	1000	3000
c	Z profile – connector piece	Variable	500	2500
d	Bottom edge of radiant panel – bottom edge of concrete ceiling	55	-	-

Suspension technology with fixed ceiling support braces

The fixed ceiling support braces are screwed into the ceiling and allow the Zehnder ZIP radiant ceiling panels to be installed close to the ceiling. An angled fitting is also possible across the width. The maximum angle for fitting is 30° across the width.

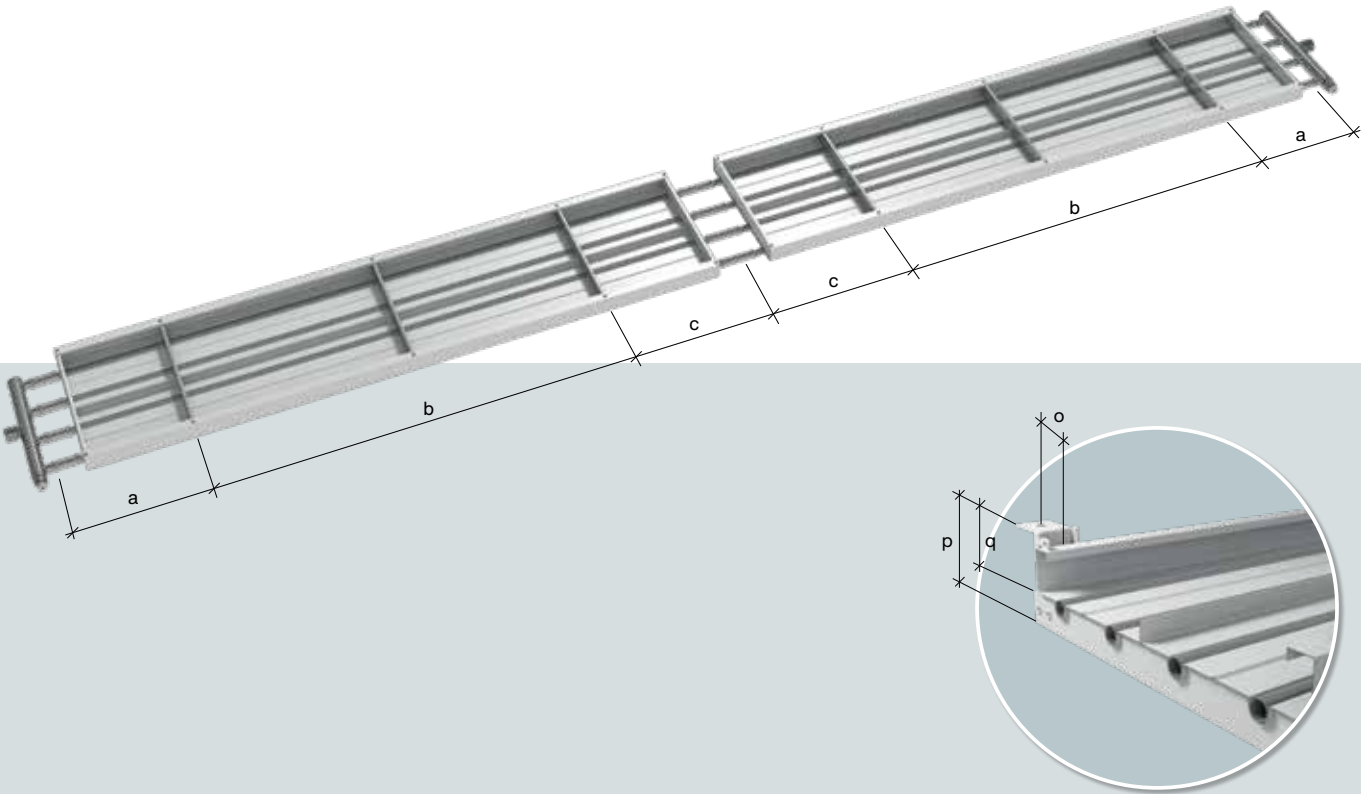


Recommended number of support tracks per module

Module length	Quantity
2000 mm	2
3000 mm	2
4000 mm	2
5000 mm	3
6000 mm	3

Fixing kits per fixed ceiling support brace

Type	Quantity Fixing kits	Distance Suspension points
Individual Zehnder ZIP strip	2	388 mm
2 Zehnder ZIP strips next to each other	2	772 mm
3 Zehnder ZIP strips next to each other	2	1156 mm
4 Zehnder ZIP strips next to each other	3	2 x 770 mm



Dimensions

Item	Description	Dimension in mm	Min. dimension in mm	Max. dimension in mm
a	Header – fixed brace	500	-	-
b	Fixed brace – fixed brace	Variable	1000	3000
c	Fixed brace – connection point	Variable	500	2500
o	Outer edge of module – centre of 1 st Suspension point	34	-	-
p	Bottom edge of fixed brace – bottom edge of concrete ceiling	91	-	-
q	Bottom edge of radiant panel – bottom edge of concrete ceiling	56	-	-

Item numbers

Item numbers	Model
Fixed brace 1	506650 / 502060
Fixed brace 2	506660 / 502070
Fixed brace 3	506670 / 502080
Fixed brace 4	506680 / 502090

Suspension technology with flexible ceiling support braces

The flexible ceiling support braces enable a fitting with an angle of up to 30° across the width of the radiant ceiling panels. The modules interlock with the pipe beading in the flexible ceiling support braces to prevent them from slipping sideways. The suspension height of the flexible ceiling support braces can vary.

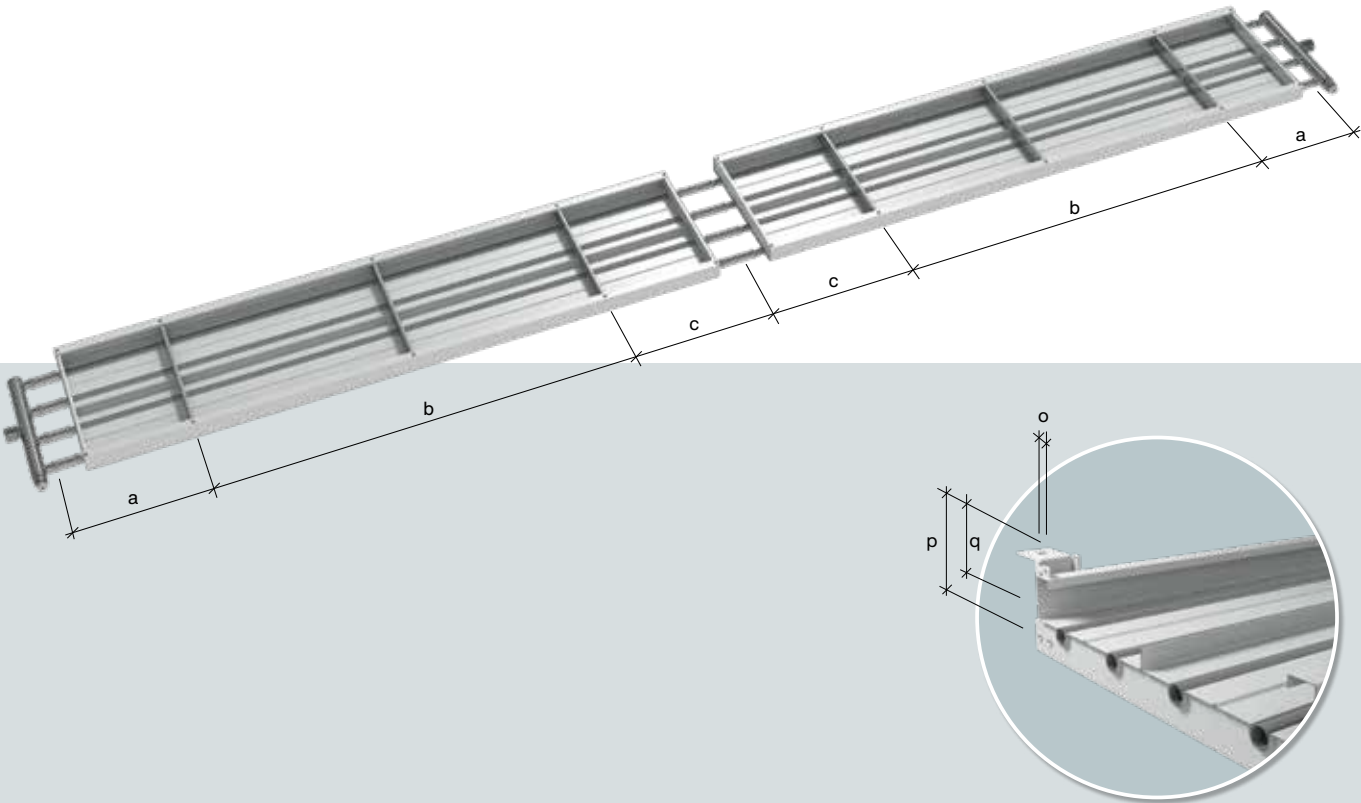


Recommended number of support tracks per module

Module length	Quantity
2000 mm	2
3000 mm	2
4000 mm	2
5000 mm	3
6000 mm	3

Fixing kits per flexible ceiling support brace

Type	Quantity Fixing kits	Distance Suspension points
Individual Zehnder ZIP strip	2	348 mm
2 Zehnder ZIP strips next to each other	2	732 mm
3 Zehnder ZIP strips next to each other	2	1116 mm
4 Zehnder ZIP strips next to each other	3	2 x 750 mm



Dimensions

Item	Description	Dimension in mm	Min. dimension in mm	Max. dimension in mm
a	Header – flexible brace	500	-	-
b	Flexible brace – flexible brace	Variable	1000	3000
c	Flexible brace – connection point	Variable	500	2500
o	Outer edge of module – centre of 1 st Suspension point	14	-	-
p	Bottom edge of flexible brace – bottom edge of concrete ceiling	81	-	-
q	Bottom edge of radiant panel – bottom edge of concrete ceiling	50	-	-

Item numbers

Item numbers	Model
Flexible brace 1	506920
Flexible brace 2	506930
Flexible brace 3	506940
Flexible brace 4	506950

Individual project solutions

Zehnder ZIP radiant ceiling panels are extremely flexible:

in addition to the extensive standard range, there are also a number of special solutions available. Therefore, whatever the space and whatever the project, we have exactly what you need. All RAL and NCS colours available upon request.

Ball guards/ball impact resistance

Practical in sports halls: due to the arched, galvanised grid, no "stray" shots get caught in the radiant ceiling panels. Ball guards can be used for a width of up to four Zehnder ZIP strips next to each other.

Zehnder ZIP radiant ceiling panels are also tested by the material test institute in Stuttgart for ball impact resistance in accordance with DIN 18032.



Dust protector panel

Zehnder ZIP radiant ceiling panels can be sealed with a dust protector panel if required.

An easy-care and equally hygienic solution that is ideal for spaces with high dust levels.



Raised headers

The headers finish above the radiant panel sheet and therefore cannot be seen from below.



Non-continuous radiant panel plate

This version allows light to pass through unobstructed, for example, from skylights.

The length of the gap between radiant panels must not be more than 3 m.

This special solution was designed by Zehnder's internal planning department.



Wet room design

This design of the radiant panels is suitable for use in wet rooms (steam).

As water could accumulate in the cover plates, these are not installed in the wet room design.



Technical details

Dimensions, operating parameters and output

Feature	Unit of measurement	Individual ZIP strip	2 ZIP strips next to each other	3 ZIP strips next to each other	4 ZIP strips next to each other
Number of pipes	Piece(s)	4	8	12	16
Pipe material	–	Precision steel pipe, welded, galvanised on the outside in line with EN 10305-3			
Radiant panel	–	Fully galvanised, coated sheet steel			

Dimensions

Widths	mm	320	704	1088	1472
Pipe spacing	mm	80			
Distance between strips	mm	-	64	64	64
Minimum module length	mm	2000			
Maximum module length	mm	6000			

Operating parameters¹⁾

Crimp connection / threaded connection

Max. operating temperature	°C	120 ³⁾ / 95 ⁴⁾			
Max. operating pressure	bar	12 ³⁾ / 5 ⁴⁾			

Weight ²⁾

Empty weight without water content, with insulation	Radiant panel	kg/m	3.8	7.6	11.4	15.2
	Per manifold	kg	0.5	1.0	1.5	2.0
Insulation weight		kg/m	0.3	0.6	1	1.3
Water content ⁵⁾		l/m	0.5	1.1	1.6	2.1
Operating weight with water content, with insulation	Radiant panel	kg/m	4.3	8.7	13.0	17.3
	Per manifold	kg	0.7	1.4	2.1	2.8
Weight of ball guards		kg/m	0.5	0.8	1.1	1.4

Dimensions, operating parameters and output

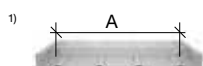
Feature	Unit of measurement	Individual ZIP strip	2 ZIP strips next to each other	3 ZIP strips next to each other	4 ZIP strips next to each other
Thermal output					
Thermal output according to EN 14037-3 at $\Delta T = 55$ K with insulation	W/m	208	417	625	834
Thermal output constant (K)	–	2.0871	4.1742	6.2613	8.3484
Thermal output exponent (n)	–	1.1489			

Cooling capacity with thermal insulation

Cooling capacity based on DIN 4715-1 at $\Delta T = 8.5$ K with insulation	W/m	30	60	90	120
Cooling capacity constant (K)	–	3.283	6.566	9.849	13.132
Cooling capacity exponent (n)	–	1.0340			

Cooling capacity without thermal insulation

Cooling capacity based on DIN 4715-1 at $\Delta T = 8.5$ K without insulation	W/m	36	71	107	142
Cooling capacity constant (K)	–	3.960	7.920	11.880	15.840
Cooling capacity exponent (n)	–	1.0265			



When installing on suspension axes

²⁾ The actual loads on the supporting structure must be determined during the design phase.

The horizontal and vertical forces created by the installation conditions on site must be taken into account.

³⁾ Crimp connection

⁴⁾ Threaded connection

⁵⁾ Water quality in accordance with VDI (Association of German Engineers) 2035

Tender specifications

Zehnder ZIP radiant ceiling panel according to DIN EN 14037 made of fully galvanised radiant panel on both sides. Max. operating temperature 120 °C, max. operating pressure 12 bar.

Fully galvanised radiant panel design, additionally coated on the outside with polyester paint similar to RAL 9016 matt and with protective paint on the back. All modules are fully galvanised and therefore protected against corrosion. Testing is carried out according DIN 50017.

Zehnder special clip profiling for holding four externally galvanised precision steel pipes with an external diameter of 15 mm in accordance with DIN EN 10305-3. The radiant panel sheets are statically self-supporting due to lateral and upper chamfers. The chamfers help to integrate as well as hold down the thermal insulation. Two end front plates similar to RAL 9016 matt are attached to the end of the radiant panel.

They are attached to the factory-fitted fixed suspension bars in a 1 m grid. The position of the suspension bars can be adjusted as required. For radiant ceiling panels arranged in parallel, installation is carried out with suspension bars. Only two suspension points towards the ceiling are required per suspension bar.

For structural reasons, a fixing distance of three metres must be ensured without additional fixing structures or support systems. If the fixing distances are not reached or if fixing structures and support systems are used, a structural analysis must be provided due to increased loads.

The maximum operating weight is 4.3 kg/m. Delivery is possible for widths of 320mm and any modules 2, 3, 4, 5 or 6 m long. The individual modules are connected on site using crimp sliding sleeves or screw connections. Special lengths are available on request.

Thermal heat insulation free from mineral wool according to EU directive 97/69 (note Q), lined with black fleece. $\lambda = 0.040 \text{ W/mK}$, thickness 40 mm.

The headers consisting of a round pipe (external diameter of 30 mm) are equipped with the required R1" male thread connectors (EN 10266), blind cover and 1/2" connector opposite for venting/drainage. The manifolds (headers) are supplied loose and connected to the panels on site using crimp sliding sleeves or screw connections, and the joints are covered using cover plates and galvanised screws.

Zehnder ZIP radiant ceiling panels are tested for their ball impact resistance according to DIN 18032.

Water quality in accordance with VDI (Association of German Engineers) 2035.

Manufacturer: Zehnder
Type: ZIP radiant ceiling panel

Thermal insulation

Fleece-lined mineral wool

Free from mineral wool according to EU directive 97/69 (note Q); lined with black fleece
 $\lambda = 0.040 \text{ W/mK}$, thickness 40 mm

Mineral wool shrink-wrapped in foil

Free from mineral wool according to EU directive 97/69 (note Q); lined with black fleece and shrink-wrapped in LDPE foil
 $\lambda = 0.040 \text{ W/mK}$, thickness 40 mm

XPS insulation

Extruded polystyrene rigid foam insulation
 $\lambda = 0.032 \text{ W/mK}$, thickness 20 mm

Operating parameters

Heating medium	 /°C
Space temperature	 /°C
Operating pressure	 bar
Thermal output (overall)	 W
Module length (overall)	 m

Crimp connection (Item no. 502280)

Galvanised crimp connection 15 mm	 Piece(s)
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Threaded connection (Item no. 633010)

Galvanised clamping ring screw connection 15 mm	 Piece(s)
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Cover plates

Made of 0.45-mm-thick sheet steel, galvanised on both sides, coated externally with polyester paint similar to RAL 9016 matt, galvanised screws used to cover the crimp or threaded connections at the connection points and to the headers.
Cover plate (Item no. 506200)
End cover (Item no. 506210)

Upper covers

Dust protector panel

Galvanised upper sheet metal cover (thickness 0.63 mm) incl. fixing clamps and screws - supplied loose

Ball guards

Galvanised metal grill cover incl. fixing clips and screws for use in sports facilities - delivered loose

Special solution for wet rooms

Special solution for wet rooms incl. XPS insulation and galvanised upper plate cover, sealed and installed at the factory

Fixing technology

Fixing kit KN 52 (Item no.: 513520)
for fixing to wooden ceilings piece(s)

Fixing kit KN 53 (Item no.: 505160)
for fixing to concrete ceilings piece(s)

Fixing kit KN 54 (Item no. 505170)
for fixing to steel profile piece(s)

Fixing kit KN 56 (Item no. 505210)
for fixing to trapezoidal sheet metal piece(s)

Fixing kit KN 57 (Item no. 505220)
for fixing to inclined steel girders piece(s)

Fixing kit KN 58 (Item no. 505230)
for fixing to horizontal steel girders piece(s)

Fixing kit KN 82 (Item no. 513530)
for fixing to wooden ceilings piece(s)

Fixing kit KN 83 (Item no. 505260)
for fixing to concrete ceilings piece(s)

Fixing kit KN 84 (Item no. 505270)
for fixing to steel profile piece(s)

Fixing kit KN 86 (Item no. 505280)
for fixing to trapezoidal sheet metal piece(s)

Fixing kit KN 87 (Item no. 505290)
for fixing to inclined steel girders piece(s)

Fixing kit KN 88 (Item no. 505340)
for fixing to horizontal steel girders piece(s)

Volume flow controller

VS RK-15 (Item no.: 513810)
Zehnder VSRK-15 (150–700 l/h) volume flow control combination consisting of a volume flow controller and a ball valve.

The volume flow controller is a valve combination which consists of an automatic flow rate controller (with a factory-set nominal value) and an actuator head. The actuator head can be equipped with an actuator (threaded connection M30 x 1.5).

The volume flow controller is used for hydraulic balancing of radiant ceiling panels.

Technical specifications:

Dimension: DN15
Max. operating temperature ts: 120 °C
Min. operating temperature ts: -10 °C
Max. operating pressure ps: 16 bar (1600 kPa)
Max. differential pressure: 4 bar (400 kPa)

Housing made of dezincification-resistant brass, seals made of EPDM or PTFE, valve spindle made of stainless steel.

Item numbers:

VS RK-15 combination, 30-210 kg/h	513800
VS RK-15 combination, 150-700 kg/h	513810
VS RK-25 combination, 300-2000 kg/h	513820
VS RK-32 combination, 600-3600 kg/h	513830
VS RK special 15/15/15, 30-210 kg/h	513840
VS RK Special 15/15/15, 150-700 kg/h	513850
VS RK special 25/15/15, 300-2000 kg/h	513860
VS RK special 25/25/25, 300-2000 kg/h	513870
VS RK special 32/25/25, 600-3600 kg/h	513880
VS RK special 32/32/32, 600-3600 kg/h	513890
Controller, separate DN15, 30-210 kg/h	513900
Controller, separate DN15, 150-700 kg/h	513910
Controller, separate DN25, 300-2000 kg/h	513920
Controller, separate DN32, 600-3600 kg/h	513930
Flow, separate DN15	513940
Flow, separate DN25	513950
Flow, separate DN32	513960

Armoured hose

Zehnder armoured hose for heating systems, consisting of temperature-resistant and age-resistant EPDM/Butyl with stainless-steel braided sleeve.

Hose N15 (Item no.: 513430)

Inner installation dimension: 500 mm
Hose length: 540 mm
Permissible operating pressure: 12 bar
Permissible operating temperature: 90 °C
Connection: Male thread R ½"
Coupler Rp ¾"

Item numbers:

Reducing sleeve 1" x ½"	501170
Sleeve 1"	501190
Reducing sleeve 5/4" x 1"	501180
Coupler screw connection ¾" x ½"	514000

For in-depth advice on products and support with planning your Zehnder ZIP project, visit our website:
international.zehnder-systems.com