Zehnder Alumline

Product brochure for climate ceiling modules as sails and the lay-in system

always the best climate

Zehnder Alumline

Optimal comfort and energy saving whatever the season

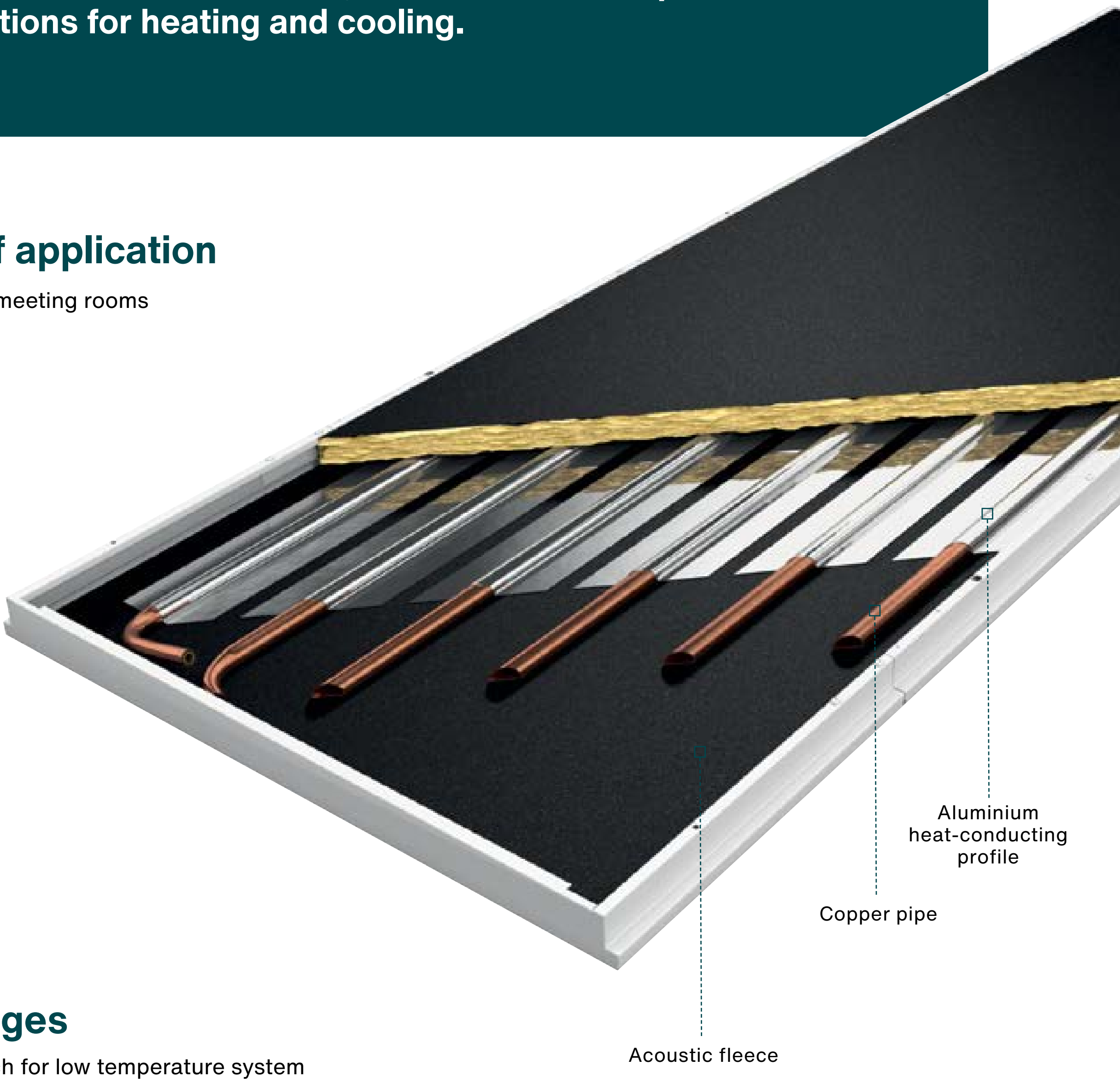
With the reduction of CO_2 emissions and tightening of thermal regulations, the construction industry plays an important role in the fight against global warming. In addition to the thermal insulation and building design, these changes significantly affect heating and cooling systems. The type of thermal transfer, the temperature level and the positioning of the heating and cooling elements are critical to reducing energy consumption.

Special features of Zehnder Alumline

With its short response time to temperature changes, energy efficiency and architectural freedom, Zehnder Alumline provides functional solutions for heating and cooling.

Areas of application

- Offices and meeting rooms
- Schools
- Nurseries
- Hospitals



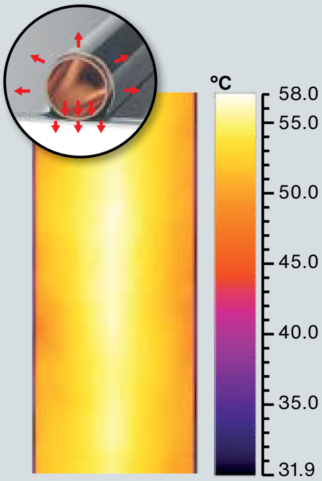
Advantages

- Perfect match for low temperature system
- Can be installed as false ceiling or free-hanging sails
- Easy to install: supplied ready for assembly
- Integrated sound absorption (optional)
- Efficient thermal transfer for high energy savings
- Lightweight with a long service life

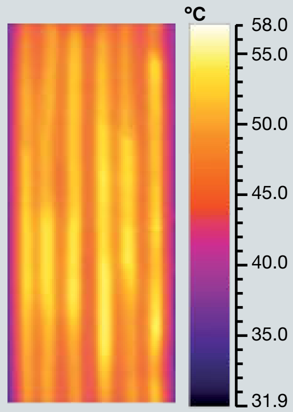
Activating the ceiling cassette:
The increased enclosure area of the copper pipes due to the omega shape of the heat conductive sheet maximises the transfer area and thus ensures optimum thermal transfer from the medium to the room-side surface of the Zehnder Alumline modules.


Round tube

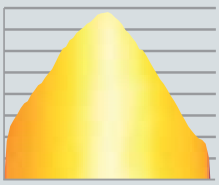
Thermography shows the uniformly high level of thermal transfer by highlighting the temperatures in the contact area in colour. The optimum transverse conduction of heat or cold ensures the consistently high performance of Zehnder Alumline for heating and cooling applications.



Heat flow characteristics
Copper pipe - Heat conductive sheet



Heat flow behaviour of the entire cassette


Maximum value: 55.8 °C
Average value: 49.5 °C

In order to make the best possible use of the transverse conduction of heat in the cassette while at the same time optimising the use of materials, the pipe spacing of the meandering curved registers can be selected between 90 mm and 150 mm.

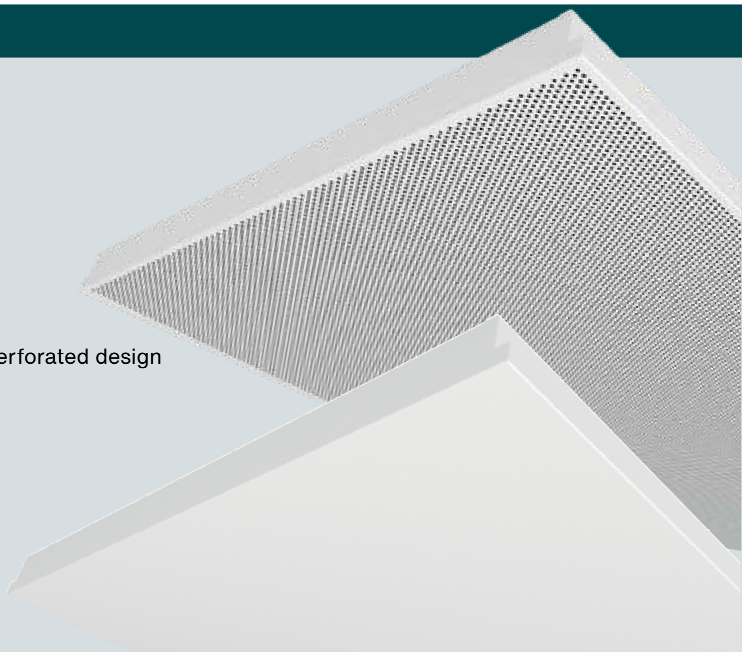
Customised layout:
Based on the heating and cooling requirements of the room, the design and number of the required modules are determined by Zehnder Alumline together with our specialists. In this way, an individually configured climate ceiling can be implemented using this high-performance system.

Surface finishes and sound absorption

Metal ceiling surfaces and colours

Metal climate ceilings are available with a choice of smooth or perforated surfaces. The surface is coated with a high-quality powder coat finish. The standard colour for climate ceiling modules is similar to RAL 9016 matt.

Other colours are available on request.



Perforated design

Smooth design

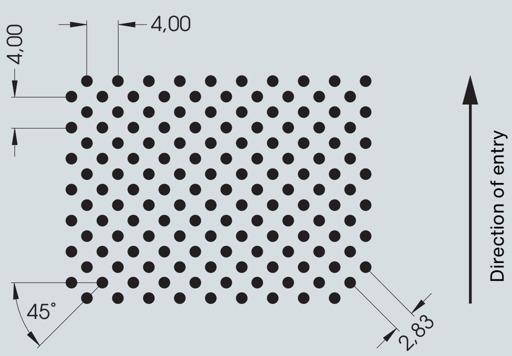
Metal ceiling perforation

In addition to their thermal efficiency and visual appeal, metal climate ceilings also offer important acoustic properties.

Standard perforation

Hole diameter	1.5 mm
Open cross section	22 %

Sound waves pass through the perforations and are absorbed by the specially developed sound insulation. With sails, the sound waves are also absorbed by means of reverberation on the top of the product. This significantly reduces noise and the associated vibrations, especially in open-plan offices, call centres, schools, etc.
We will be happy to provide you with the acoustic calculation data on request.



Additional perforation variations are available on request.

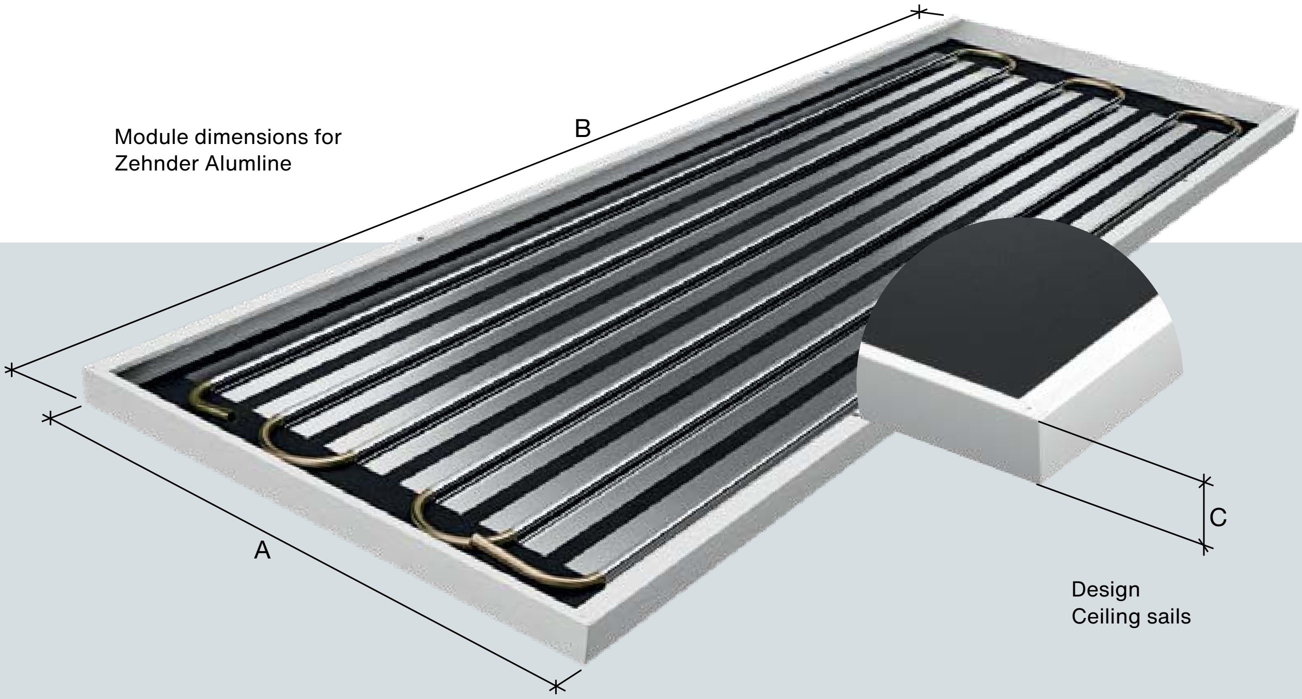
Sound absorption values α_w

	Ceiling sails Perforation 1.5 mm Open cross section 22% with rock wool in LDPE foil			Ceiling sails smooth with rock wool in LDPE foil			Closed ceiling Perforation 1.5 mm Open cross section 22% with rock wool in LDPE foil		
Activation	6 parallel pipes	4 parallel pipes	None	6 parallel pipes	4 parallel pipes	None	6 parallel pipes	4 parallel pipes	None
Sound absorption values α_w (DIN EN 11654)	1.00	1.00	1.00	0.45	0.40	0.40	0.55	0.85	1.00

Zehnder Alumline ceiling sail

Advantages

- Flexible installation options
- Design accents
- Maximum performance

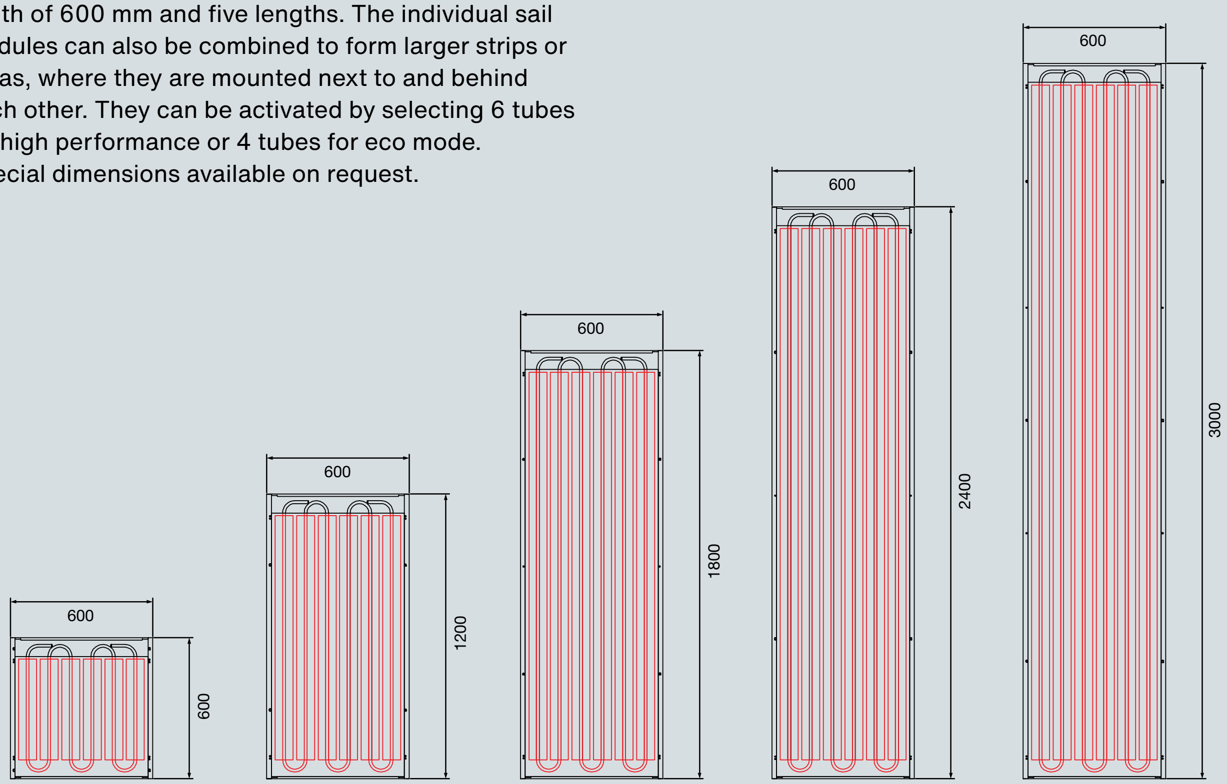


Module dimension nominal size 600 mm		
Dimensions	**Description**	**Ceiling sails Dimension in mm**
A	Overall width	600
B	Overall length	600 - 3000
C	Overall height	40 *
D	Height of the supporting edge	-

* Module sizes made to measure optionally with height of 50 mm

Zehnder Alumline as a ceiling sail

Zehnder Alumline standard modules are available in a width of 600 mm and five lengths. The individual sail modules can also be combined to form larger strips or areas, where they are mounted next to and behind each other. They can be activated by selecting 6 tubes for high performance or 4 tubes for eco mode.
Special dimensions available on request.



Heating and cooling performance (perforated surface)

The heating and cooling performance values are given in accordance with EN 14037 (heating) and EN 14240 (cooling).

Thermal outputs for 4-pipe activation

	Sail module / Ceiling sail with insulation					Sail module / Ceiling sail without insulation				
Dimensions	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000
K	1.844	3.924	6.003	8.087	10.170	2.146	4.565	6.986	9.402	11.822
n			1.137					1.137		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
70	231	492	753	1013	1274	269	572	875	1178	1481
68	224	476	728	980	1233	260	553	847	1140	1433
66	216	460	704	948	1192	251	535	818	1102	1386
64	209	444	680	915	1151	243	517	790	1064	1338
62	201	429	656	883	1110	234	498	762	1026	1290
60	194	413	632	850	1069	226	480	734	989	1243
58	187	397	608	818	1029	217	462	707	951	1196
56	179	382	584	786	989	209	444	679	914	1149
55	175	374	572	770	968	204	435	665	896	1126
54	172	366	560	754	948	200	426	652	877	1103
52	165	351	537	723	909	192	408	624	840	1057
50	158	336	513	691	869	183	390	597	804	1010
48	151	320	490	660	830	175	372	570	767	965
46	143	305	467	629	790	167	355	543	731	919
44	136	290	444	598	751	159	337	516	695	874
42	129	275	421	567	713	150	320	490	659	829
40	122	260	398	536	674	142	303	463	624	784
38	115	246	376	506	636	134	286	437	588	740
36	109	231	353	476	598	126	269	411	553	696
34	102	216	331	446	561	118	252	385	518	652
32	95	202	309	416	523	110	235	359	484	608
30	88	188	287	387	486	103	218	334	450	565
28	82	174	266	358	450	95	202	309	416	523
26	75	160	244	329	413	87	186	284	382	480
24	68	146	223	300	377	80	169	259	349	439
22	62	132	202	272	342	72	153	235	316	397
20	56	118	181	244	307	65	138	211	284	357
18	49	105	161	216	272	57	122	187	252	316
16	43	92	141	189	238	50	107	163	220	277
14	37	79	121	163	204	43	92	140	189	238
12	31	66	101	136	172	36	77	118	159	199
10	25	54	82	111	139	29	63	96	129	162

Cooling capacities for 4-pipe activation

	Sail module / Ceiling sail with insulation					Sail module / Ceiling sail without insulation				
Dimensions	**600 x 600**	**600 x 1200**	**600 x 1800**	**600 x 2400**	**600 x 3000**	**600 x 600**	**600 x 1200**	**600 x 1800**	**600 x 2400**	**600 x 3000**
K	2.691	5.709	8.712	11.785	14.794	2.819	6.006	9.208	12.403	15.591
n			1.082					1.083		
Δ t (K)	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**
15	50	107	164	221	278	53	113	173	233	292
14	47	99	152	205	258	49	105	160	216	271
13	43	92	140	189	238	45	97	148	199	251
12	40	84	129	173	218	42	89	136	183	230
11	36	77	117	158	198	38	81	124	166	209
10	33	69	106	142	179	34	73	111	150	189
9	29	62	94	127	160	31	65	99	134	168
8	26	54	83	112	141	27	57	88	118	148
7	22	47	72	97	122	23	50	76	102	128
6	19	40	61	82	103	20	42	64	86	109
5	15	33	50	67	85	16	34	53	71	89
4	12	26	39	53	66	13	27	41	56	70
3	9	19	29	39	49	9	20	30	41	51
2	6	12	19	25	31	6	13	20	26	33
1	3	6	9	12	15	3	6	9	12	16

Note: the following outputs were measured with a perforated surface (22%); a smooth surface increases the performance slightly. Removing the insulation has a positive effect on the cooling capacity (see table). However, this increase can only be calculated with an open ceiling.
Removing the insulation increases the thermal output; however, this can lead to heat accumulation under higher ceilings.
Attention: Zehnder has developed a special design for smooth and perforated versions for system temperatures between 50 °C and 83 °C.

Heating and cooling performance (perforated surface)

The heating and cooling performance values are given in accordance with EN 14037 (heating) and EN 14240 (cooling).

Thermal outputs for 6-pipe activation

	Sail module / Ceiling sail with insulation					Sail module / Ceiling sail without insulation				
Dimensions	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000
K	1.944	4.136	6.325	8.521	10.711	2.259	4.807	7.359	9.906	12.454
n			1.13					1.13		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
70	244	518	793	1067	1342	283	602	922	1241	1560
68	236	501	767	1033	1298	274	583	892	1201	1510
66	228	485	741	998	1255	265	563	862	1161	1459
64	220	468	716	964	1212	256	544	833	1121	1409
62	212	451	691	930	1169	247	525	803	1081	1359
60	204	435	665	896	1126	238	506	774	1042	1310
58	197	418	640	862	1084	229	487	744	1002	1260
56	189	402	615	828	1041	220	467	715	963	1211
55	185	394	603	811	1020	215	458	701	943	1186
54	181	386	590	795	999	211	449	686	924	1162
52	174	370	565	761	957	202	430	657	885	1113
50	166	353	541	728	915	193	411	629	847	1064
48	159	337	516	695	874	184	392	600	808	1016
46	151	321	492	662	833	176	374	572	770	968
44	144	306	468	630	792	167	355	544	732	920
42	136	290	444	597	751	158	337	516	694	873
40	129	274	420	565	710	150	319	488	657	826
38	122	259	396	533	670	141	301	460	620	779
36	114	243	372	501	630	133	283	433	583	733
34	107	228	349	470	590	125	265	406	546	687
32	100	213	326	438	551	116	247	379	510	641
30	93	198	303	407	512	108	230	352	474	595
28	86	183	280	377	473	100	213	325	438	551
26	79	168	257	346	435	92	195	299	403	506
24	72	153	235	316	397	84	178	273	368	462
22	65	139	213	286	360	76	162	247	333	419
20	59	125	191	257	323	68	145	222	299	376
18	52	111	169	228	287	60	129	197	265	333
16	46	97	148	199	251	53	113	172	232	291
14	39	83	127	171	215	45	97	148	199	250
12	33	70	107	144	181	38	81	124	167	210
10	27	57	87	117	147	31	66	101	136	171

Cooling capacities for 6-pipe activation

	Sail module / Ceiling sail with insulation					Sail module / Ceiling sail without insulation				
Dimensions	**600 x 600**	**600 x 1200**	**600 x 1800**	**600 x 2400**	**600 x 3000**	**600 x 600**	**600 x 1200**	**600 x 1800**	**600 x 2400**	**600 x 3000**
K	2.887	6.095	9.327	12.584	15.807	3.009	6.410	9.814	13.216	16.682
n			1.079					1.079		
Δ t (K)	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**
15	54	114	175	236	296	57	121	185	248	312
14	50	106	163	219	275	53	112	171	231	290
13	46	98	150	202	254	49	103	158	213	268
12	42	90	138	185	233	45	95	145	195	245
11	38	82	125	169	212	41	86	132	178	223
10	35	74	113	152	191	37	78	119	160	201
9	31	66	101	136	171	33	69	106	143	180
8	27	58	89	119	150	29	61	93	126	158
7	24	50	77	103	130	25	53	81	109	137
6	20	42	65	87	110	21	45	68	92	116
5	16	35	53	72	90	17	37	56	76	95
4	13	27	42	56	71	14	29	44	59	75
3	9	20	31	41	52	10	21	32	44	55
2	6	13	20	27	34	6	14	21	28	35
1	3	6	9	13	16	3	6	10	13	17

Note: the following outputs were measured with a perforated surface (22%); a smooth surface increases the performance slightly. Removing the insulation has a positive effect on the cooling capacity (see table). However, this increase can only be calculated with an open ceiling.
Removing the insulation increases the thermal output; however, this can lead to heat accumulation under higher ceilings.
Attention: Zehnder has developed a special design for smooth and perforated versions for system temperatures between 50 °C and 83 °C.

Heating and cooling performance (smooth surface)

The heating and cooling performance values are given in accordance with EN 14037 (heating) and EN 14240 (cooling).

Thermal outputs for 4-pipe activation

	Sail module / Ceiling sail with insulation					Sail module / Ceiling sail without insulation				
Dimensions	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000
K	1.963	4.175	6.385	8.596	10.811	2.281	4.852	7.424	9.996	12.571
n			1.137					1.137		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
70	246	523	800	1077	1354	286	608	930	1252	1574
68	238	506	774	1042	1310	276	588	900	1211	1523
66	230	489	748	1007	1266	267	568	870	1171	1472
64	222	472	722	972	1223	258	549	840	1131	1422
62	214	455	697	938	1179	249	529	810	1091	1371
60	206	439	671	904	1136	240	510	780	1051	1321
58	198	422	646	869	1093	231	491	751	1011	1271
56	191	406	621	835	1050	222	472	722	971	1221
55	186	397	607	819	1029	217	462	707	952	1197
54	183	389	595	802	1008	213	453	692	932	1172
52	175	373	570	768	966	204	434	663	893	1123
50	168	357	546	734	923	195	415	634	854	1074
48	160	340	521	701	882	186	396	606	815	1025
46	152	324	496	668	840	177	377	577	777	977
44	145	308	472	635	799	169	359	549	739	929
42	137	292	447	602	757	160	340	520	700	881
40	130	277	423	570	717	151	322	492	663	833
38	123	261	399	538	676	143	303	464	625	786
36	115	245	376	506	636	134	285	437	588	739
34	108	230	352	474	596	126	267	409	551	693
32	101	215	328	442	556	117	250	382	514	647
30	94	200	305	411	517	109	232	355	478	601
28	87	184	282	380	478	101	214	328	442	555
26	80	170	259	349	439	93	197	302	406	511
24	73	155	237	319	401	85	180	275	371	466
22	66	140	215	289	363	77	163	249	336	422
20	59	126	193	259	326	69	146	224	301	379
18	52	112	171	230	289	61	130	199	267	336
16	46	98	149	201	253	53	114	174	234	294
14	39	84	128	173	217	46	98	149	201	253
12	33	70	108	145	182	39	82	125	169	212
10	27	57	88	118	148	31	67	102	137	172

Cooling capacities for 4-pipe activation

	Sail module / Ceiling sail with insulation					Sail module / Ceiling sail without insulation				
Dimensions	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000
K	2.885	6.096	9.304	12.507	15.714	3.009	6.405	9.810	13.197	16.590
n			1.082					1.082		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
15	54	114	175	235	295	57	120	184	248	311
14	50	106	162	218	274	52	112	171	230	289
13	46	98	149	201	253	48	103	158	212	267
12	42	90	137	185	232	44	94	144	194	244
11	38	82	125	168	211	40	86	131	177	223
10	35	74	113	152	190	36	78	119	160	201
9	31	66	100	135	170	33	69	106	142	179
8	27	58	88	119	150	29	61	93	125	158
7	24	50	77	103	129	25	53	81	109	136
6	20	42	65	87	110	21	45	68	92	115
5	16	35	53	72	90	17	37	56	75	95
4	13	27	42	56	71	14	29	44	59	74
3	9	20	31	41	52	10	21	32	43	55
2	6	13	20	27	33	6	14	21	28	35
1	3	6	9	13	16	3	6	10	13	17

Note: the following outputs were measured with a smooth surface; a perforated surface reduces the performance slightly. Removing the insulation has a positive effect on the cooling capacity (see table). However, this increase can only be calculated with an open ceiling.
Removing the insulation increases the thermal output; however, this can lead to heat accumulation under higher ceilings.
Attention: Zehnder has developed a special design for smooth and perforated versions for system temperatures between 50 °C and 83 °C.

Heating and cooling performance (smooth surface)

The heating and cooling performance values are given in accordance with EN 14037 (heating) and EN 14240 (cooling).

Thermal outputs for 6-pipe activation

	Sail module / Ceiling sail with insulation					Sail module / Ceiling sail without insulation				
Dimensions	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000
K	2.030	4.320	6.608	8.895	11.183	2.358	5.021	7.684	10.344	13.006
n			1.137					1.137		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
70	254	541	828	1114	1401	296	629	962	1296	1629
68	246	523	801	1078	1355	286	609	931	1254	1576
66	238	506	774	1042	1310	276	588	900	1212	1524
64	230	488	747	1006	1265	267	568	869	1170	1471
62	221	471	721	971	1220	258	548	838	1129	1419
60	213	454	695	935	1176	248	528	808	1087	1367
58	205	437	668	900	1131	239	508	777	1046	1315
56	197	420	642	865	1087	229	488	747	1005	1264
55	187	411	629	847	1065	217	478	732	985	1238
54	189	403	616	830	1043	220	468	716	965	1213
52	181	386	590	795	999	211	449	686	924	1162
50	173	369	565	760	956	202	429	656	884	1111
48	166	352	539	726	912	193	410	627	844	1061
46	158	336	513	691	869	183	390	597	804	1011
44	150	319	488	657	826	174	371	568	764	961
42	142	303	463	623	784	165	352	538	725	911
40	135	286	438	590	741	156	333	509	686	862
38	127	270	413	556	699	148	314	480	647	813
36	119	254	389	523	658	139	295	452	608	765
34	112	238	364	490	616	130	277	423	570	717
32	104	222	340	458	575	121	258	395	532	669
30	97	206	316	425	535	113	240	367	494	622
28	90	191	292	393	494	104	222	340	457	575
26	82	175	268	361	454	96	204	312	420	528
24	75	160	245	330	415	88	186	285	384	482
22	68	145	222	299	376	79	169	258	348	437
20	61	130	199	268	337	71	151	232	312	392
18	54	116	177	238	299	63	134	205	277	348
16	48	101	155	208	262	55	117	180	242	304
14	41	87	133	179	225	47	101	154	208	261
12	34	73	111	150	189	40	85	130	174	219
10	28	59	91	122	153	32	69	105	142	178

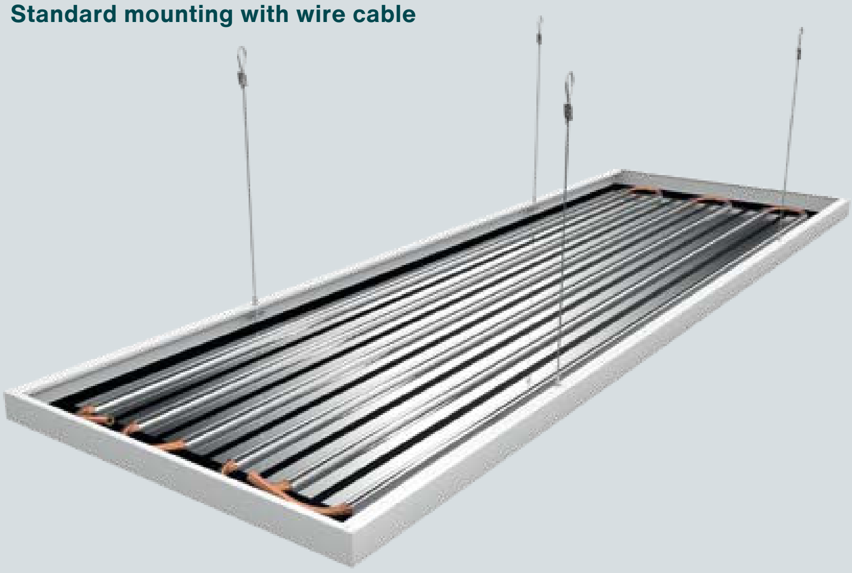
Cooling capacities for 6-pipe activation

	Sail module / Ceiling sail with insulation					Sail module / Ceiling sail without insulation				
Dimensions	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000	600 x 600	600 x 1200	600 x 1800	600 x 2400	600 x 3000
K	2.987	6.385	9.717	13.115	16.492	3.182	6.707	10.292	13.815	17.389
n			1.083					1.083		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
15	56	120	183	246	310	59	126	193	259	326
14	52	111	170	229	287	55	117	179	241	303
13	48	102	157	211	265	51	108	165	222	279
12	44	94	144	193	243	47	99	151	204	256
11	40	85	131	176	221	42	90	138	185	233
10	36	77	118	159	200	38	81	124	167	210
9	32	69	105	142	178	34	72	111	149	188
8	28	61	93	125	157	30	64	98	131	165
7	25	52	80	108	136	26	55	84	114	143
6	21	44	68	91	115	22	47	72	96	121
5	17	36	56	75	94	18	38	59	79	99
4	13	29	44	59	74	14	30	46	62	78
3	10	21	32	43	54	10	22	34	45	57
2	6	14	21	28	35	7	14	22	29	37
1	3	6	10	13	17	3	7	10	14	17

Note: the following outputs were measured with a smooth surface; a perforated surface reduces the performance slightly. Removing the insulation has a positive effect on the cooling capacity (see table). However, this increase can only be calculated with an open ceiling.
Removing the insulation increases the thermal output; however, this can lead to heat accumulation under higher ceilings.
Attention: Zehnder has developed a special design for smooth and perforated versions for system temperatures between 50 °C and 83 °C.

Suspension system for ceiling sail

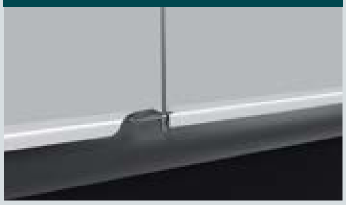
Standard mounting with wire cable



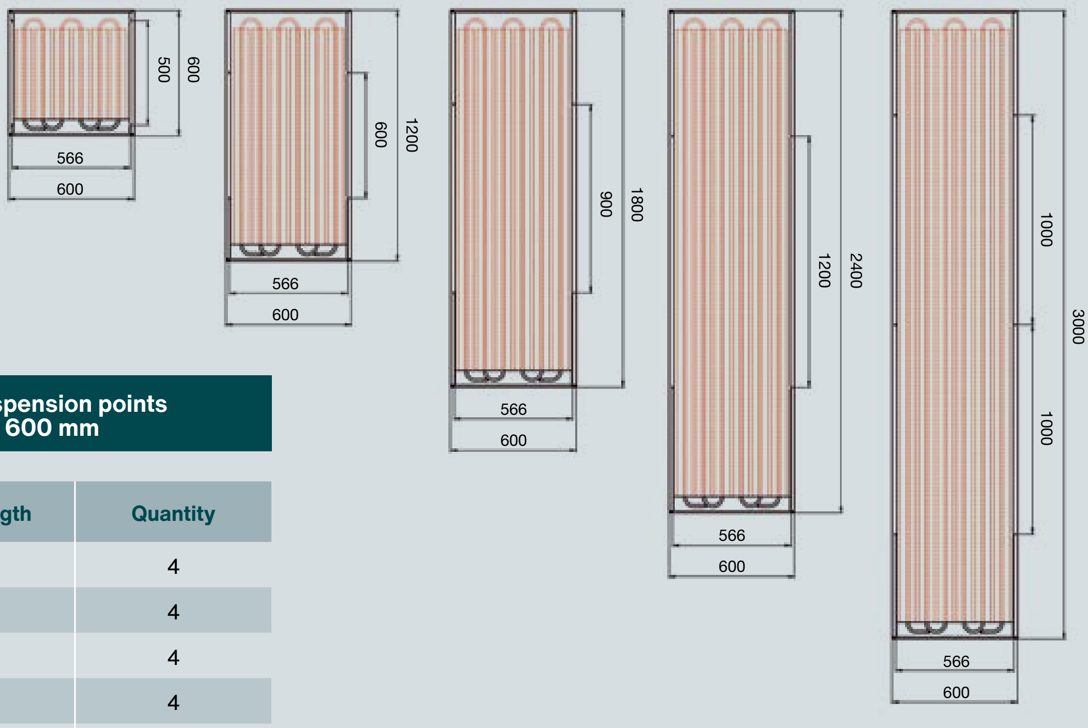
The hook-on system system must be at a right angle to the module on all planes.

Long hole with fine adjustment

Cross anchor



Fine adjustments enable the module to be aligned exactly, which makes installation easier.



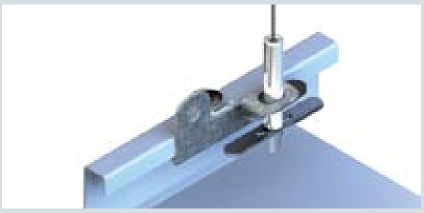
Number of suspension points
Nominal width 600 mm

Nominal length	Quantity
600 mm	4
1200 mm	4
1800 mm	4
2400 mm	4
3000 mm	6

Variable position

The multi-clip is pushed into the lateral edge of the module. The suspension points can therefore be varied.


Multi-clip with carabiner


Multi-clip with wire cable and fine adjustment

Large sails that can be hinged down

Zehnder holding brackets also make it possible to individually hinge down large sails connected in series. Holding brackets can be combined with standard ceiling accessories currently on the market.

Ceiling sails with hook suspension

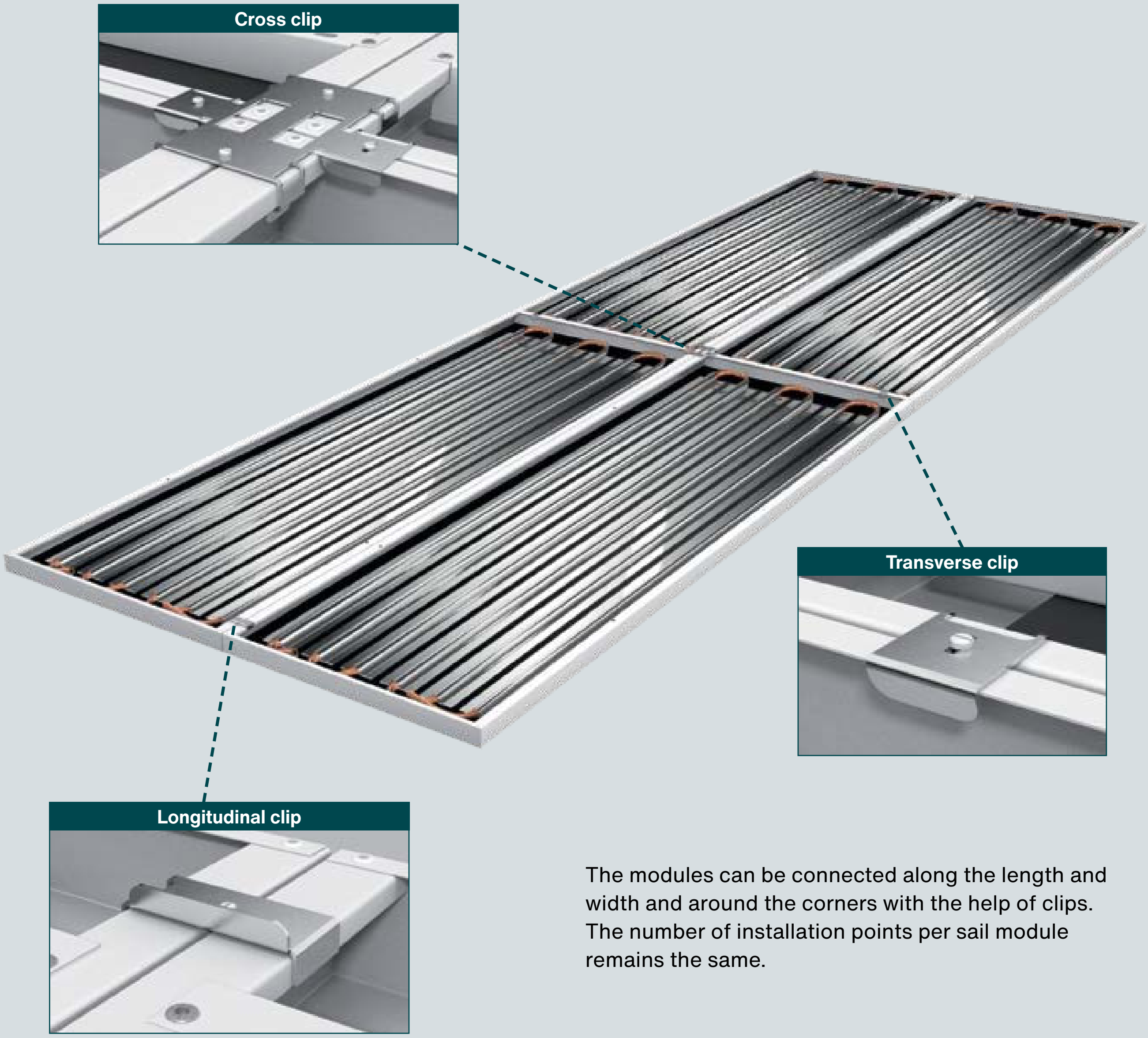
Zehnder hook suspensions are characterised by their ease of use when hanging and aligning the modules with each other. Additional mounting axes must be provided in the modules for the on-site fastening of the hooks.

Special solutions tailored to customer requirements

We supply individual customer solutions – cut-outs, special perforations and special shapes. We will find a project-specific solution by working together with you and will gladly advise you. The figure shows cut-outs for lights.

Combination of ceiling sails

Connecting clips for sail surfaces



The modules can be connected along the length and width and around the corners with the help of clips. The number of installation points per sail module remains the same.

Sail array: Zehnder sail bar

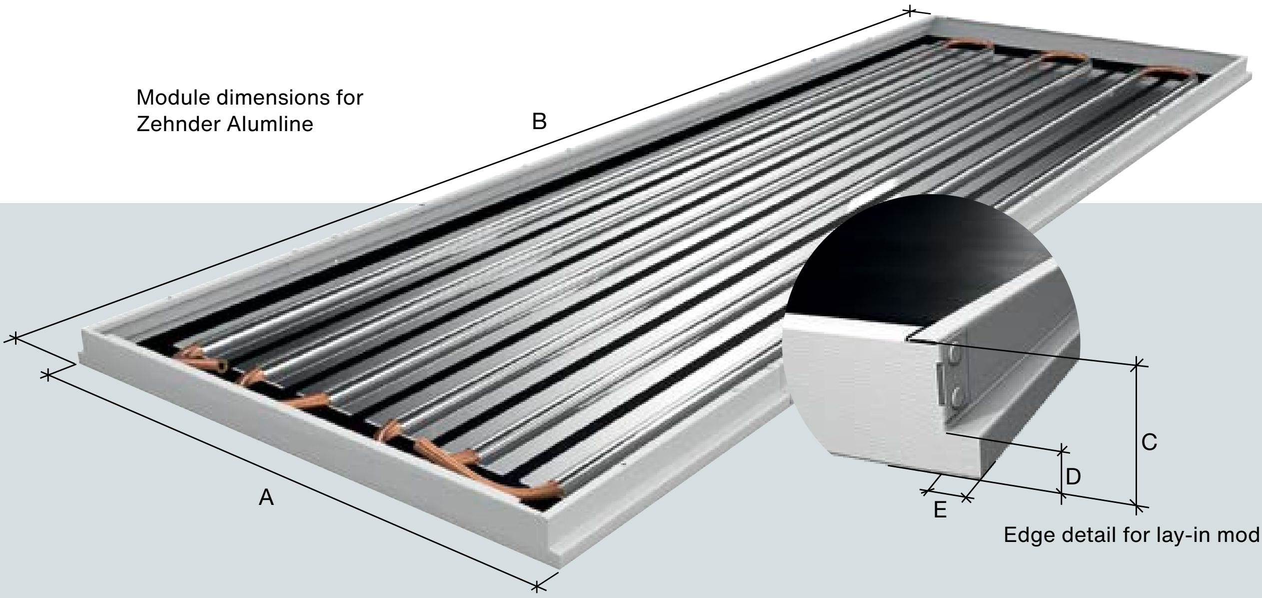
Up to five sail modules side by side can be combined with a support system of profile rail and special sail hangers. With few ceiling suspension points, this mounting form is suitable for sail arrays or several adjacent single sails.

Zehnder Alumline ceiling solution

Advantages

- Suitable for insertion in grid ceilings
- Simple and rapid installation
- Sections can be activated
- Can be combined with lights, air outlets and other components

Module dimensions for Zehnder Alumline



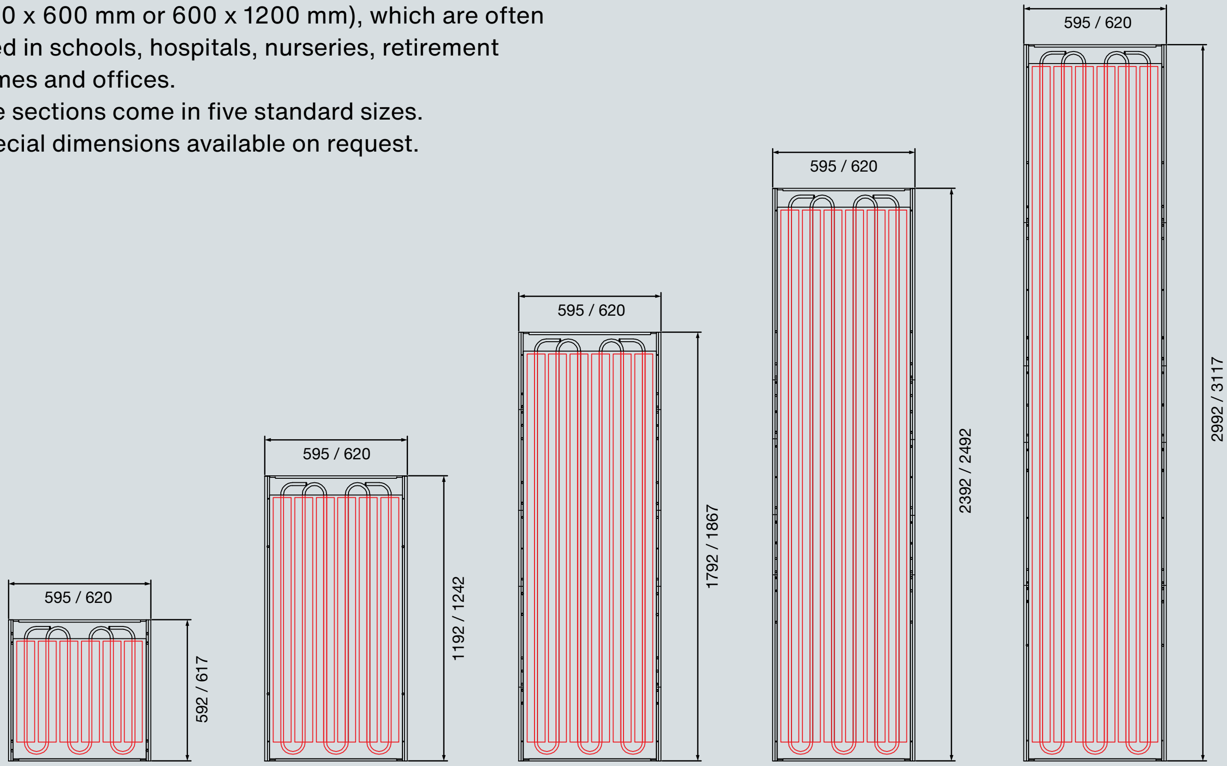
Edge detail for lay-in modules

Module dimension nominal size 600 mm

Dimensions	Description	Closed ceiling
A	Overall width	595 / 620
B	Overall length	592 - 2992 / 617 - 3117
C	Overall height	40
D	Height of the supporting edge	14
E	Width of the supporting edge	10 / 16

Zehnder Alumline for closed ceilings

The modules integrate perfectly with all types of lay-in ceilings, especially traditional grid ceilings (600 x 600 mm or 600 x 1200 mm), which are often used in schools, hospitals, nurseries, retirement homes and offices.
The sections come in five standard sizes.
Special dimensions available on request.



Heating and cooling performance (perforated surface)

The heating and cooling performance values are given in accordance with EN 14037 (heating) and EN 14240 (cooling).

Thermal outputs for 4-pipe activation

	Lay-in module with insulation					Lay-in module without insulation				
Dimensions	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992
K	1.624	3.460	5.297	7.133	9.083	1.652	3.511	5.371	7.230	9.213
n			1.092					1.092		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
70	168	358	548	738	940	171	364	556	749	953
68	163	347	531	715	911	166	352	539	726	924
66	158	336	514	692	882	160	341	522	702	894
64	153	325	497	670	852	155	330	504	679	865
62	148	314	480	647	823	150	318	487	656	835
60	142	303	463	624	794	144	307	470	633	806
58	137	292	447	601	766	139	296	453	610	776
56	132	281	430	579	737	134	285	436	587	747
55	129	275	421	567	722	131	279	427	575	733
54	127	270	413	556	708	129	274	419	564	718
52	122	259	396	534	680	124	263	402	541	689
50	117	248	380	511	651	118	252	385	519	660
48	112	237	363	489	623	113	241	368	496	632
46	107	227	347	467	594	108	230	352	473	603
44	101	216	330	445	566	103	219	335	451	574
42	96	205	314	423	538	98	208	318	429	546
40	91	195	298	401	510	93	197	302	406	518
38	86	184	281	379	482	88	187	285	384	489
36	82	173	265	357	455	83	176	269	362	461
34	77	163	249	336	427	78	165	253	340	433
32	72	152	233	314	400	73	155	237	319	406
30	67	142	217	293	373	68	144	221	297	378
28	62	132	202	271	346	63	134	205	275	351
26	57	122	186	250	319	58	123	189	254	323
24	52	111	170	229	292	53	113	173	233	296
22	48	101	155	209	266	48	103	157	212	269
20	43	91	140	188	239	44	93	142	191	243
18	38	81	124	168	213	39	83	126	170	216
16	34	72	109	147	188	34	73	111	149	190
14	29	62	95	127	162	30	63	96	129	164
12	25	52	80	108	137	25	53	81	109	139
10	20	43	66	88	112	20	43	66	89	114

Cooling capacities for 4-pipe activation

	Lay-in module with insulation					Lay-in module without insulation				
Dimensions	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992
K	2.308	4.928	7.577	10.184	12.980	2.3595	5.0206	7.6816	10.343	13.004
n			1.082					1.082		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
15	43	92	141	190	243	44	94	144	193	247
14	40	86	131	177	225	41	87	133	180	229
13	37	79	121	163	208	38	80	123	166	211
12	34	73	111	150	191	35	74	113	152	194
11	31	66	101	136	174	32	67	103	138	176
10	28	60	91	123	157	29	61	93	125	159
9	25	53	81	110	140	25	54	83	111	142
8	22	47	72	96	123	22	48	73	98	125
7	19	41	62	84	106	19	41	63	85	108
6	16	34	53	71	90	16	35	53	72	92
5	13	28	43	58	74	13	29	44	59	75
4	10	22	34	46	58	11	23	34	46	59
3	8	16	25	33	43	8	17	25	34	43
2	5	11	16	22	27	5	11	16	22	28
1	2	5	8	10	13	2	5	8	10	13

Note: the following outputs were measured with a perforated surface (22%); a smooth surface increases the performance slightly. Removing the insulation has a positive effect on the cooling capacity (see table). However, this increase can only be calculated with an open ceiling.
Removing the insulation increases the thermal output; however, this can lead to heat accumulation under higher ceilings.
Attention: Zehnder has developed a special design for smooth and perforated versions for system temperatures between 50 °C and 83 °C.

Heating and cooling performance (perforated surface)

The heating and cooling performance values are given in accordance with EN 14037 (heating) and EN 14240 (cooling).

Thermal outputs for 6-pipe activation

	Lay-in module with insulation					Lay-in module without insulation				
Dimensions	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992
K	1.708	3.635	5.559	7.482	9.433	1.731	3.687	5.641	7.591	9.563
n			1.092					1.092		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
70	177	376	576	775	976	179	382	584	786	990
68	171	365	558	751	946	174	370	566	762	959
66	166	353	540	727	915	168	358	547	737	928
64	160	341	522	703	885	163	346	529	713	898
62	155	330	504	679	855	157	334	511	688	867
60	149	318	486	655	825	152	322	493	664	837
58	144	306	469	631	795	146	311	475	640	806
56	139	295	451	607	765	141	299	458	616	776
55	136	289	442	596	750	138	293	449	604	761
54	133	283	434	584	735	135	287	440	592	746
52	128	272	416	560	706	130	276	422	568	716
50	122	261	399	537	676	124	264	404	544	686
48	117	249	381	513	647	119	253	387	521	656
46	112	238	364	490	617	113	241	369	497	626
44	107	227	347	467	588	108	230	352	473	596
42	101	215	330	444	559	103	218	334	450	567
40	96	204	312	421	530	97	207	317	427	537
38	91	193	295	398	501	92	196	300	403	508
36	86	182	278	375	472	87	185	282	380	479
34	80	171	262	352	444	82	173	265	357	450
32	75	160	245	330	415	76	162	248	334	421
30	70	149	228	307	387	71	151	231	312	392
28	65	138	212	285	359	66	140	215	289	364
26	60	128	195	263	331	61	129	198	267	336
24	55	117	179	241	303	56	119	181	244	308
22	50	106	163	219	276	51	108	165	222	280
20	45	96	147	197	249	46	97	149	200	252
18	40	85	131	176	222	41	87	133	178	225
16	35	75	115	155	195	36	76	117	157	198
14	31	65	99	134	168	31	66	101	136	171
12	26	55	84	113	142	26	56	85	115	144
10	21	45	69	93	117	21	46	70	94	118

Cooling capacities for 6-pipe activation

	Lay-in module with insulation					Lay-in module without insulation				
Dimensions	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992
K	2.494	5.293	8.089	10.883	13.704	2.508	5.387	8.213	11.079	13.917
n			1.081					1.081		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
15	46	99	151	204	257	47	100	154	207	261
14	43	92	140	189	238	44	93	143	192	242
13	40	85	130	174	220	40	86	132	177	223
12	37	78	119	160	202	37	79	121	163	205
11	33	71	108	146	183	34	72	110	148	186
10	30	64	98	131	165	30	65	99	133	168
9	27	57	87	117	148	27	58	88	119	150
8	24	50	77	103	130	24	51	78	105	132
7	20	43	66	89	113	21	44	67	91	114
6	17	37	56	76	95	18	37	57	77	97
5	14	30	46	62	78	14	31	47	63	79
4	11	24	36	49	61	11	24	37	50	62
3	8	17	27	36	45	8	18	27	36	46
2	5	11	17	23	29	5	11	17	23	30
1	3	5	8	11	14	3	5	8	11	14

Note: the following outputs were measured with a perforated surface (22%); a smooth surface increases the performance slightly. Removing the insulation has a positive effect on the cooling capacity (see table). However, this increase can only be calculated with an open ceiling.
Removing the insulation increases the thermal output; however, this can lead to heat accumulation under higher ceilings.
Attention: Zehnder has developed a special design for smooth and perforated versions for system temperatures between 50 °C and 83 °C.

Heating and cooling performance (smooth surface)

The heating and cooling performance values are given in accordance with EN 14037 (heating) and EN 14240 (cooling).

Thermal outputs for 4-pipe activation

	Lay-in module with insulation					Lay-in module without insulation				
Dimensions	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992
K	1.963	4.175	6.385	8.596	10.811	2.282	4.852	7.425	9.996	12.572
n			1.137					1.137		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
70	179	380	582	783	997	181	386	590	795	1011
68	173	368	564	759	965	176	374	572	770	979
66	168	357	546	735	934	170	362	553	745	948
64	162	345	528	710	904	164	350	535	720	916
62	157	333	510	686	873	159	338	517	696	885
60	151	321	492	662	842	153	326	499	671	854
58	146	310	474	638	812	148	314	481	647	823
56	140	298	456	614	781	142	302	463	623	792
55	137	292	447	602	766	139	296	454	611	777
54	135	286	438	590	751	137	291	445	598	761
52	129	275	421	566	720	131	279	427	574	731
50	124	263	403	543	690	126	267	409	550	700
48	118	252	385	519	660	120	255	391	526	669
46	113	240	368	495	630	115	244	373	502	639
44	108	229	350	472	600	109	232	355	479	609
42	102	218	333	448	570	104	221	338	455	579
40	97	206	316	425	541	98	209	320	431	549
38	92	195	299	402	511	93	198	303	408	519
36	87	184	282	379	482	88	187	286	384	489
34	81	173	264	356	453	82	175	268	361	459
32	76	162	248	333	424	77	164	251	338	430
30	71	151	231	311	395	72	153	234	315	401
28	66	140	214	288	366	67	142	217	292	372
26	61	129	197	266	338	62	131	200	269	343
24	56	118	181	243	310	56	120	183	247	314
22	51	107	164	221	282	51	109	167	225	286
20	46	97	148	199	254	46	98	150	202	257
18	41	86	132	178	226	41	88	134	180	229
16	36	76	116	156	199	36	77	118	159	202
14	31	66	100	135	172	31	67	102	137	174
12	26	55	85	114	145	26	56	86	116	147
10	21	45	70	94	119	22	46	71	95	121

Cooling capacities for 4-pipe activation

	Lay-in module with insulation					Lay-in module without insulation				
Dimensions	**595 x 592**	**595 x 1192**	**595 x 1792**	**595 x 2392**	**595 x 2992**	**595 x 592**	**595 x 1192**	**595 x 1792**	**595 x 2392**	**595 x 2992**
K	2.885	6.096	9.304	12.507	15.714	3.009	6.405	9.810	13.197	16.590
n			1.081					1.082		
Δ t (K)	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**
15	46	98	150	202	258	47	100	153	206	262
14	43	91	140	188	239	44	93	142	191	243
13	40	84	129	173	221	40	86	131	176	224
12	36	77	118	159	203	37	78	120	162	206
11	33	70	108	145	184	34	71	109	147	187
10	30	63	97	131	166	30	64	99	133	169
9	27	57	87	117	148	27	58	88	118	151
8	23	50	76	103	131	24	51	77	104	133
7	20	43	66	89	113	21	44	67	90	115
6	17	37	56	75	96	17	37	57	76	97
5	14	30	46	62	79	14	30	47	63	80
4	11	24	36	48	62	11	24	37	49	63
3	8	17	26	36	45	8	18	27	36	46
2	5	11	17	23	29	5	11	17	23	30
1	3	5	8	11	14	3	5	8	11	14

Note: the following outputs were measured with a smooth surface; a perforated surface reduces the performance slightly. Removing the insulation has a positive effect on the cooling capacity (see table). However, this increase can only be calculated with an open ceiling.
Removing the insulation increases the thermal output; however, this can lead to heat accumulation under higher ceilings.
Attention: Zehnder has developed a special design for smooth and perforated versions for system temperatures between 50 °C and 83 °C.

Heating and cooling performance (smooth surface)

The heating and cooling performance values are given in accordance with EN 14037 (heating) and EN 14240 (cooling).

Thermal outputs for 6-pipe activation

	Lay-in module with insulation					Lay-in module without insulation				
Dimensions	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992	595 x 592	595 x 1192	595 x 1792	595 x 2392	595 x 2992
K	1.780	3.794	5.799	7.808	9.839	1.807	3.843	5.881	7.922	9.978
n			1.092					1.092		
Δ t (K)	W	W	W	W	W	W	W	W	W	W
70	184	392	600	808	1018	187	398	609	820	1033
68	179	380	582	783	987	181	386	590	794	1001
66	173	368	563	758	955	175	373	571	769	969
64	167	356	544	733	923	170	361	552	743	937
62	162	344	526	708	892	164	349	533	718	905
60	156	332	507	683	861	158	336	515	693	873
58	150	320	489	658	829	152	324	496	668	841
56	145	308	471	634	798	147	312	477	643	809
55	142	302	461	621	783	144	306	468	630	794
54	139	296	452	609	767	141	300	459	618	778
52	133	284	434	584	736	135	288	440	593	747
50	128	272	416	560	705	130	276	422	568	715
48	122	260	398	535	674	124	264	403	543	684
46	117	248	380	511	644	118	252	385	518	653
44	111	236	362	487	613	113	240	367	494	622
42	106	225	344	463	583	107	228	349	469	591
40	100	213	326	439	553	102	216	331	445	561
38	95	201	308	415	523	96	204	313	421	530
36	89	190	290	391	493	91	193	295	397	500
34	84	178	273	367	463	85	181	277	373	469
32	78	167	255	344	433	80	169	259	349	439
30	73	156	238	320	404	74	158	241	325	409
28	68	144	221	297	374	69	146	224	301	380
26	63	133	204	274	345	63	135	206	278	350
24	57	122	187	251	316	58	124	189	255	321
22	52	111	170	228	288	53	112	172	232	292
20	47	100	153	206	259	48	101	155	209	263
18	42	89	136	183	231	42	90	138	186	234
16	37	78	120	161	203	37	79	122	164	206
14	32	68	104	139	176	32	69	105	141	178
12	27	57	88	118	148	27	58	89	120	151
10	22	47	72	97	122	22	48	73	98	123

Cooling capacities for 6-pipe activation

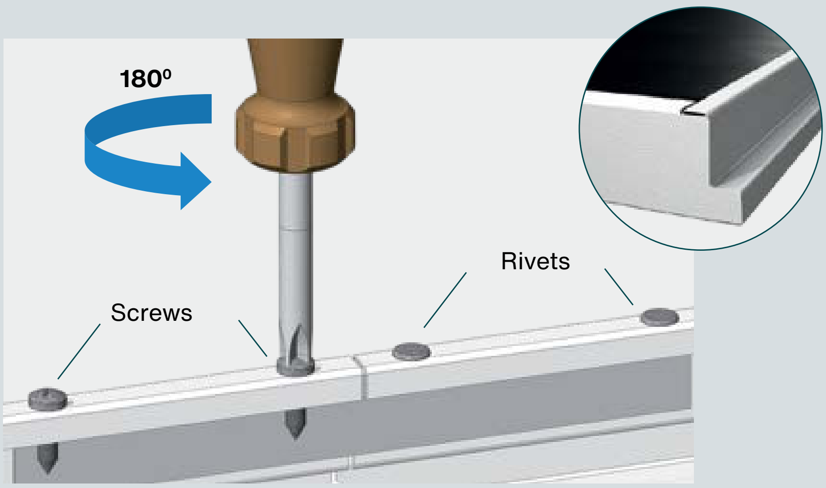
	Lay-in module with insulation					Lay-in module without insulation				
Dimensions	**595 x 592**	**595 x 1192**	**595 x 1792**	**595 x 2392**	**595 x 2992**	**595 x 592**	**595 x 1192**	**595 x 1792**	**595 x 2392**	**595 x 2992**
K	2.598	5.513	8.428	11.377	14.310	2.619	5.609	8.577	11.520	14.522
n			1.081					1.081		
Δ t (K)	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**	**W**
15	49	103	158	213	268	49	105	160	216	272
14	45	96	147	197	249	46	97	149	200	253
13	42	88	135	182	229	42	90	137	185	233
12	38	81	124	167	210	39	82	126	170	214
11	35	74	113	152	192	35	75	115	154	195
10	31	67	102	137	173	32	68	103	139	176
9	28	59	91	122	154	28	60	92	124	157
8	25	52	80	108	136	25	53	81	109	138
7	21	45	69	93	117	22	46	70	95	119
6	18	38	59	79	99	18	39	60	80	101
5	15	31	48	65	82	15	32	49	66	83
4	12	25	38	51	64	12	25	38	52	65
3	9	18	28	37	47	9	18	28	38	48
2	6	12	18	24	30	6	12	18	24	31
1	3	6	8	11	14	3	6	9	12	15

Note: the following outputs were measured with a smooth surface; a perforated surface reduces the performance slightly. Removing the insulation has a positive effect on the cooling capacity (see table). However, this increase can only be calculated with an open ceiling.
Removing the insulation increases the thermal output; however, this can lead to heat accumulation under higher ceilings.
Attention: Zehnder has developed a special design for smooth and perforated versions for system temperatures between 50 °C and 83 °C.

Suspension system for lay-in ceilings

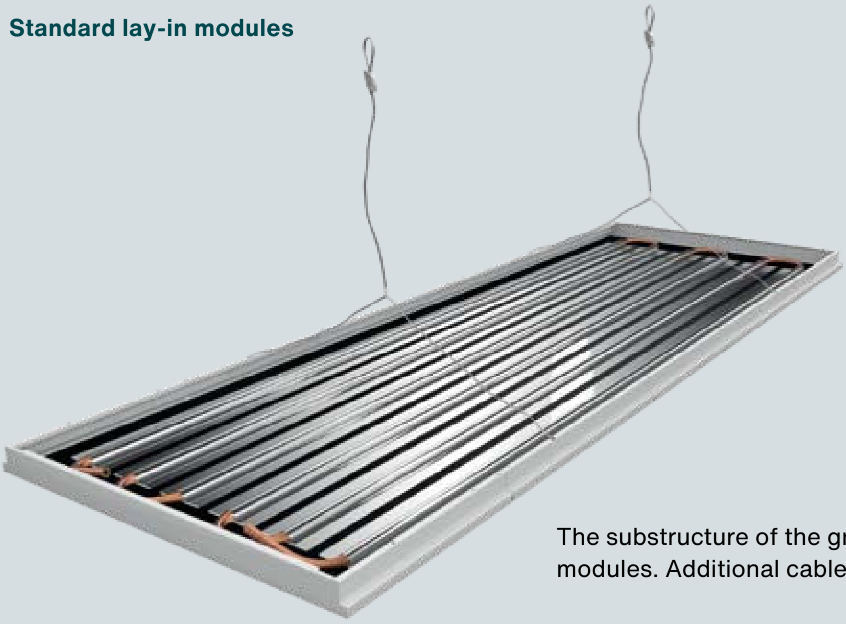
Anti-flec technology for lay-in modules

For using Zehnder Alumline lay-in modules in high temperatures.



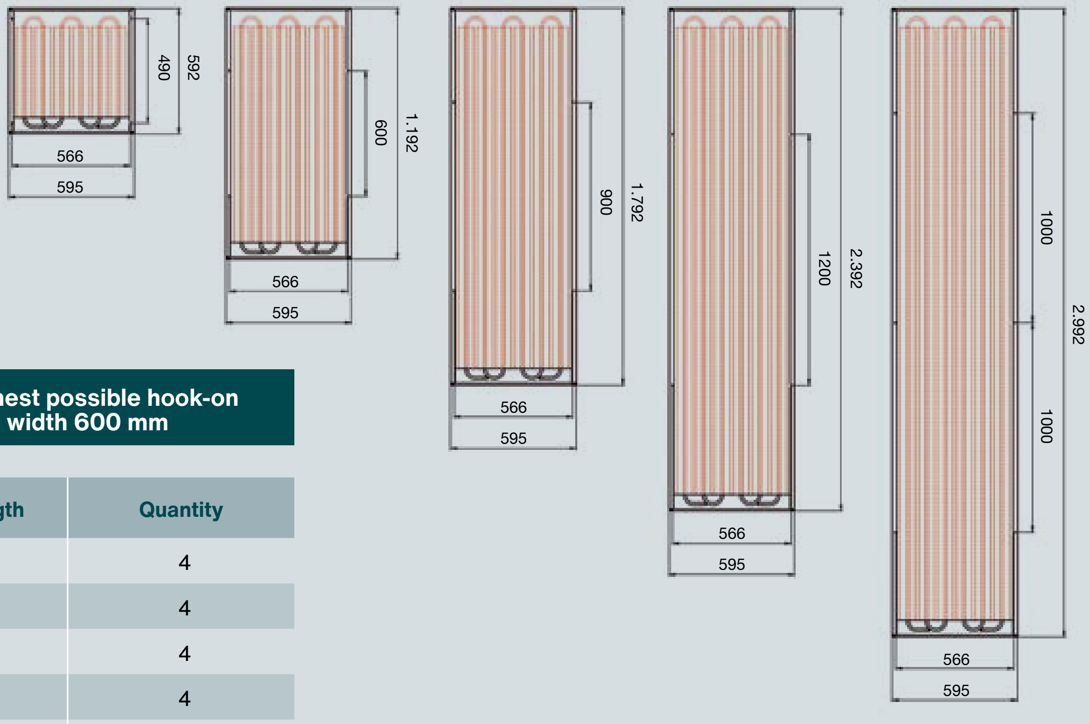
The Zehnder Alumline lay-in modules for grid ceilings are produced from a length of 1500 mm with anti-flec technology. This ensures an even contact surface on the ceiling grid, even when heating. After laying the modules in the grid, the anti-flec profiles are loosened in the ceiling grid by opening the screw pairs.

Standard lay-in modules



Cross anchor

The substructure of the grid ceiling bears the weight of the modules. Additional cables can be used to secure the modules.

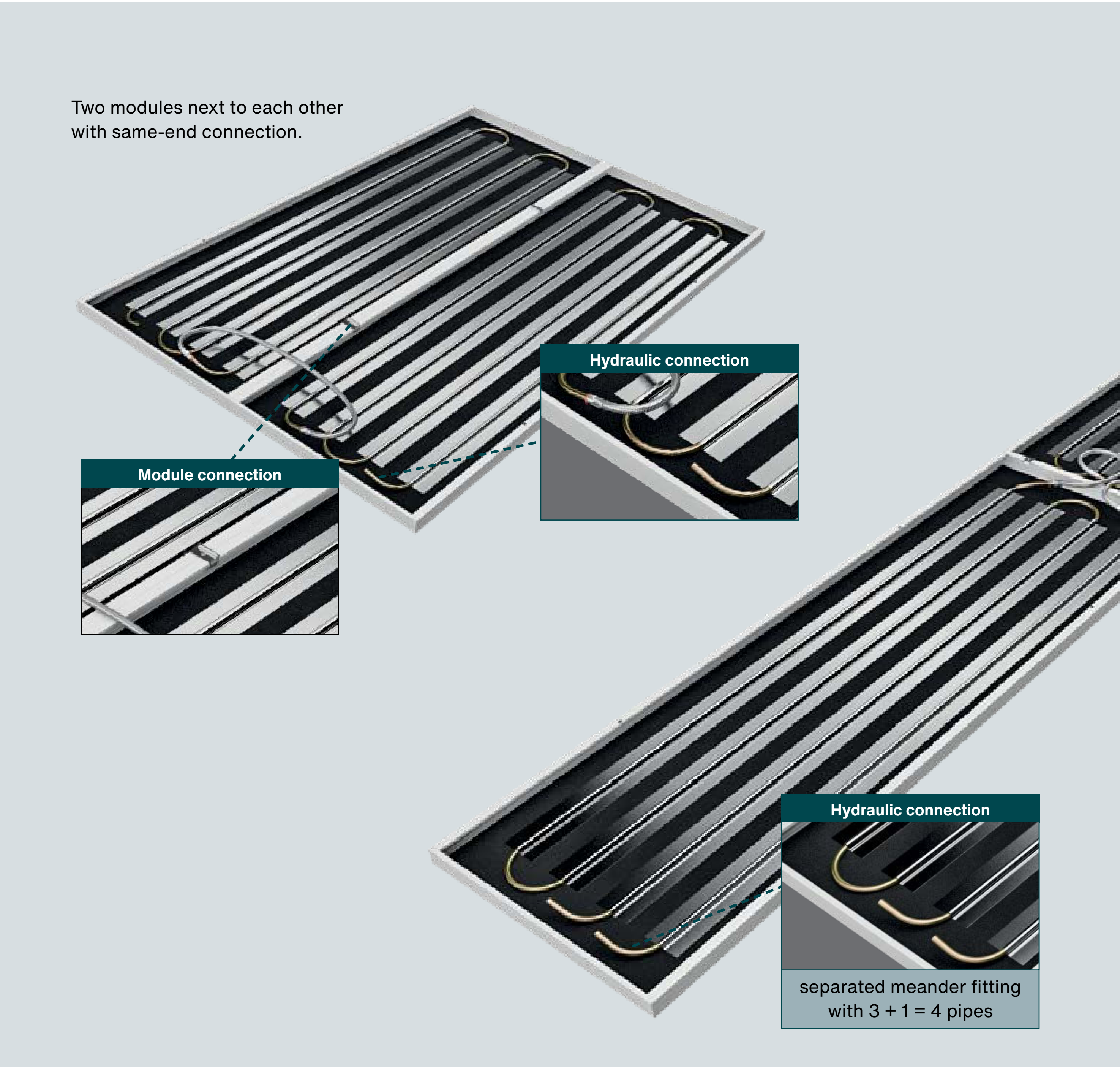


Number of highest possible hook-on points Nominal width 600 mm

Nominal length	Quantity
600 mm	4
1200 mm	4
1800 mm	4
2400 mm	4
3000 mm	6

Connection technology for 4 parallel pipes

The Zehnder modules can be installed as strips up to a maximum of 9 metres in length. In this case, the front-facing modules have two-part meander fittings with hydraulic couplings on both sides of the panels, which enable a series connection.

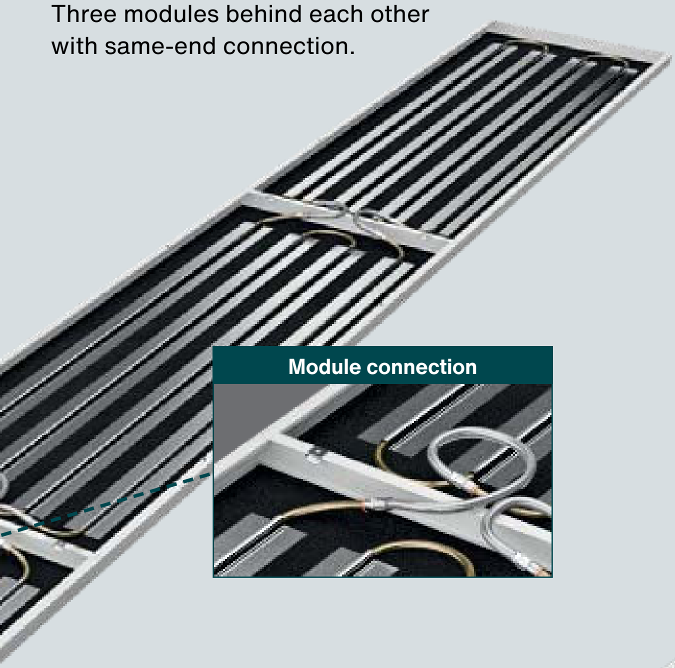


Special solution

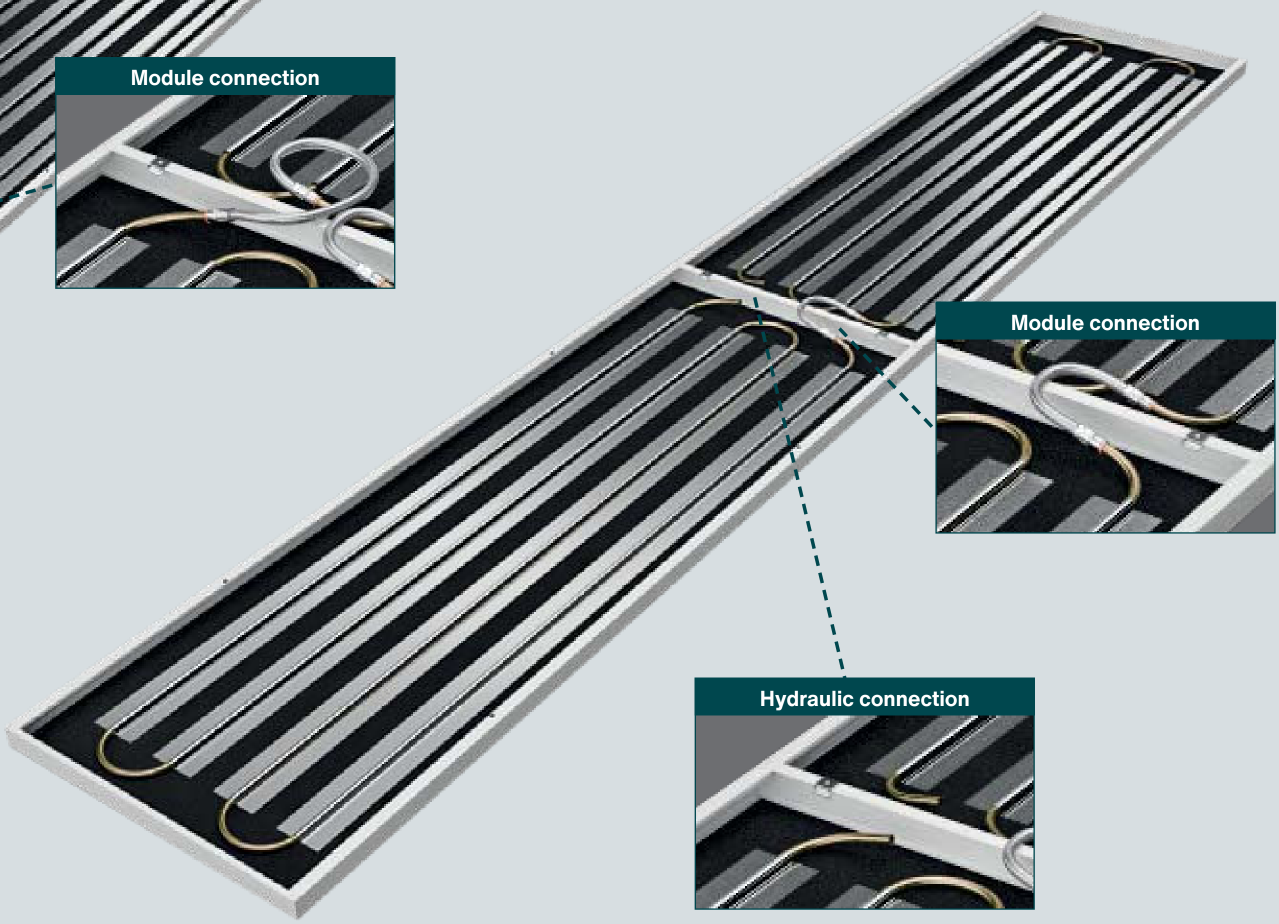
Cut-outs can be made in the Zehnder cassettes in order to integrate external wall grilles, projectors, fire alarms, lights and other equipment.

Zehnder makes the required cut-outs in the cassettes according to your instructions.

Three modules behind each other with same-end connection.

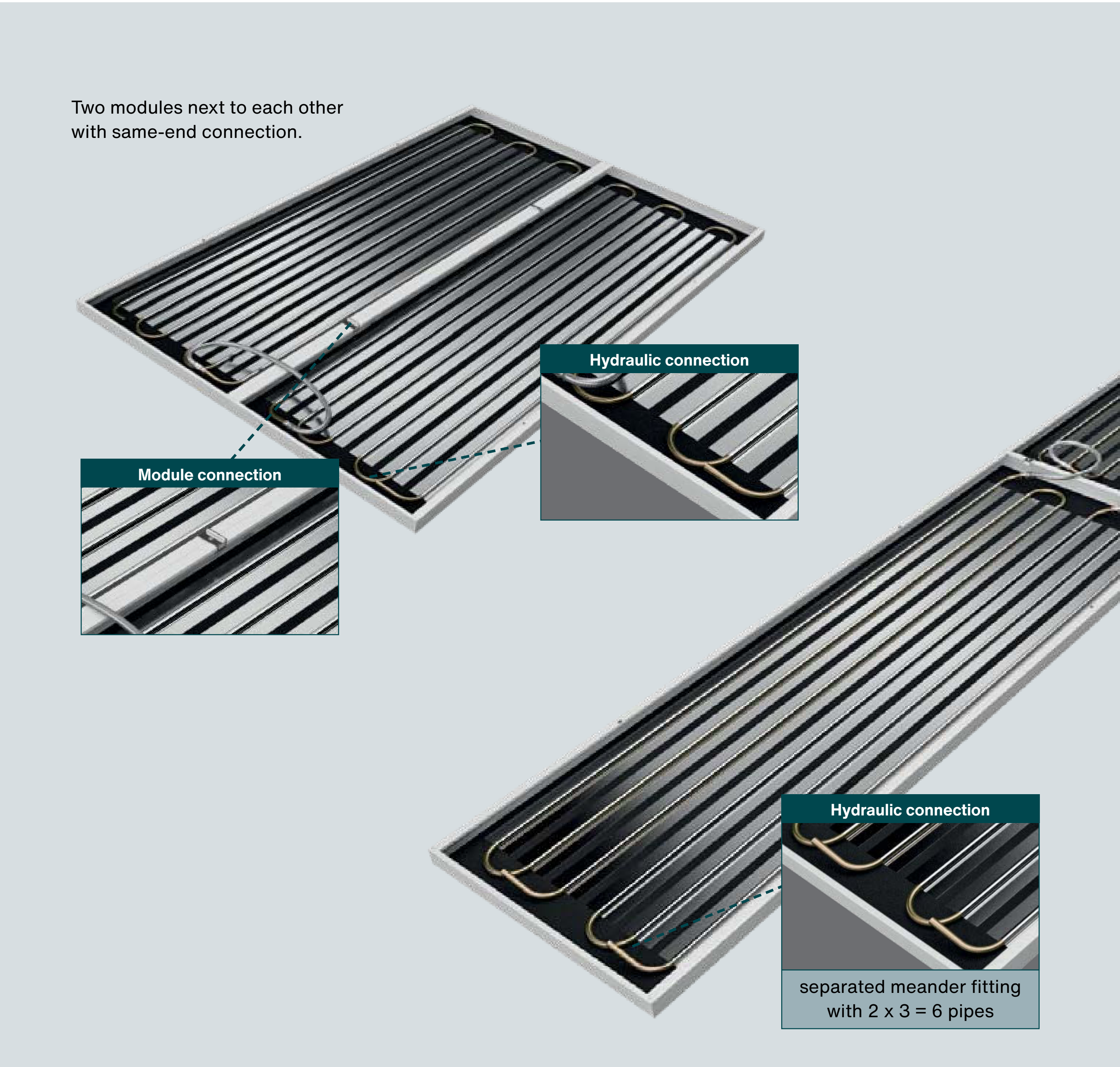


Two modules behind each other with centre connection.



Connection technology 6 parallel pipes

The Zehnder modules can be installed as strips up to a maximum of 9 metres in length. In this case, the front-facing modules have two-part meander fittings with hydraulic couplings on both sides of the panels, which enable a series connection.



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Cut-outs can be made in the Zehnder cassettes in order to integrate external wall grilles, projectors, fire alarms, lights and other equipment.

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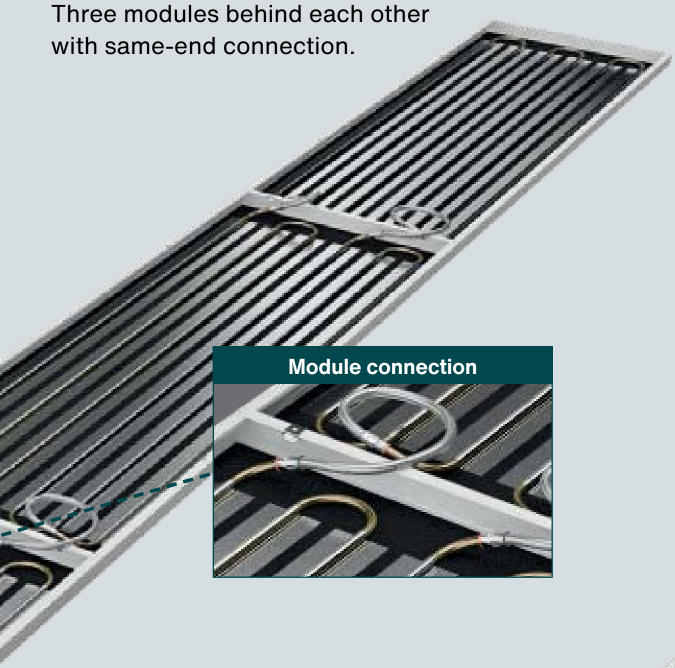
Three modules behind each other with same-end connection.



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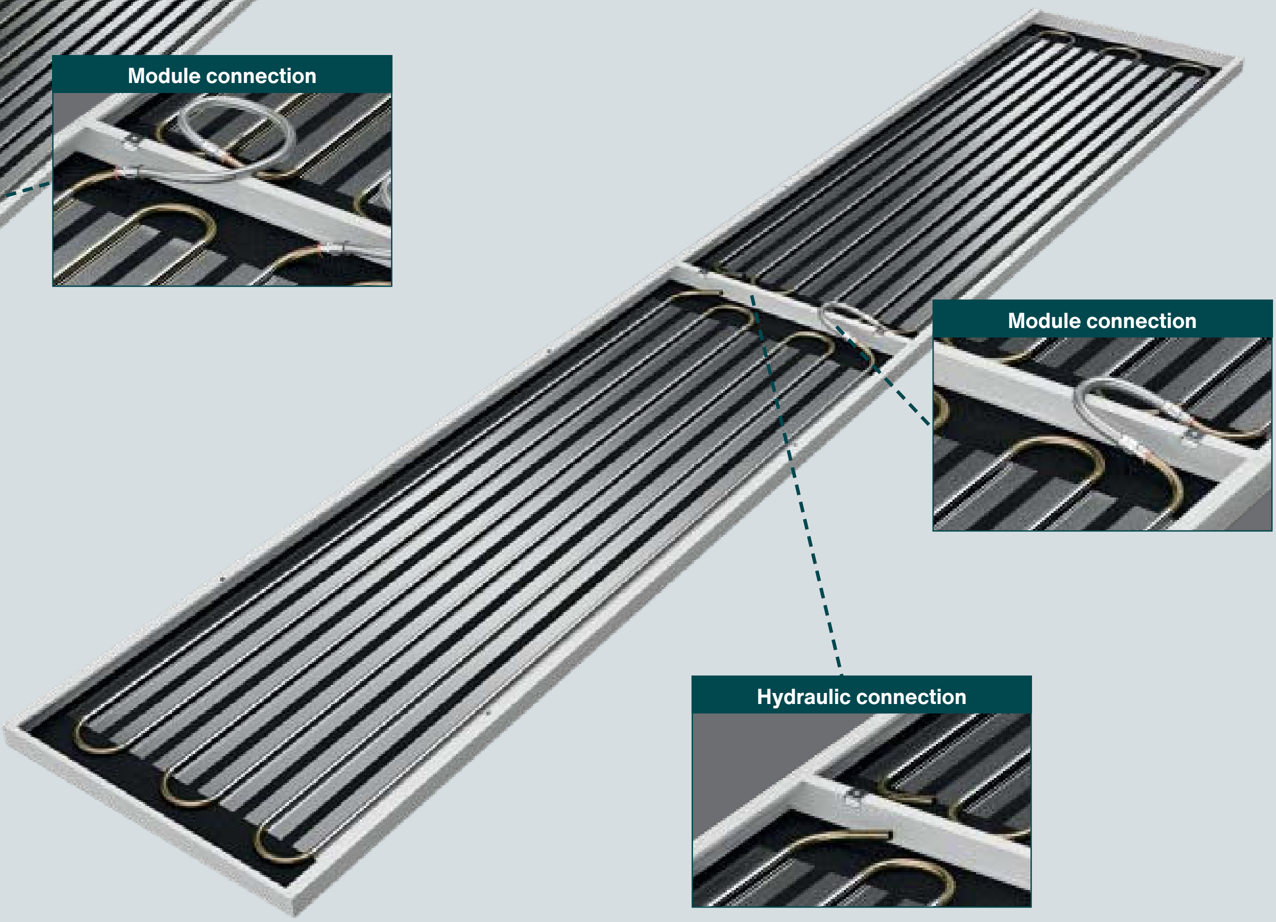
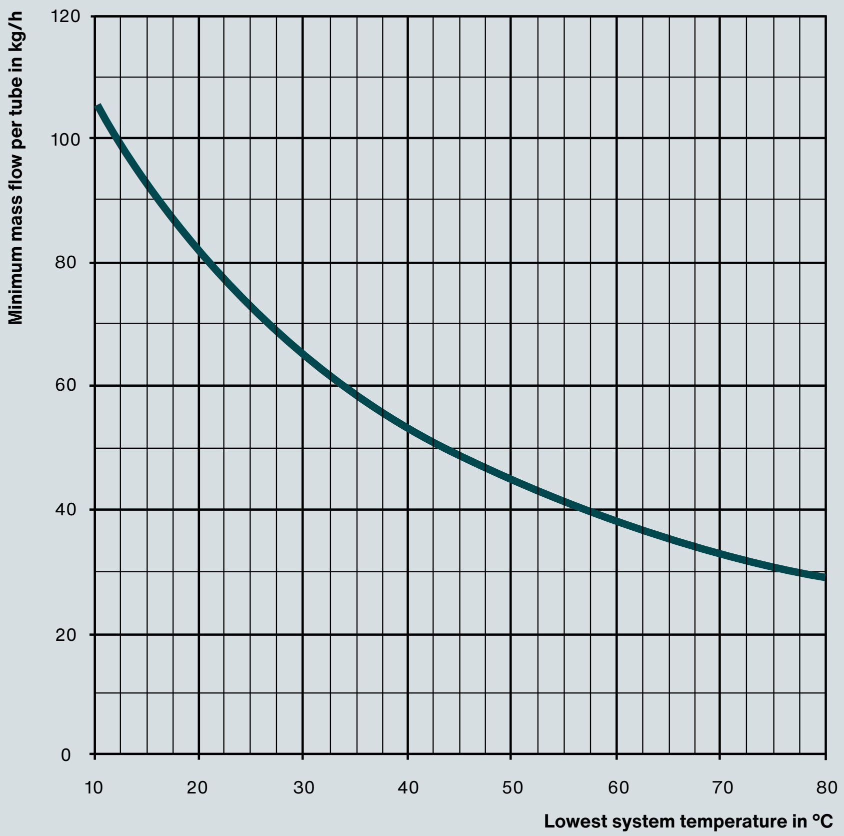


Minimum mass flow

To maintain the outputs shown in the tables on pages 10 to 17 and 24 to 31 , 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 tube is not achieved, this can result in a drop in performance up to 15 %.

Minimum mass flow

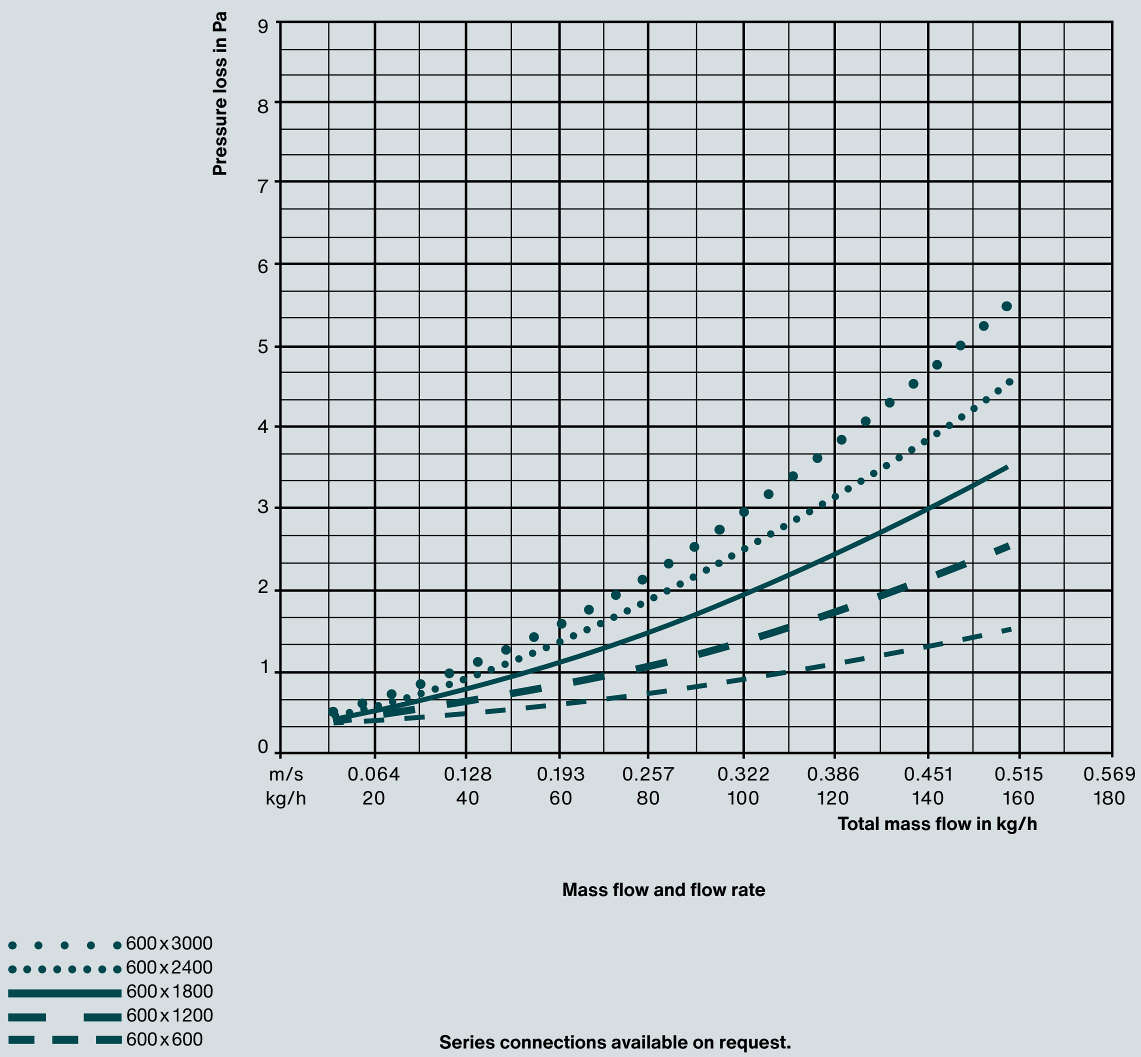


Pressure loss calculation

The pressure loss, depending on the module size and mass flow, is shown in the diagram. The maximum permitted flow speed is 0.5 m/s.

Pressure loss calculations

Pressure loss graph for 4 parallel pipes



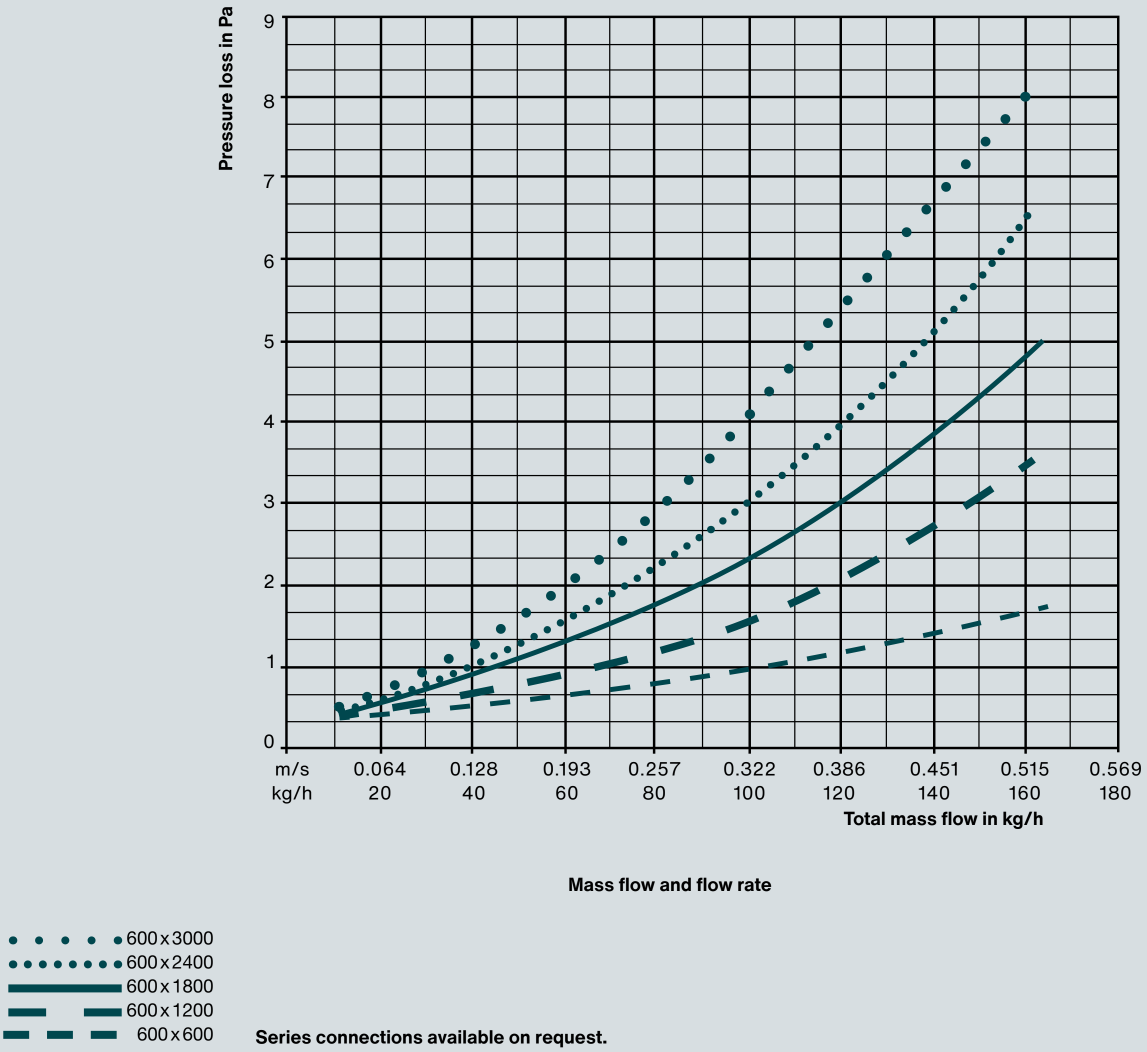
Series connections available on request.

Pressure loss calculation

The pressure loss, depending on the module size and mass flow, is shown in the diagram. The maximum permitted flow speed is 0.5 m/s.

Pressure loss calculations

Pressure loss graph for 6 parallel pipes



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Pressure loss calculations

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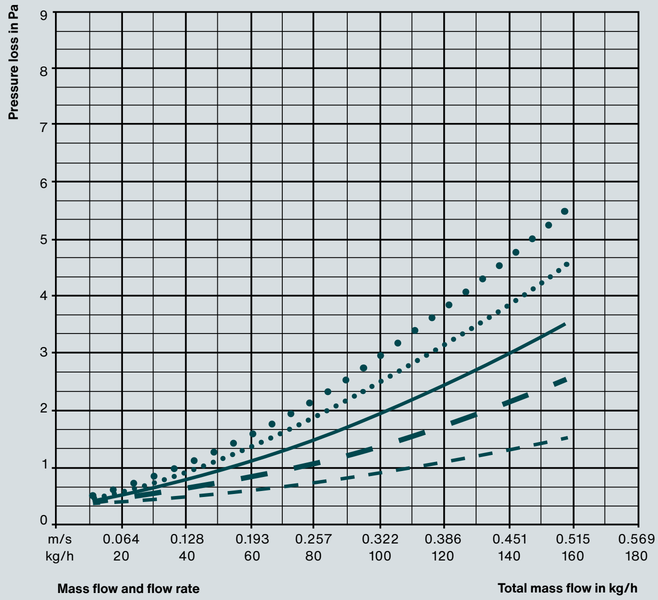
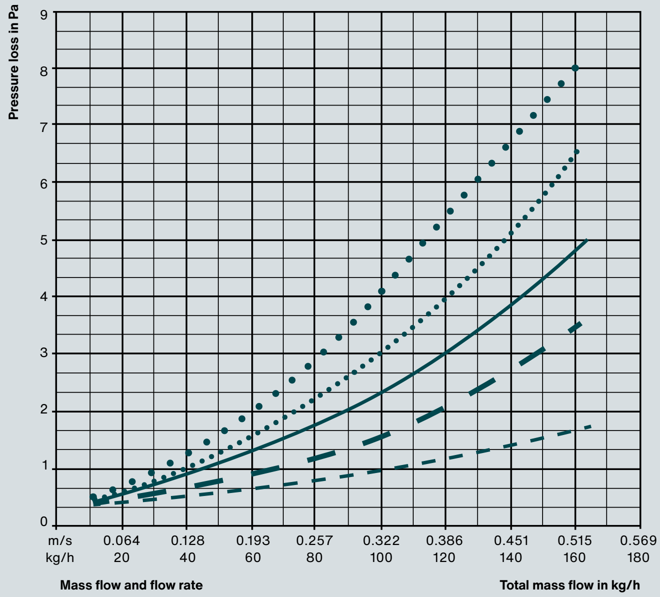


Pressure loss graph for 6 parallel pipes



Series connections available on request.

- 600 x 3000 (large dots)
- 600 x 2400 (small dots)
- 600 x 1800 (solid line)
- 600 x 1200 (long dashes)
- 600 x 600 (short dashes)

Technical specification for 4-pipe activation

		Ceiling sails					Lay-in module				
Dimensions	Unit of measurement										
Width type[1]	-	600					600 / 625				
Length type[1]	-	600	1200	1800	2400	3000	600 / 625	1200 / 1250	1800 / 1875	2400 / 2500	3000 / 3125
Overall width[1]	mm	600					595 / 620				
Overall length[1]	mm	600	1200	1800	2400	3000	592 / 617	1192 / 1242	1792 / 1867	2392 / 2492	2992 / 3117
Number of suspension points per module	Piece(s)	4	4	4	4	6	4	4	4	4	6
No. of parallel pipes	Piece(s)	4					4				
Tube spacing	mm	150					150				
Pipe material / Dimension (outside ø)	- / mm	Copper pipe / 12					Copper pipe / 12				
Panel material	-	Galvanised steel					Galvanised steel				
Parameters											
Max. operating temperature – standard version	°C	50					50				
Max. operating temperature – special version	°C	83					83				
Max. operating pressure	bar	10					10				
Weight											
Operating weight with water content, without insulation	kg	3.91	7.53	11.16	14.78	18.40	3.48 / 3.70	6.75 / 7.18	10.45 / 11.10	13.71 / 14.58	18.75 / 19.84
Operating weight with water content, with insulation[2]	kg	4.06	7.87	11.67	15.47	19.27	3.64 / 3.87	7.08 / 7.54	10.96 / 11.67	14.41 / 15.36	19.63 / 20.82
Water content	kg	0.28	0.50	0.74	0.98	1.22	0.26	0.50	0.74	0.98	1.22

[1] Intermediate lengths available on request.
[2] Insulation made of rock wool in LDPE foil, mass per unit area = 0.84 kg/m^2, λ = 0.03 – 0.04 W/(m.K)

Technical specification for 6-pipe activation


		Ceiling sails					Lay-in module				
Dimensions	Unit of measurement										
Width type[1]	-	600					600 / 625				
Length type[1]	-	600	1200	1800	2400	3000	600 / 625	1200 / 1250	1800 / 1875	2400 / 2500	3000 / 3125
Overall width[1]	mm	600					595 / 620				
Overall length[1]	mm	600	1200	1800	2400	3000	592 / 617	1192 / 1242	1792 / 1867	2392 / 2492	2992 / 3117
Number of suspension points per module	Piece(s)	4	4	4	4	6	4	4	4	4	6
No. of parallel pipes	Piece(s)	6					6				
Tube spacing	mm	90					90				
Pipe material / Dimension (outside ø)	- / mm	Copper pipe / 12					Copper pipe / 12				
Panel material	-	Galvanised steel					Galvanised steel				
Parameters											
Max. operating temperature – standard version	°C	50					50				
Max. operating temperature – special version	°C	83					83				
Max. operating pressure	bar	10					10				
Weight											
Operating weight with water content, without insulation	kg	4.04	7.78	11.53	15.27	19.01	3.61 / 3.86	6.99 / 7.48	10.82 / 11.56	14.20 / 15.19	19.36 / 20.59
Operating weight with water content, with insulation[2]	kg	4.19	8.12	12.04	15.96	19.88	3.77 / 4.03	7.33 / 7.66	11.33 / 12.13	14.90 / 15.97	20.24 / 21.58
Water content	kg	0.39	0.75	1.11	1.47	1.83	0.39	0.75	1.11	1.47	1.83

[1] Intermediate lengths available on request.
[2] Insulation made of rock wool in LDPE foil, mass per unit area = 0.84 kg/m², λ = 0.03 – 0.04 W/(m.K)

Tender specifications

Ceiling sail – free-hanging modules

Alumline sail version... x ... mm, active (Standard modules: 600 x 600 mm; 600 x 1200 mm; 600 x 1800 mm; 600 x 2400 mm; 600 x 3000 mm)
Alumline sail version ... x ... mm, active (special version)

Metal ceiling panels according to quality standard TAIM e.V. Version : November 1998, Material: galvanised sheet steel, minimum thickness 0.6 mm, lip on longitudinal side in line with static requirements.
Surface similar to RAL ... (9016), smooth surface similar to RAL ... (9016), perforated, hole pattern ... RD - L30 (1.5 mm - 22% - 45°), surrounding non-perforated edge, approx. 10 mm wide.

A special heat-conducting acoustic fleece has been force-fitted to the back of the perforated version, without pleats, to improve sound absorption. The supplier must present test results to prove that sound absorption is achieved in conjunction with the metal ceiling panels on offer. Sound absorption measured according to EN ISO 345.

Fixing:
Fixing to the bare ceiling via metal anchors approved by the building authorities, with a maximum load of at least 0.5 kN per anchor. Suspension by means of wire assembly cables (Ø 1.5 mm) with autolocking, cross anchor and optional fine adjustment.

Insulation:
Heat and sound-absorbing insulating layer based on rock wool, coated with black fleece on one side and shrink-wrapped in LDPE foil.

Heating and cooling register:
Factory-integrated copper pipe register (Ø 12 mm) with large-area aluminium heat-conducting profiles in the shape of the module with flow and return connections. Only pipes (Ø 12 mm) made of copper may be used according to DIN EN 12735-2. The copper pipe registers are glued into the linear panels at the factory using a special adhesive, thus ensuring optimum thermal transfer and, as such, optimum heating and cooling performance. The size of the meandering copper pipe is tailored to the ceiling module.
The climate ceilings must be hydraulically connected so there is a maximum pressure loss of approx. 25 kPa per control circuit.

Nominal cooling capacity (10 K):	134 W/m² according to EN 14240
Nominal thermal output (15 K):	145 W/m² according to EN 14037

Sail consisting of module sizes: ... piece ... x ... mm
Material: galvanised sheet steel, similar to RAL ... (9016), perforated or smooth, including insulation

Maximum operating temperature:	83 °C
Maximum operating pressure:	10 bar

Hose connection 12 x 12 mm
Armoured hose with oxygen barrier and stainless steel braiding, push-in brass couplings pressed on both sides. Plastic plug-in connectors are not permitted. Plug-in connector on both sides for copper pipe (12 mm).
The copper pipes used on site to connect the flexible connection pipes must meet the requirements of DIN EN 1057.
Only copper pipes in the conditions R220 (soft) and R250 (half hard) are permitted.

Tight against diffusion according to DIN 4726

Maximum operating temperature:	80 °C
Maximum operating pressure:	10 bar

Length:	... mm (1000 mm, 1500 mm, ...)

Hose connection 12 x ½" female thread as coupler
Armoured hose with oxygen barrier and stainless steel braiding, brass push-in coupling pressed on one side and ½" male thread, flat gasket. Plastic plug-in connectors are not permitted. Plug-in connector for copper pipe (12 mm).
The copper pipes used on both sides to connect the flexible connection pipes must meet the requirements of DIN EN 1057 .
Only copper pipes in the conditions R220 (soft) and R250 (half hard) are permitted.

Tight against diffusion according to DIN 4726

Maximum operating temperature:	80 °C
Maximum operating pressure:	10 bar

Length:	... mm (500 mm, 750 mm, ...)

Examples:

Heating power rating

Room temperature:	20 °C
Hot water supply:	40 °C
Hot water return:	36 °C
Spec. thermal output smooth/perf. (incl. insulation):	160/153 W/m² compliant with EN 14037

Cooling power rating

Room temperature:	26 °C
Cold water supply:	16 °C
Cold water return:	19 °C
Spec. Cooling capacity smooth/perf.:	approx. 89/85 W/m² compliant with EN 14240

Lay-in modules for T24 grid ceiling

All positions below cover the materials supplied for a T24 ceiling construction.

Heating and cooling ceiling modules for a T24 grid ceiling

As flush lay-in metal cassettes for a visible T24 track supporting structure for heating and cooling, in a perforated / smooth version, for removing sensitive heat loads in an approximate ratio of 60% via radiation and 40% via convection.

A minimum suspension height of 350 mm (bottom edge of bare ceiling to upper edge of heating and cooling ceiling) is required. Components and additional loads must be suspended separately from the bare ceiling.

Tolerances and quality requirements according to TAIM e.V.

Hydraulic pipework for the individual metal cassettes as per the room-specific calculations. The Tichelmann ring is installed on the room side by others on the building site. Hoses connected to the outlet connectors of the pipework on the room side by 12 mm outlets.

Zehnder Alumline active
Metal ceiling panels according to the TAIM e.V. quality standard. Version : November 1998, Material: galvanised sheet steel, minimum thickness 0.6 mm, lip on longitudinal side in line with static requirements. Surface similar to RAL ... (9016), perforated, hole pattern RD - L30 (diameter 1.5 mm – open cross section 22% - 45°); surrounding non-perforated edge, approx. 10 mm wide.

A special heat-conducting acoustic fleece has been force-fitted to the back, without pleats, to improve sound absorption. The supplier must present test results to prove that sound absorption is achieved in conjunction with the metal ceiling panels on offer. Sound absorption measured according to EN ISO 345.

Inserted thermal insulation as a heat and sound-absorbing insulating layer, based on rock wool, flame-resistant, classified as Euroclass B1 and tested to DIN 13501-1. Placed over the entire copper pipe register.

Factory-integrated copper pipe register (Ø 12 mm) with large-area aluminium heat-conducting profiles in the shape of the module with flow and return connections. Only pipes (Ø 12 mm) made of copper may be used for air-conditioning and refrigeration technology according to DIN EN 12735-2. The copper pipe registers are permanently glued into the linear panels, making direct contact with the acoustic fleece, at the factory using a special adhesive, thus ensuring optimum thermal transfer. The centre distance and the number of heat-conducting profiles must be selected so that the given technical specification can be achieved.

The climate ceilings must be hydraulically connected so there is a maximum pressure loss of approx. 25 kPa per control circuit.

Nominal cooling capacity (10 K):	107 W/m² according to EN 14240
Nominal thermal output (15 K):	117 W/m² according to EN 14037

Degree of activation stands at ... %

All given performance values must be verified by an official test report from an independent institute.

Module size of the long panel active: ... mm x ... mm Standard width 595 mm (600 mm)
Standard width 620 mm (625 mm)
Material: galvanised sheet steel, similar to RAL ... (9016), perforated or smooth

Maximum operating temperature:	83 °C
Maximum operating pressure:	10 bar

In line with the pressure loss stated above, a corresponding number of radiant panel systems must be connected in series, then connected to the distribution pipe in parallel.

Examples:

Cooling power rating	
Room temperature:	26 °C
Cold water supply:	16 °C
Cold water return:	19 °C
Cooling capacity with	
spec. cooling capacity smooth/perf.:	approx. 72/67 W/m²
	compliant with EN 14240

Heating power rating	
Room temperature:	20 °C
Hot water supply:	34 °C
Hot water return:	30 °C
Thermal output with	
spec. cooling capacity smooth/perf.:	approx. 74/71 W/m²
	compliant with EN 14037

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.

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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

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25k trained customers per year

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

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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 ceiling systems are energy efficient and versatile to fit multiple environments.

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

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