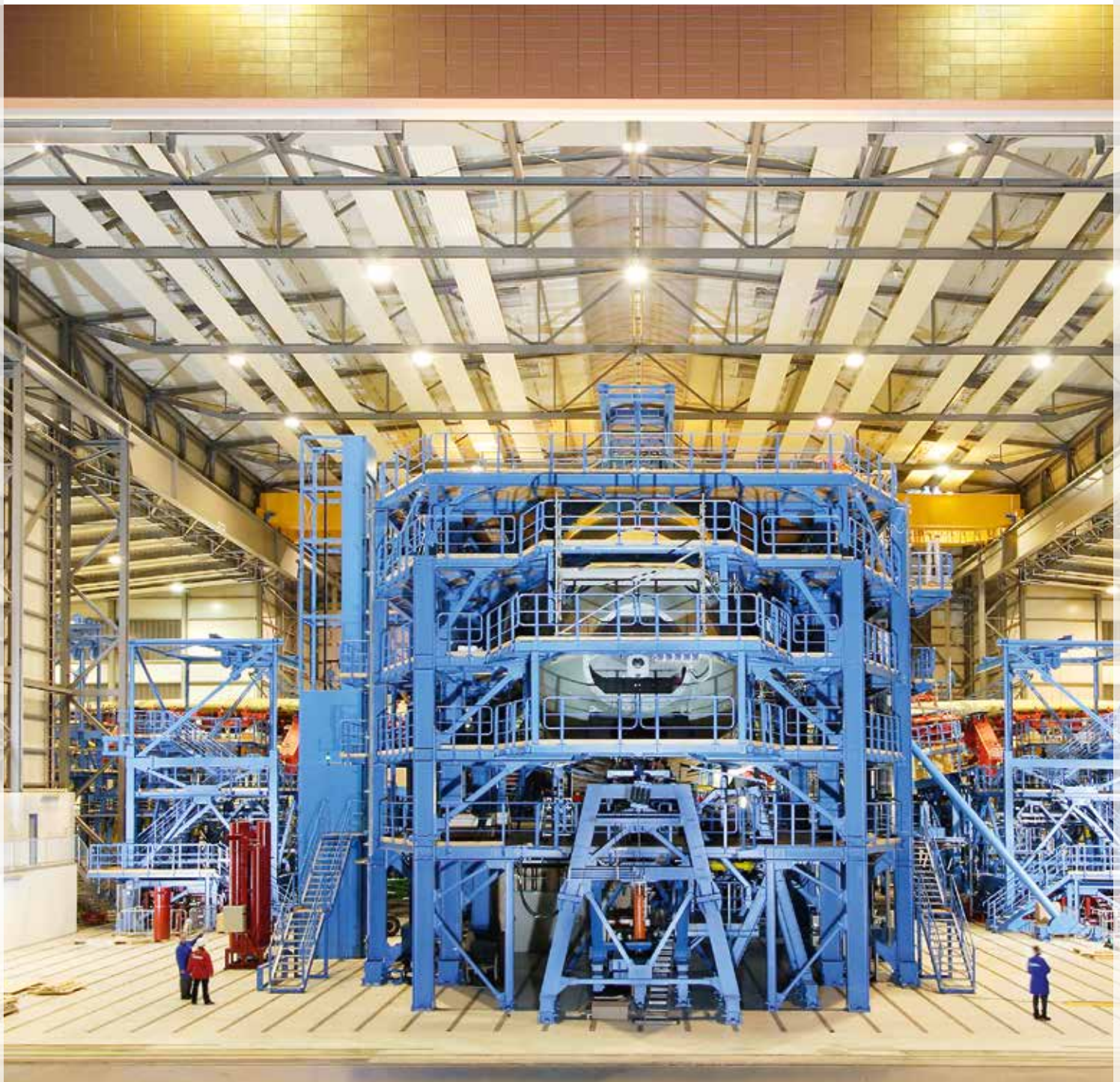


Zehnder ZBN

Technical document for radiant ceiling panels for heating and cooling



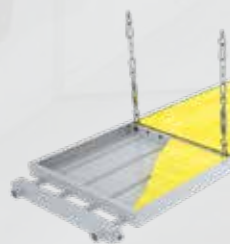
Delivering comfort, energy-saving in operation and flexibility

Zehnder ZBN radiant ceiling panels heat and cool a building comfortably and efficiently. They can be used in all rooms from approx 2 m - 50 m in height and compared to other systems, they can achieve energy savings of over 40%. Zehnder ZBN radiant ceiling panels are available in many different dimensions, with the exact length tailored to the building in question. Special versions can also be manufactured.



ZEHNDER ZBN OFFERS THESE SPECIAL FEATURES

Due to high levels of energy efficiency and a customised design, Zehnder ZBN enables functional solutions for heating and cooling.



PAGE x-x

MOUNTING AND INSTALLATION

The installation stage is made easier due to flexible systems and professional support from Zehnder.



PAGE x-x

TECHNICAL SPECIFICATIONS

- Calculation of pressure loss and minimum mass flow
- Heating and cooling performance
- Technical specification

PAGE x-x



Product benefits

Zehnder ZBN radiant ceiling panels are a cost-effective, efficient, environmentally friendly and energy-saving heating and cooling alternative for buildings of any height. Here are the benefits at a glance.

1 Economic efficiency

- Possible energy savings of over 40%
- Air temperature may be up to 3 K lower (heating) or 3 K higher (cooling) than the perceived temperature
- Low temperature stratification
- Free choice of energy carrier
- No additional electricity costs for driving energy
- No maintenance or servicing costs
- High-performance radiant ceiling panels

2 Comfortable climate

- Principle of radiant heat
- Uniform, comfortable heat distribution throughout the room
- Even temperature distribution across the entire height of building
- Heating and cooling effect immediately noticeable
- No dust dispersal
- The system runs absolutely silently

3 Technology

- High heating and cooling performance (according to EN 14037 or based on EN 14240)
- Unrestricted use of floor and wall space
- Extremely quick system response to temperature changes
- Easy installation, cost savings up to 20% for individual element of 7.5 m
- Thermal insulation installed ex works

4 Variety of products

- Nine Zehnder ZBN standard models (2 to 10 pipes) with widths of 300 to 1,500 mm
- Length of strips up to approx. 120 m (sub-length up to 7.5 m)
- High-quality powder coating in any colour
- Special solutions tailored to customer requirements
- Perforated design for sound absorption

Structure and attachment

Zehnder stands for quality, functionality and design. The company is certified to ISO 9001 and 14001 and manufactures its products in accordance with the strictest quality guidelines. Zehnder ZBN radiant ceiling panels are produced and tested according to EN 14037 and therefore CE compliant.

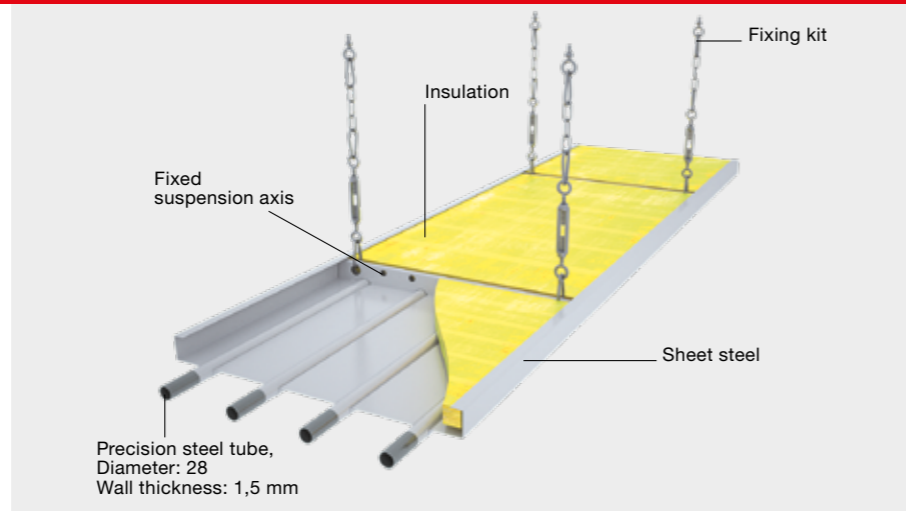
SURFACE FINISHES

Zehnder ZBN radiant ceiling panels are available with a smooth or a perforated surface. The surface is coated with a high-quality powder coat finish (standard colour RAL 9016 or any other colour of your choice).



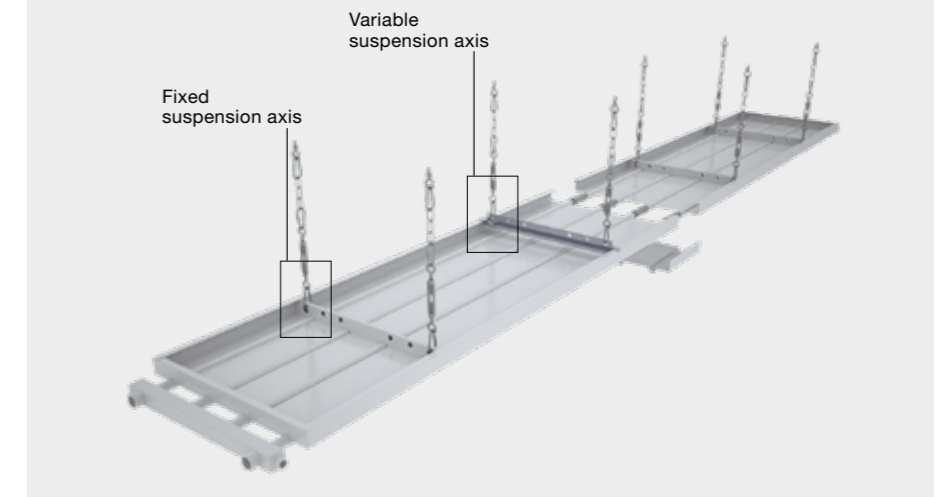
STRUCTURE OF THE ELEMENT

Zehnder ZBN radiant ceiling panels consist of a steel sheet with pre-formed channels into which the pipes are fitted. The insulation is fitted on the top of the panel at the factory. In the perforated design, insulation can be used which has special acoustic properties.



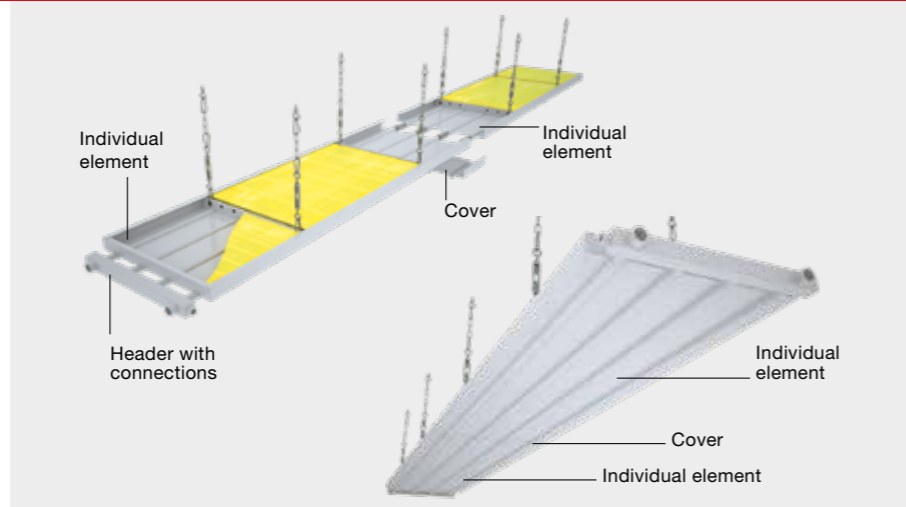
SUSPENSION AND ATTACHMENT

The Zehnder ZBN radiant ceiling panel can be attached to fixed or variable suspension axes. Additional suspension variants are available on request.



DESIGNS

The standard widths are 300, 450, 600, 750, 900, 1,050, 1,200, 1,350 and 1,500 mm. Other special sizes are also available on request. A radiant ceiling panel strip can consist of several individual elements arranged in series. The individual elements are produced in lengths of up to 7.5 m. This sub-length is unique within Europe and reduces installation costs by up to 20% compared to the standard sub-length of 6 m.



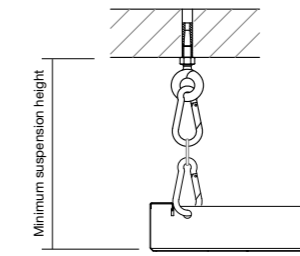
FIXED AND VARIABLE SUSPENSION AXES

With fixed suspension axes, the fixing points are located at fixed positions on the panel and cannot be moved. Variable suspension axes can be moved along the length of the panel, enabling them to be adjusted to best suit the conditions of the building.



Standard fixing kits

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



Key	Article number:
1 M10 hexagon nut	505080
2 M10 steel dowel	505060
3 M10 girder clamp	505030
4 Securing clip	506100
5 M10 flat leaf screw	959110
6 M10 trapezoidal hanger	505020
7 M8 x 110 turnbuckle	505140
8 4 mm link chain	509960
9 7 x 70 carabiner hook	505010
10 M10 eyelet screw	505040
11 M10 washer	959030
12 M10 x 40 hexagon screw	505070
13 M8 x 110 hexagon screw	501500
14 M10 turnbuckle	513510

TIMBER BEAMS



K32 fixing kit
 Minimum suspension height without link chain: 442 mm
 Item number: 513540

A diagram showing the components of the K32 fixing kit. It includes a metal bracket (14) attached to a wooden beam, a chain (8), and a hook (9). The diagram is numbered 1 through 14, corresponding to the key.

TRAPEZOIDAL SHEET METAL



K36 fixing kit
 Minimum suspension height without link chain: 471 mm
 Item number: 501310

A diagram showing the components of the K36 fixing kit. It includes a metal bracket (13) attached to trapezoidal sheet metal, a chain (8), and a hook (9). The diagram is numbered 7 through 13, corresponding to the key.

CONCRETE CEILING



K33 fixing kit
 Minimum suspension height without link chain: 429 mm
 Item number: 501290

A diagram showing the components of the K33 fixing kit. It includes a metal bracket (2) attached to a concrete ceiling, a chain (8), and a hook (9). The diagram is numbered 7 through 10, corresponding to the key.

INCLINED STEEL GIRDER



K37 fixing kit
 Minimum suspension height without link chain: 464 mm
 Item number: 504900

Provided on site

A diagram showing the components of the K37 fixing kit. It includes a metal bracket (3) attached to an inclined steel girder, a chain (8), and a hook (9). The diagram is numbered 7 through 12, corresponding to the key.

STEEL PROFILE



K34 fixing kit
 Minimum suspension height without link chain: 429 mm
 Item number: 501300

Provided on site

A diagram showing the components of the K34 fixing kit. It includes a metal bracket (10) attached to a steel profile, a chain (8), and a hook (9). The diagram is numbered 7 through 10, corresponding to the key.

HORIZONTAL STEEL GIRDER

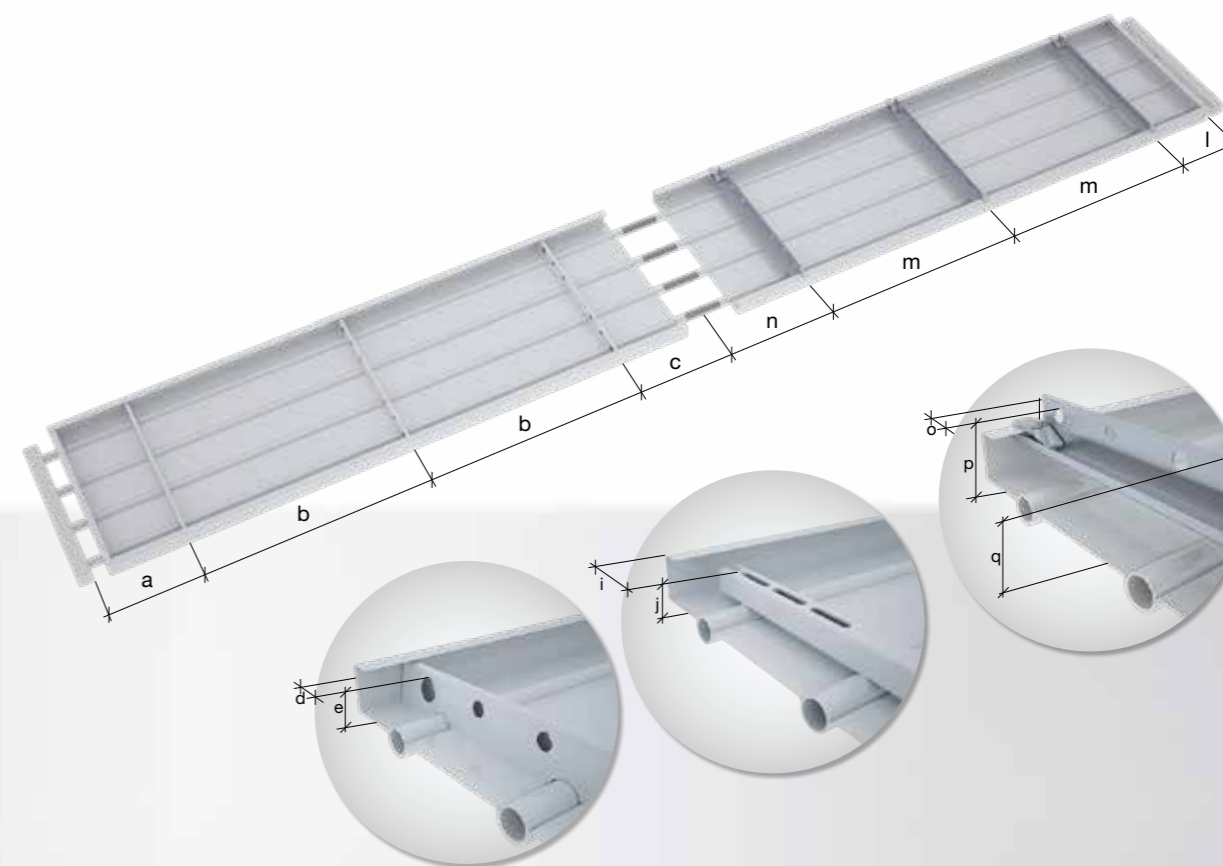
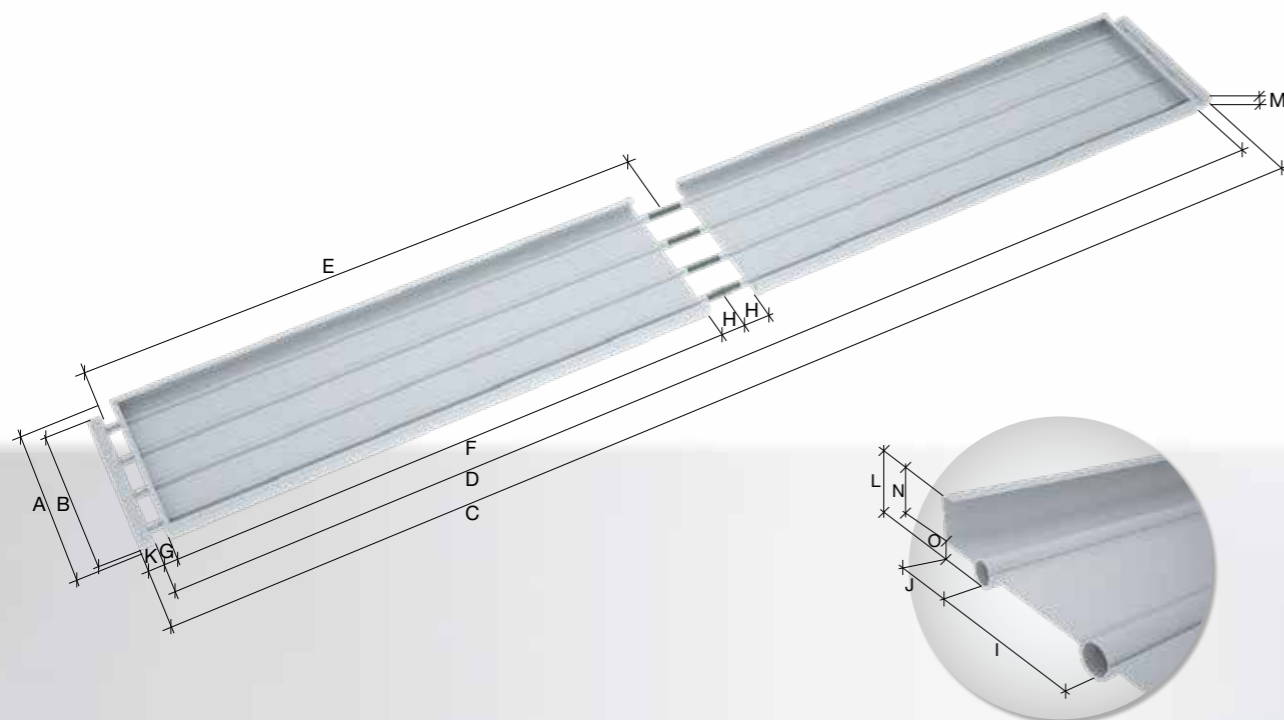


K38 fixing kit
 Minimum suspension height without link chain: 442 mm
 Item number: 504910

Provided on site

A diagram showing the components of the K38 fixing kit. It includes a metal bracket (3) attached to a horizontal steel girder, a chain (8), and a hook (9). The diagram is numbered 7 through 11, corresponding to the key.

Dimensions



Module dimensions

Item	Description	Dimension in mm	Min. dimension in mm	Max. dimension in mm	Note
A	Overall width	Variable	300	1,500	Grid width 150 mm
B	Width of header	Variable	250	1,450	Grid width 150 mm
C	Overall length (without connections)	Variable	2,090	120,090	
D	Length of pipe	Variable	2,000	120,000	
E	Length of individual element	Variable	2,000	7,500	
F	Radiant plate length of individual section	Variable	1,900	7,400	
G	Pipe projection from header	Variable	50	2,000	Standard 50 mm
H	Pipe projection from connection	Variable	100	2,000	Standard 100 mm
I	Distance between two pipes	150	-	-	
J	Distance from pipe – side lip	75	-	-	
K	Length of header	45	-	-	
L	Overall height (without suspension)	69	-	-	
M	Height of header	45	-	-	
N	Height of side lip	50	-	-	
O	Height of pipe beading	19	-	-	

Fixing dimensions

Item	Description	Dimension in mm	Min. dimension in mm	Max. dimension in mm	Note
Fixed axes panel type 300-900					
a	Header – centre of axis (fixed)	Variable	50	1,000	Standard dimension 500 mm
b	Centre of axis (fixed) – centre of axis (fixed)	Variable	50	3,250	Standard dimension 3,250 mm
c	Centre of axis (fixed) – joint	Variable	100	3,150	Standard dimension 800 mm
d	Outer edge of module – centre of 1st suspension point	50	-	-	
e	Bottom edge of radiant plate – upper edge of suspension point	39	-	-	
Fixed axes panel type 1,050-1,500					
a	Header – centre of axis (fixed)	Variable	50	1,000	Standard dimension 500 mm
b	Centre of axis (fixed) – centre of axis (fixed)	Variable	50	3,250	Standard dimension 3,250 mm
c	Centre of axis (fixed) – joint	Variable	100	3,150	Standard dimension 800 mm
i	Outer edge of module – centre of 1st suspension point	50	-	-	
j	Bottom edge of radiant plate – upper edge of suspension point	35	-	-	
Movable axes panel type 300-1,500					
l	Header – centre of axis (movable)	Variable	90	750	
m	Centre of axis (movable) – centre of axis (movable)	Variable	60	3,000	
n	Centre of axis (movable) – joint	Variable	190	2,810	
o	Outer edge of module – centre of 1st suspension point	50	-	-	
p	Bottom edge of radiant plate – upper edge of suspension point	74	-	-	from width 1,050; 77 mm
q	Bottom edge of radiant plate – upper edge of suspension axis	82	-	-	from width 1,050; 94 mm

Connector technology

If you are using two or more individual elements, they will need to be connected to one another, with the pipes joined in one of two different ways. The individual elements are assembled into the desired configuration by means of press-fit or welded connections and the joints are then hidden under a cover. So all you see is great design!

PRESS-FIT CONNECTION

An exclusive programme has been developed to ensure press fittings can be used reliably. Zehnder uses this programme to check the configuration of the radiant ceiling panels to be installed and supplies the appropriate press fittings, thus guaranteeing that the system will remain permanently leak-tight.



WELDED CONNECTION

The welded connection can be used universally and is suitable for all temperatures, strip widths and lengths, and all types of hydraulic connection. The pipes are butt-jointed and welded from both edges towards the centre.

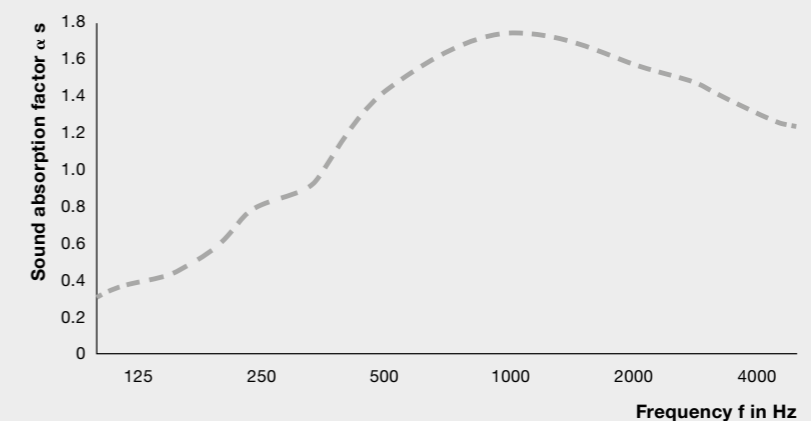


Sound absorption

In addition to their heating and cooling effect, perforated Zehnder ZBN radiant ceiling panels can also be used for sound absorption: the sound waves pass through the perforated surface of the radiant panel sheet into the thermal insulation within, where they are absorbed. This results in a significant reduction of the noise level or a reduction in the reverberation time (in gyms and sports halls, for example). Detailed information for calculating acoustics is available on request.



Zehnder ZBN sound absorption factor depending on frequency



Dimensions, operating parameters and output

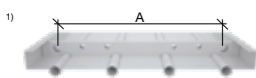
Zehnder ZBN	Unit of measurement	Strip									
Type		300/2	450/3	600/4	750/5	900/6	1,050/7	1,200/8	1,350/9	1,500/10	
Dimensions											
Widths	mm	300	450	600	750	900	1,050	1,200	1,350	1,500	
Number of pipes	piece(s)	2	3	4	5	6	7	8	9	10	
Pipe material/dimension (exterior Ø x pipe thickness)	- / mm	Precision steel tube / 28 x 1.5									
Panel material	-	Steel									
Tube spacing	mm	150									
Length of individual element, min.	mm	2,000									
Length of individual element, max.	mm	7,500									
Suspension points per axis	piece(s)	2	2	2	2	2	2	2	3	3	
Distance between suspension points (A) ¹⁾	mm	200	350	500	650	800	950	1,100	625	700	

Operating parameters											
Max. operating temperature ²⁾	°C	120									
Max. operating pressure ³⁾	bar	10									

Weights											
Empty weight without water content, with insulation	Radiant panel	Kg/m	6.95	9.67	12.42	15.14	17.86	22.08	24.83	27.56	30.28
	Per manifold	Kg	1	1.5	2	2.5	3	3.5	4	4.5	5
Weight of insulation		Kg/m	0.3	0.45	0.6	0.75	0.9	1.05	1.2	1.35	1.5
Water content		l/m	0.982	1.473	1.964	2.455	2.946	3.437	3.928	4.419	4.91
Operating weight with water and insulation	Radiant panel	Kg/m	7.94	11.14	14.38	17.59	20.8	25.52	28.76	31.97	35.18
	Per manifold	Kg	1.5	2.2	3	3.7	4.5	5.2	6	6.7	7.4
Weight of ball guards		Kg/m	0.29	0.42	0.55	0.68	0.81	0.94	1.67	2.92	3.22
Weight of dust protector panel			1.50	2.25	3.00	3.75	4.50	5.25	6.00	6.75	7.50

Heat output											
Thermal output according to EN 14037-2 at ΔT = 55 K with upper insulation	W/m	199	270	342	425	507	590	672	738	804	
Thermal output constant (K)	-	1.787	2.421	3.055	3.798	4.540	5.283	6.029	6.561	7.087	
Thermal output exponent (n)	-	1.176	1.177	1.177	1.177	1.177	1.177	1.176	1.179	1.181	

Cooling capacity											
Cooling capacity based on EN 14240 at ΔT = 10 K with upper insulation	W/m	32	45	57	73	90	106	122	133	143	
Cooling capacity constant (K)	-	2.683	3.695	4.707	6.056	7.405	8.753	10.102	10.946	11.791	
Cooling capacity exponent (n)	-	1.083	1.083	1.083	1.083	1.083	1.083	1.083	1.083	1.083	



¹⁾ Higher operating temperature on request.
²⁾ Higher operating pressure on request.

Special solutions

Zehnder ZBN radiant ceiling panels are extremely flexible: in addition to the wide standard range, there are also a number of special solutions available. Therefore, whatever the room and whatever the project, we have exactly what you need.

INTEGRATED LIGHTS, ETC.

Cut-outs can be provided in the radiant panels to accommodate various components, such as LED light fixtures, fire alarms, loudspeakers, etc.



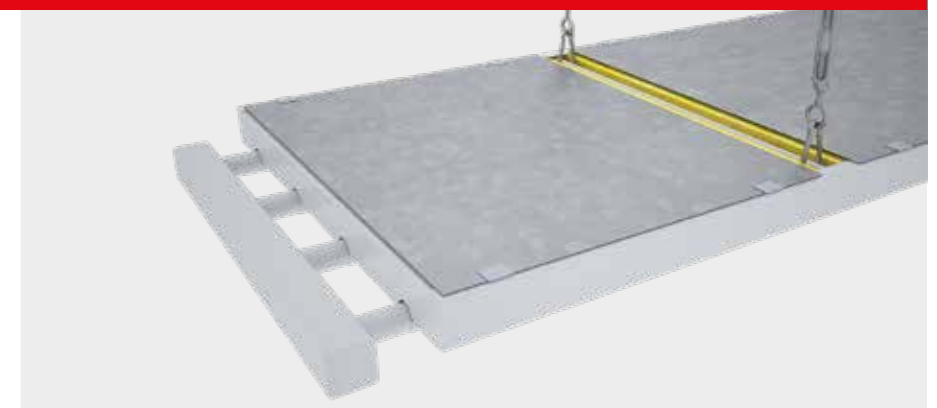
BALL GUARDS

Practical in sports halls: Due to the arched, galvanised grid, no "stray" shots get caught in the radiant ceiling panels. Furthermore, Zehnder ZBN radiant ceiling panels have successfully passed testing for ball impact resistance to DIN 18032 by the Stuttgart Materials Testing Institute.



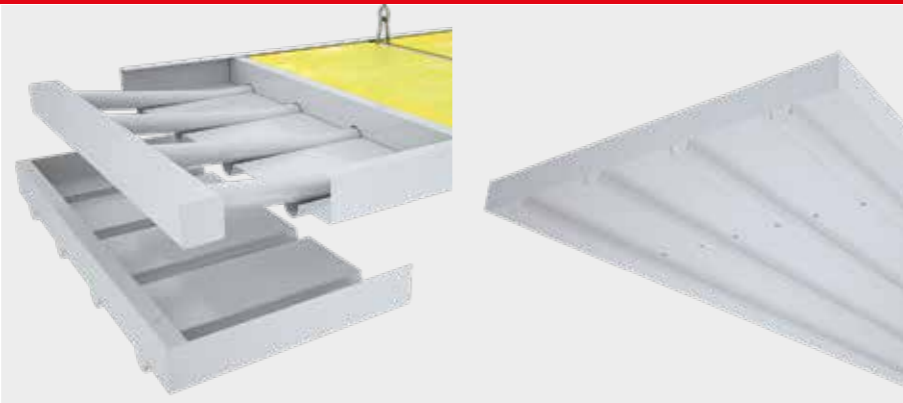
DUST PROTECTOR PANEL

Zehnder ZBN radiant ceiling panels can be sealed with a dust protector panel as required. An easy-care and equally hygienic solution that is ideal for rooms with high dust levels.



RAISED HEADERS WITH END COVER

The headers are hidden behind a cover. So all you see is great design!



NON-CONTINUOUS RADIANT PANEL PLATE

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

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



MITRE CUTS

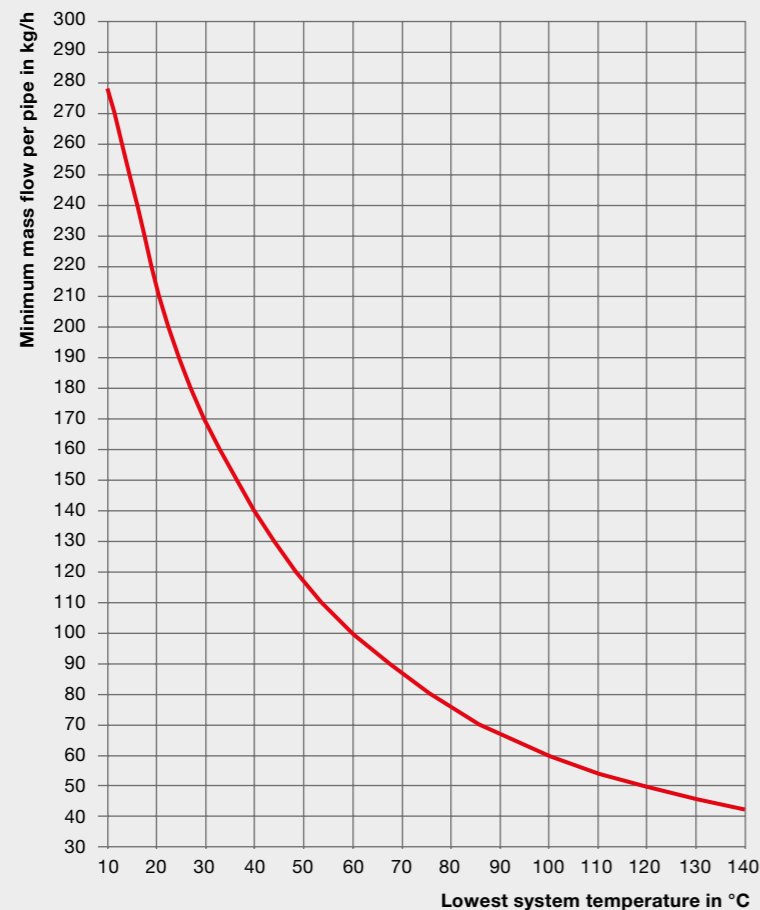
Zehnder ZBN radiant ceiling panels are also available in angled versions or with mitre cuts, whether you want them to fit in with the room's existing design or to make a statement all of their own.



Minimum mass flow

To maintain the output shown in the table, a turbulent flow must be ensured within the pipes in the panels. 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 around 15%.

Minimum mass flow



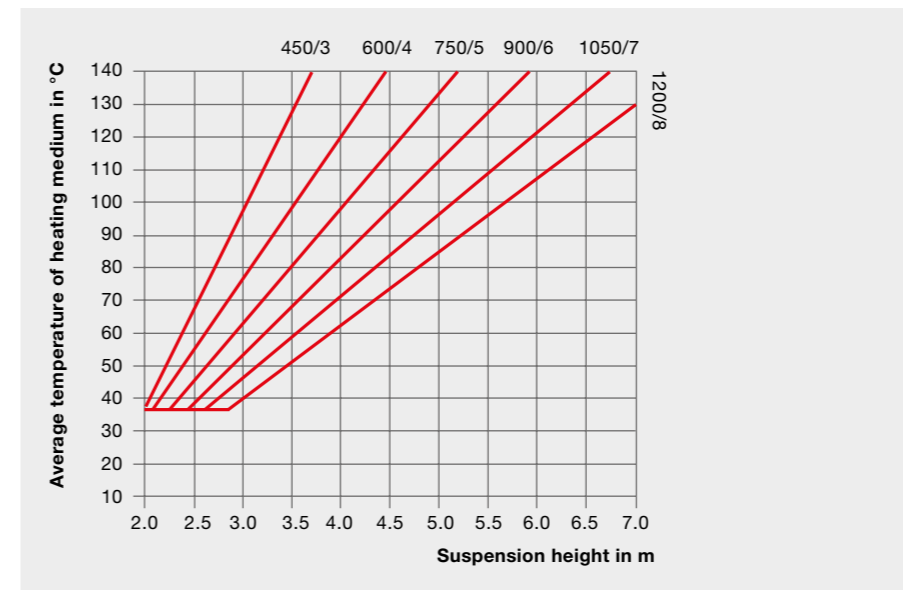
Temperature limits

The right design temperature must be selected in order to ensure the radiant ceiling system delivers a comfortable climate throughout the room. You can use the following table and graph to check this design temperature, which must be lower than the two temperature limits (average temperature of heating medium). Higher temperature limits can be used for rooms and corridors where people do not spend a great deal of time. These values are only intended as a guide. A detailed calculation can be performed according to ISO 7730.

Temperature limits

Height m	Proportion of the ceiling surface covered by Zehnder ZBN radiant ceiling panels					
	10%	15%	20%	25%	30%	35%
	Average temperature of heating medium in °C					
≤ 3	73	71	68	64	58	56
4	115	105	91	78	67	60
5	>147	123	100	83	71	64
6		132	104	87	75	69
7		137	108	91	80	74
8		>141	112	96	86	80
9			117	101	92	87
10			122	107	98	94

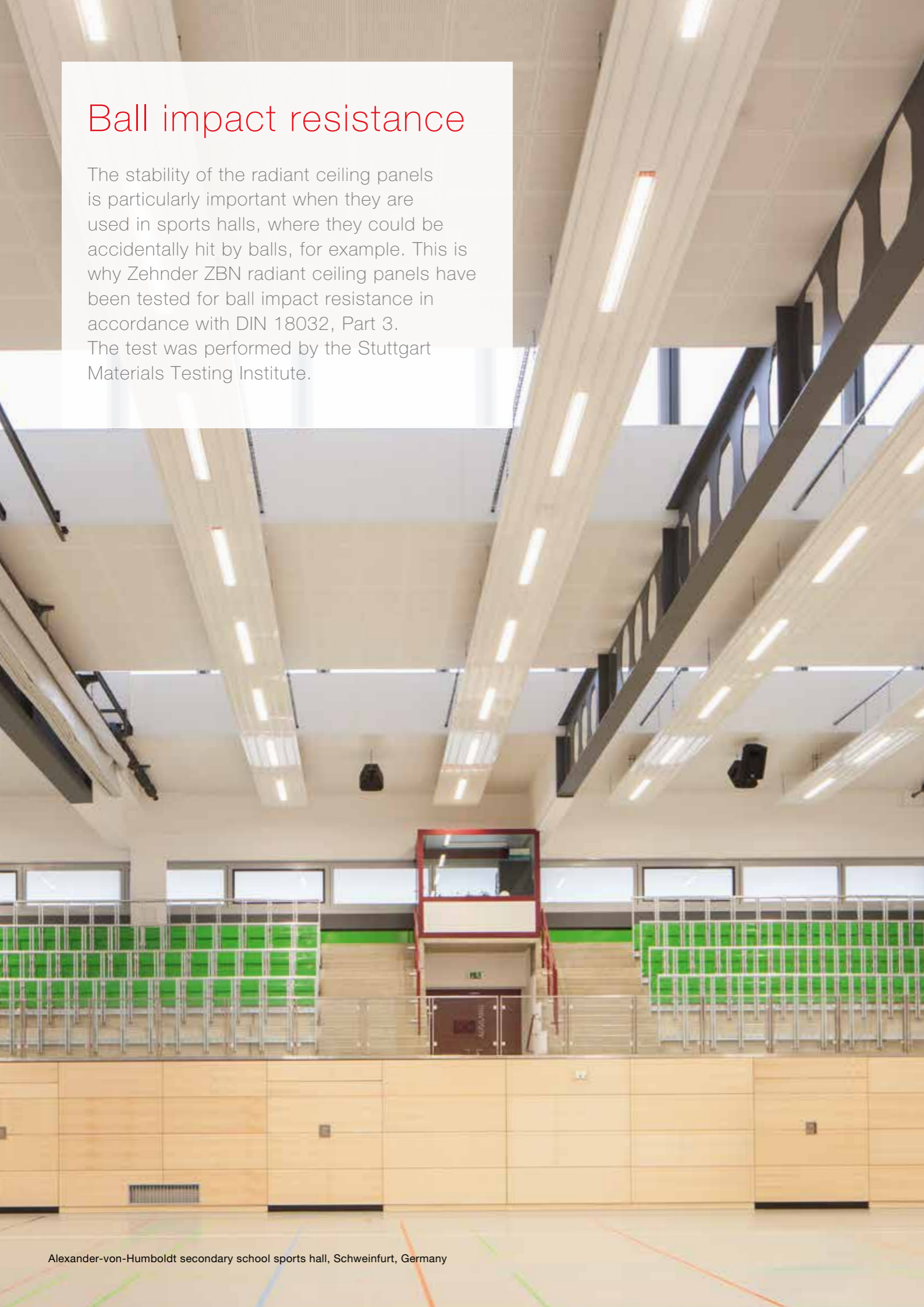
Step 1: Ceiling coverage. The design temperature must not exceed the defined thresholds.



Step 2: Width of the radiant panel. The design temperature must not exceed the defined thresholds.

Ball impact resistance

The stability of the radiant ceiling panels is particularly important when they are used in sports halls, where they could be accidentally hit by balls, for example. This is why Zehnder ZBN radiant ceiling panels have been tested for ball impact resistance in accordance with DIN 18032, Part 3. The test was performed by the Stuttgart Materials Testing Institute.



Alexander-von-Humboldt secondary school sports hall, Schweinfurt, Germany

Connection options

Asymmetrical and symmetrical connections

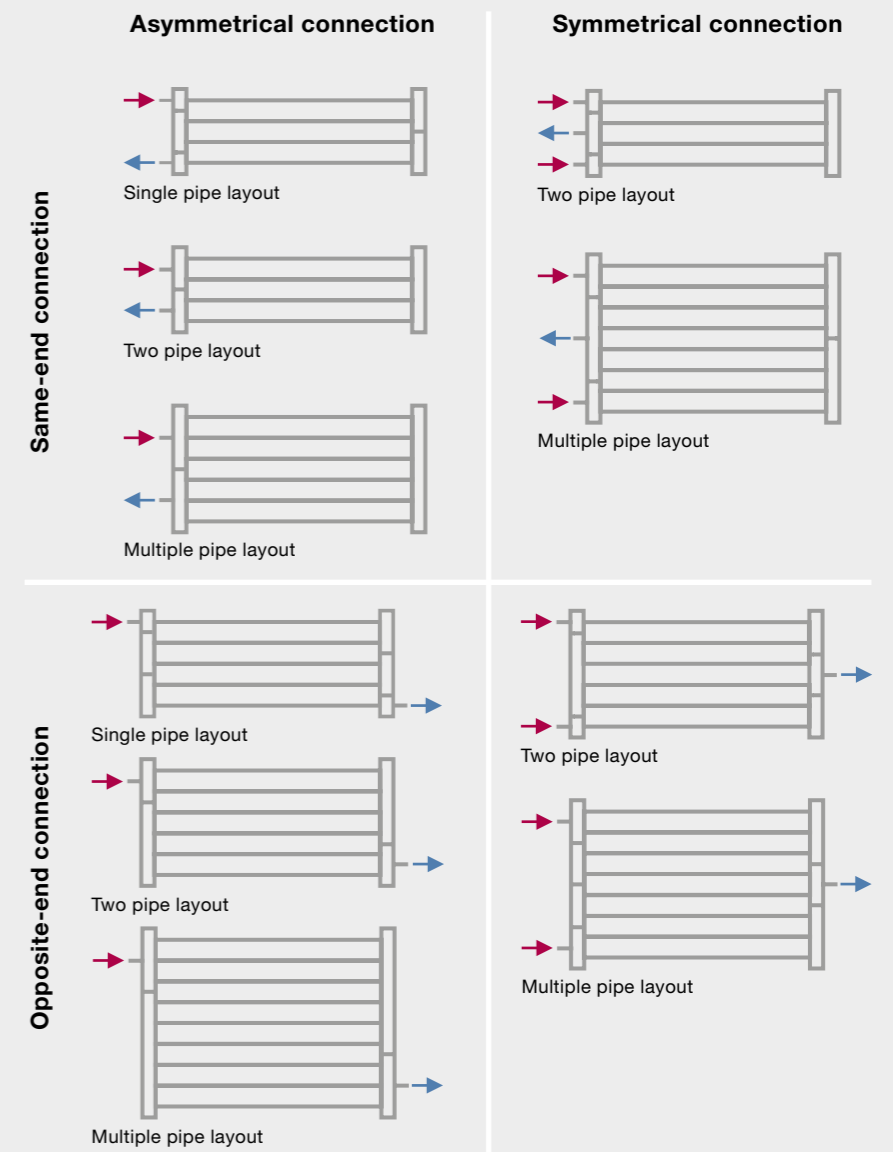
With freely suspended strips, an asymmetrical water connection can be used. If the system is being installed in a suspended ceiling, a symmetrical connection is advisable in order to ensure even expansion.

Same-end or opposite-end connection

The position of the connection is usually determined by the conditions of the particular building.

Varying number of pipes laid in parallel

The number of pipes depends on the minimum mass flow required for the strip.



Layout basics

The heat load of the room is calculated according to the applicable standard. If the transmission heat loss through the roof is over 30% of the total heat load, this indicates that significant heat loss is occurring in the ceiling area. If the roof's insulation cannot be improved, the thermal insulation on top of the radiant ceiling panels can be removed proportionately instead, thus compensating for the considerable amount of transmission heat loss through the roof. If the air exchange rate of a room is above the usual level achieved with gap ventilation (max. 1/h), particularly with extraction systems, the air fed into the room 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.

Thermal output calculation						
Type	Length in m	Excess temperature in K	Output in W/m	Output in W/manifold pair	Quantity	Total thermal output in W
ZBN 900/6	12.5	55	507	271	4	26,434
ZBN 900/6	45	55	507	271	4	92,344
ZBN 450/3	45	55	270	131	4	49,124
ZBN 300/2	45	55	199	88.7	2	18,087
						185,989 W

Example of layout and arrangement

The following example shows how a hall is dimensioned.

Objective

Even indoor temperature (20 °C) throughout the entire room.

Specifications

Free-standing hall:
 Length 100 m, width 30 m, height 8 m
 Air exchange: 0.3 1/h
 Outdoor temperature: -12 °C

Heat load

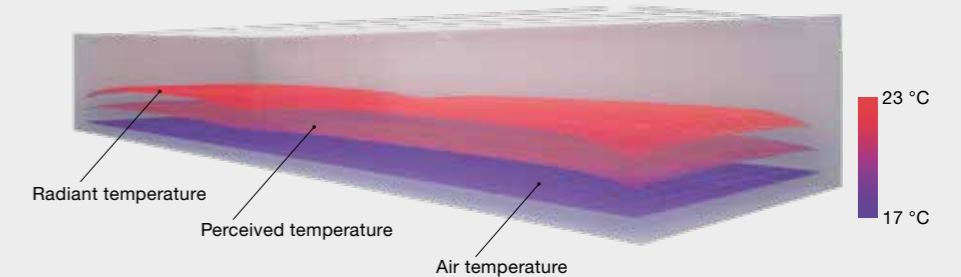
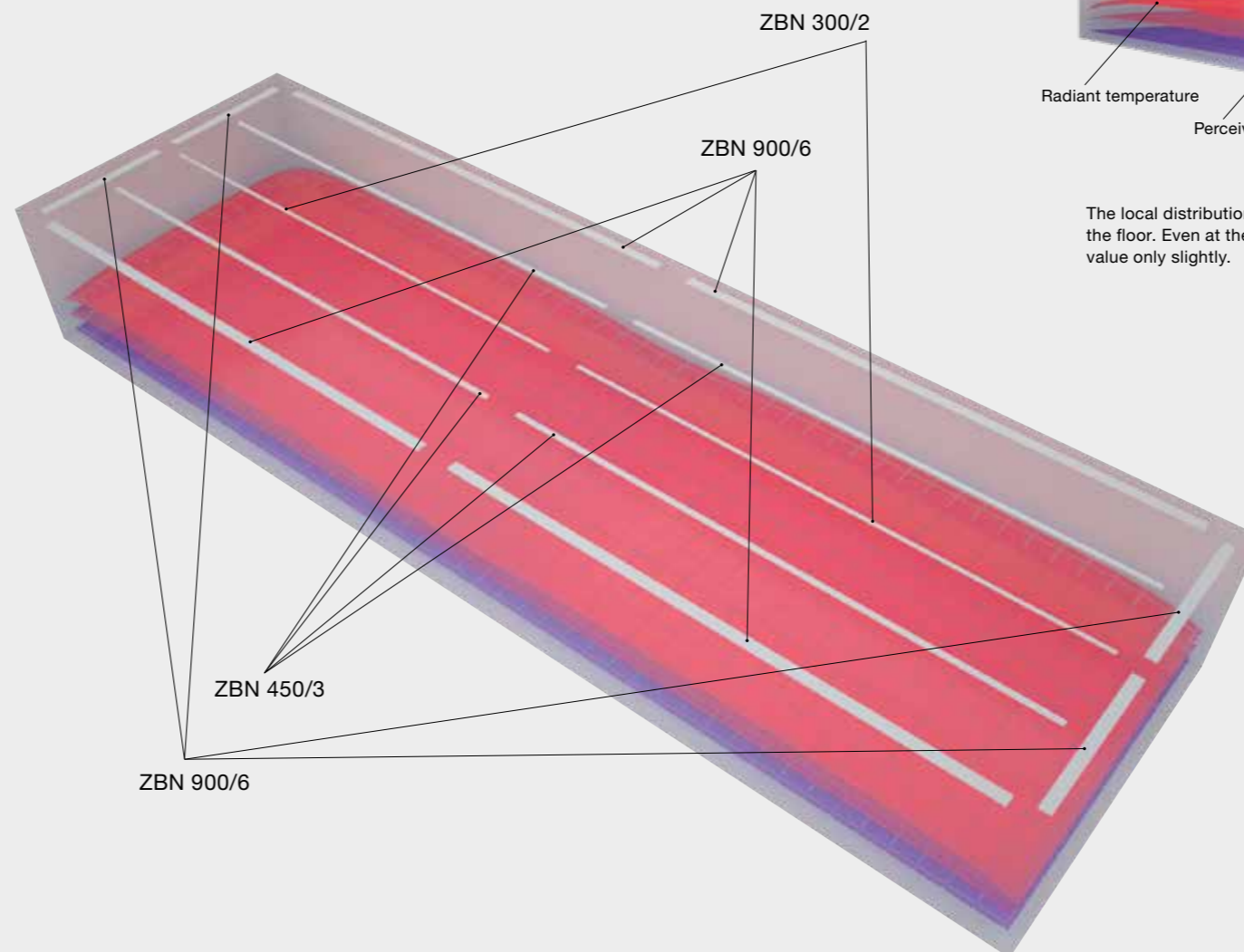
Design transmission heat loss:	108,500 W
Design ventilation heat loss:	77,260 W
Design heat loss:	185,760 W

Layout of the radiant ceiling panels

Flow temperature: 80 °C
 Return temperature: 70 °C

Arrangement

- Five radiant panel strips arranged lengthwise, divided into sections in the centre, uniform centre-to-centre distance of 7.2 m, outer strips dimensioned greater than inner ones.
- One strip at each face end, divided into sections; distance from strips to outer walls 1.5 m.

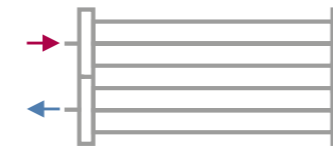


The local distribution of the room temperature is calculated for a height of 1 m above the floor. Even at the edges of the room, the indoor temperature deviates from the design value only slightly.

Pressure loss calculation

The pressure loss for Zehnder ZBN 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.

Determining the pressure loss:



ZBN 900/6; 20 m; connection 1"

1 Calculate total mass flow of the radiant ceiling panel in question.
e.g. $\dot{m} = 891 \text{ kg/h}$ (see page 24)

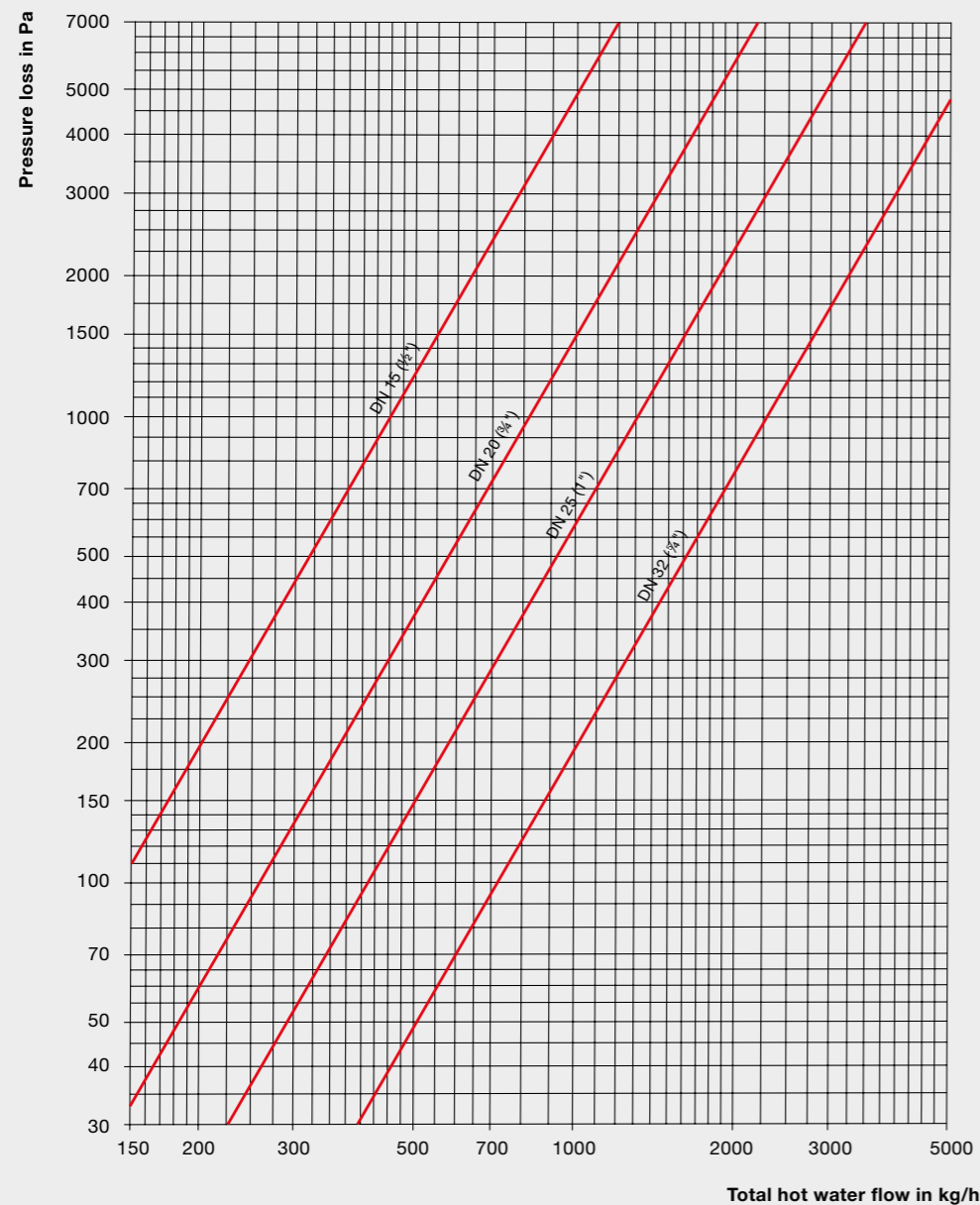
Calculation formula:
 $\dot{m} = (\dot{Q} \cdot 0.86) / \Delta T$
 \dot{Q} = output (w)
 ΔT = spread (K)
 \dot{m} = mass flow (kg/h)

2 Refer to the graph for the pressure loss of the pair of headers.
For example, $\Delta p_{\text{pair of headers}} = 475 \text{ Pa}$ / pair of headers, at 891 kg/h and 1" pipe connection

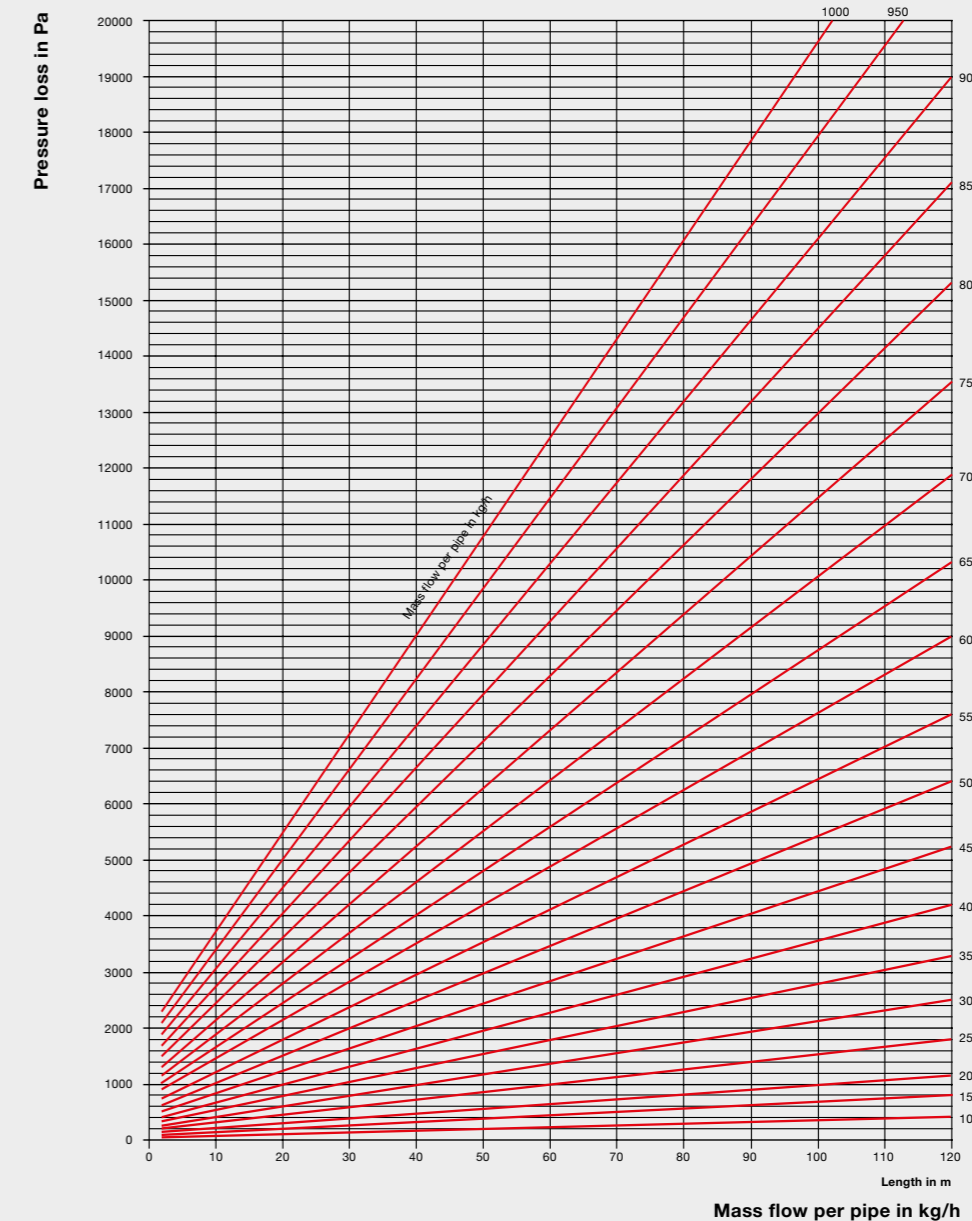
3 Refer to the graph for the pressure loss of the pipe. The mass flow is determined by dividing the total mass flow by the number of parallel pipes through which water is flowing, e.g. 891 kg/h: 3 parallel pipes = 297 kg/h
 $\Delta p_{\text{pipe}} = 600 \text{ Pa} \cdot 2$ (for flow and return) = 1,200 Pa

4 The overall pressure loss of the radiant ceiling panel is simply the sum of the individual pressure losses calculated thus far. For example, 475 Pa + 1,200 Pa = 1,675 Pa

Pressure loss of the pair of headers including connections



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.

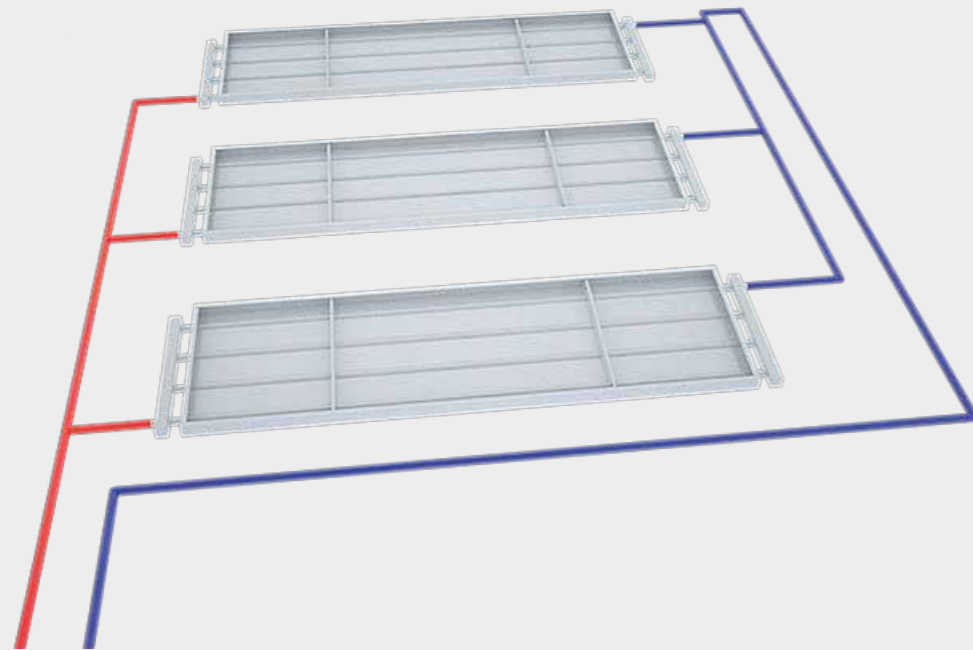


Fig. 1: Pipes laid according to the Tichelmann system (two-pipe system with reverse return)

Systems where the individual panels have different outputs must be subjected to hydraulic balancing by means of the pipework design 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**).

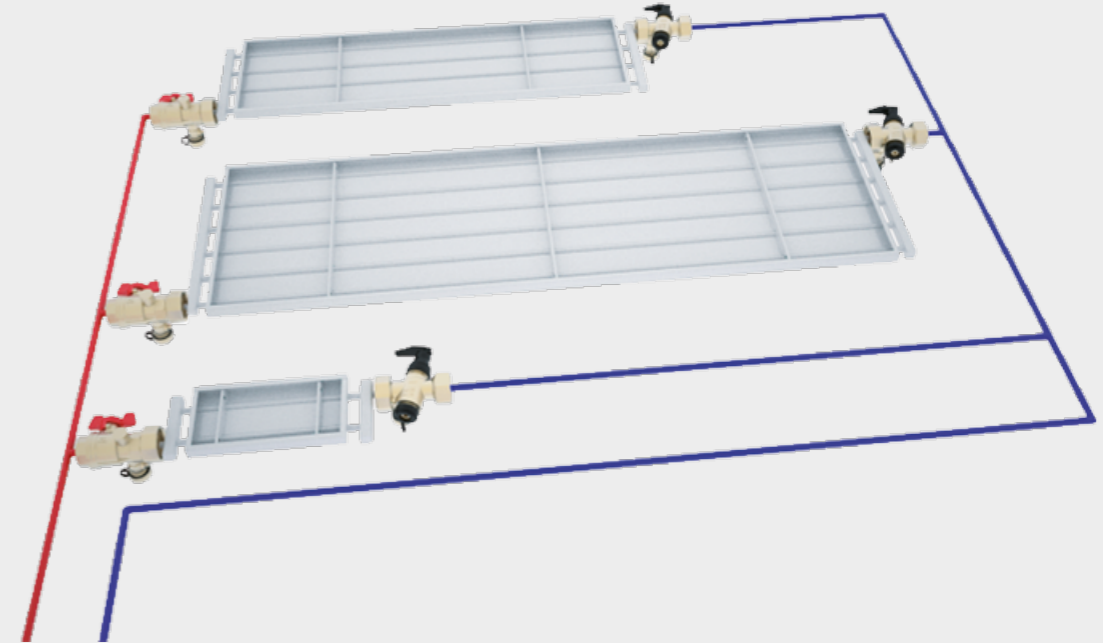


Fig. 2: Simpler pipe layout with Zehnder volume flow control combination (VSRK)

The Zehnder volume flow control combination VSRK

The VSRK is a complete set consisting of a volume flow controller and ball cocks.

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 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.

The working condition is permitted for the following medium: Water and ethylene/propylene glycol water mix (max. 50%), ph value 6.5–10.

Article numbers:

VSRK Combination DN15	509780
VSRK Combination DN25	509800
VSRK Combination DN32	509810
VSRK Special 15/15/15	505380
VSRK Special 25/15/15	505390
VSRK Special 25/25/25	502400
VSRK Special 32/25/25	505200
VSRK Special 32/32/32	505430
Flow, separate DN15	501000
Flow, separate DN25	505180
Flow, separate DN32	505190
Controller, separate DN15	502410
Controller, separate DN25	502420
Controller, separate DN32	502430
Armoured hose DN15	509260
Armoured hose DN25	509280
Armoured hose DN32	509310
Insert for VSRK DN15	501030
Coupler screw connection 1 ¼" x 1"	501470
Coupler screw connection 1 ½" x 1 ¼"	501480

Example of VSRK-25:



For more information, visit: www.zehnder-systems.com

Volume flow controller DN15

Mass flow (kg/h)	Minimum differential pressure (kPa)
30	20.0
35	20.9
40	21.8
45	22.7
50	23.6
55	24.4
60	25.2
65	26.0
70	26.8
75	27.5
80	28.2
85	28.9
90	29.6
95	30.3
100	30.9
105	31.5
110	32.1
115	32.7
120	33.2
125	33.7
130	34.2
135	34.7
140	35.2
145	35.7
150	36.1
155	36.5
160	36.9
165	37.3
170	37.7
175	38.0
180	38.3
185	38.7
190	39.0
195	39.2
200	39.5
205	39.8
210	40.0

Volume flow controller DN25

Mass flow (kg/h)	Minimum differential pressure (kPa)
150	20.0
175	20.9
200	21.8
225	22.7
250	23.6
275	24.4
300	25.2
325	26.0
350	26.8
375	27.5
400	28.2
425	28.9
450	29.6
475	30.3
500	30.9
525	31.5
550	32.1
575	32.7
600	33.2
625	33.7
650	34.2
675	34.7
700	35.2
725	35.7
750	36.1
775	36.5
800	36.9
825	37.3
850	37.7
875	38.0
900	38.3
925	38.7
950	39.0
975	39.2
1,000	39.5
1,025	39.8
1,050	40.0

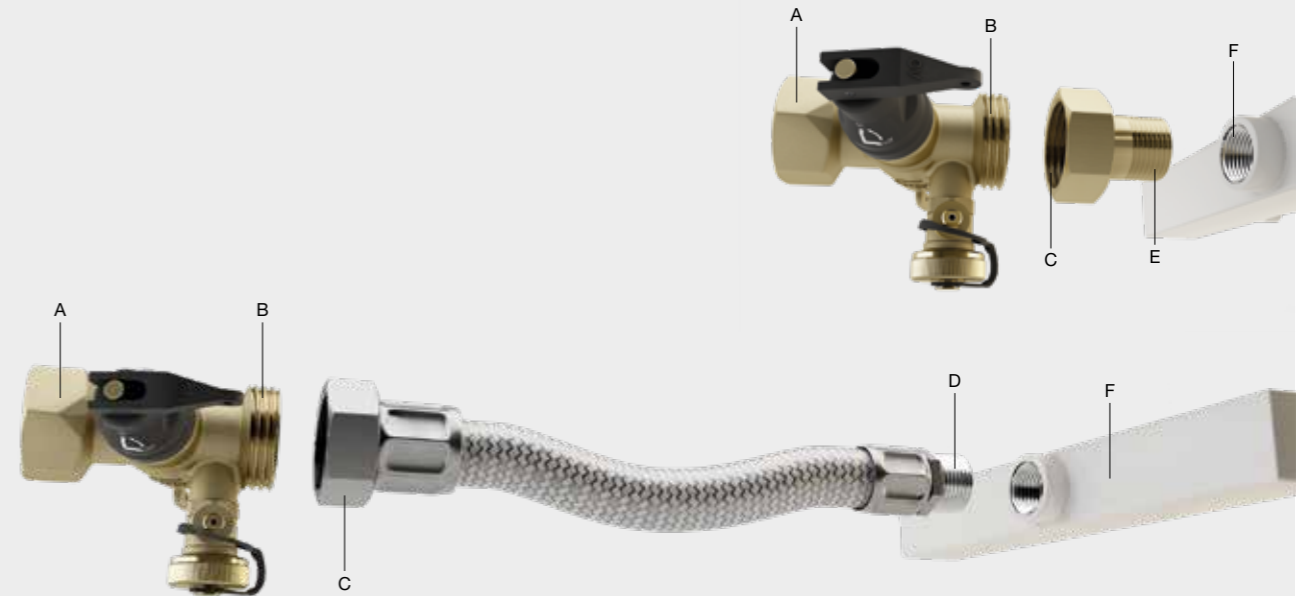
Volume flow controller DN32

Mass flow (kg/h)	Minimum differential pressure (kPa)
600	15.0
700	15.3
800	15.7
900	16.0
1,000	16.3
1,100	16.7
1,200	17.0
1,300	17.3
1,400	17.7
1,500	18.0
1,600	18.3
1,700	18.7
1,800	19.0
1,900	19.3
2,000	19.7
2,100	20.0
2,200	20.3
2,300	20.7
2,400	21.0
2,500	21.3
2,600	21.7
2,700	22.0
2,800	22.3
2,900	22.7
3,000	23.0
3,100	23.3
3,200	23.7
3,300	24.0
3,400	24.3
3,500	24.7
3,600	25.0

Connection size for Zehnder volume flow control combinations

VSRK dimensions	Controller or ball valve		Flat-sealing coupler screw connection	Male thread of hose	Conical male thread	Header female thread
	A	B	C	D	E	F
DN15	Rp ½"	G ¾"	Rp ¾"	R ½"	R ½"	R ½"
DN25	Rp 1"	G 1 ¼"	Rp 1 ¼"	R 1"	R 1"	R 1"
DN32	Rp 1 ¼"	G 1 ½"	Rp 1 ½"	R 1 ¼"	R 1 ¼"	R 1 ¼"

Return



Flow



Tender specifications

Zehnder ZBN radiant ceiling panel, with registers made from precision steel tubes (ØA 28 mm), openly accessible manifolds and all necessary connections welded on at the factory.

The tube ends must be machined at the factory so that press fittings with O-rings can be used without the need for further reworking. The tubes and radiant plate must be highly thermally conductive and joined securely.

This is ensured by the original Zehnder double-point spot welding. The thickness of the radiant plate must not exceed 1.15 mm.

Mounting the radiant plate using steel spring clips or clamping with profiles is not permitted for reasons relating to the warranty and heat.

The horizontal radiant panel sheets are statically self-supporting due to the directly radiating half-beading at the bottom and due to lateral chamfers of 5 cm at the top and 2 cm inside. These also serve to hold down the insulation. For structural reasons, flat radiant panel systems without beading or surfaces with profiles at the top are not permitted. Uneven radiant plates which deviate from the horizontal plane are excluded.

Suspension axis clearances of up to 3.25 metres must be possible without additional securing structures or carrier systems. Zehnder ZBN units are manufactured using a high-quality, all-round polyester powder coating. Tube registers with a simple anti-rust coating or wet coating are not permitted. Each radiant panel strip is finished with welded end plates.

Zehnder ZBN radiant ceiling panels have been tested in accordance with EN 14037 Parts 1–3, ensuring high quality and thermal output in the long term. The radiant ceiling panel Zehnder ZBN has a proportion of radiation of up to 81%, depending on its configuration. The maximum permitted operating pressure corresponds to level 3 in the certification guidelines (10 bar). Version available for higher operating pressure on request.

The radiant ceiling panels are delivered with max. sub-lengths of 7.50 m.

The heating installer will connect the sub-lengths and install the cover plates.

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

Brand: Zehnder
Type: ZIP radiant ceiling panels

Thermal insulation

Thermal insulation

Mineral wool, laminated on one side with reinforced alu-mesh foil
λ = 0.038 W/mK, thickness 40 mm

Insulation in LDPE foil

Mineral wool free lined with black fleece according to EU directive 97/69 (note Q) and shrink-wrapped in LDPE foil
λ = 0.040 W/mK, thickness 40 mm

Sound-absorbent insulation

Glass wool, coated with glass mat on both sides (natural/black)
λ = 0.035 W/mK, thickness 40 mm

Polyester insulation

Thermally bonded polyester mat made from 100% polyester fibres without chemical binding agent, laminated on one side with reinforced alu-mesh foil
λ = 0.045 W/mK, thickness 40 mm

Operating parameters

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

Press-fit connection (Article no. 506800)

Galvanised press-fit connection 28 mm piece(s)

Upper covers

Dust protector panel

Galvanised upper plate cover (thickness 0.63 mm) incl. fixing clamps and screws – delivered loose

Ball guards

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

Fastening system

K 33 fixing kit (Article no.: 501290)
for fixing to concrete ceilings piece(s)

K 34 fixing kit (Article no. 501300)
for fixing to steel profile piece(s)

K 36 fixing kit (Article no. 501310)
for fixing to trapezoidal sheet metal piece(s)

K 37 fixing kit (Article no. 504900)
for fixing to inclined steel girders piece(s)

K 38 fixing kit (Article no. 504910)
for fixing to horizontal steel girders piece(s)

Volume flow controller

Zehnder 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 nominal value that can be set at the factory) and an actuator head.

The actuator head can be equipped with an actuator or a temperature controller (threaded connection M30 x 1.5).

The volume flow control combination is usually applied to hydraulic balancing as well as to room temperature control.

Due to the integrated barrier and draining, connected consumers can be shut off and cleaned or drained individually (threaded connection M30 x 1.5 mm).

Technical specifications:

Dimensions:	DN25
Max. operating temperature ts:	120 °C
Min. operating temperature ts:	-10 °C
Max. operating pressure ps:	16 bar
Max. differential pressure:	4 bar
Connections:	Female thread Rp1" Male thread G 1¼"

Medium: Water or ethylene/propylene glycol water mix (max. 50%), ph value 6.5–10

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

Article numbers:

VSRK Combination DN15	509780
VSRK Combination DN25	509800
VSRK Combination DN32	509810
VSRK Special 15/15/15	505380
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VSRK Special 32/32/32	505430
Flow, separate DN15	501000
Flow, separate DN25	505180
Flow, separate DN32	505190
Controller, separate DN15	502410
Controller, separate DN25	502420
Controller, separate DN32	502430

Armoured hose

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

Hose DN25

Inner installation dimension:	500 mm
Hose length:	545 mm
Permissible operating pressure:	10 bar
Operating temperature range:	100 °C
Connections:	Male thread R1" Coupler Rp 1¼"

Article numbers:

Armoured hose DN15	509260
Armoured hose DN25	509280
Armoured hose DN32	509310
Insert for VSRK DN15	501030
Coupler screw connection 1¼" x 1"	501470
Coupler screw connection 1½" x 1¼"	501480

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The broad and clearly structured portfolio from the Zehnder Group is split into four product lines. Consequently, we can provide our customers with the right product, perfect system and matching service for all types of projects – from new build to renovations, single or multi-occupancy homes, as well as commercial projects. This variety ensures that our wealth of experience is continuously expanding, providing tangible added value to our customers on a daily basis.



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Our individual decorative radiators for living and bathrooms make a home not only warmer but also more attractive. Created by renowned designers, they impress with excellent functionality.



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Our comfortable indoor ventilation is energy-efficient and provides a healthy indoor climate. It promotes the wellbeing of the occupants and increases the value of the property.



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Zehnder ceiling systems are convenient and energy-efficient for heating and cooling. They are perfectly attuned to the relevant environment.



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Clean air systems from Zehnder reduce the level of dust in the air, create a healthier working environment and reduce the amount of cleaning required.

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