

RADIATING CEILING PANELS

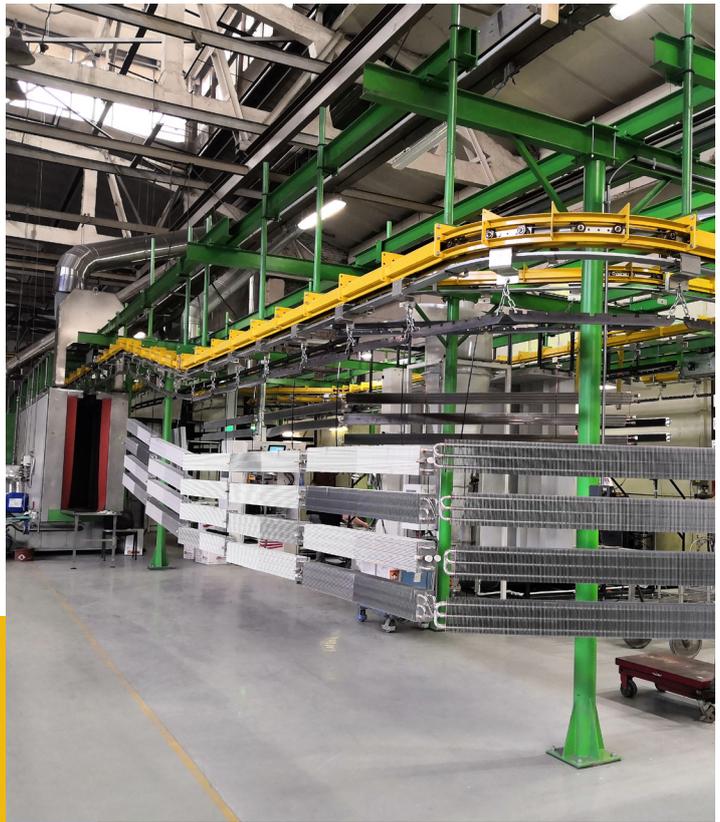
# Ecoterm Pro

TECHNICAL  
PAMPHLET

2024



Isoterm Firm JSC has been on the hot-water heating systems market since 1990. Isoterm Firm's full production cycle plant manufactures 43 series and 284 models of convector heaters, as well as provides over 1 400 000 various sizes and connection type options. The production of the heating appliances is carried out using state of the art high-performance equipment. Our company has received the ISO 9001 international standard certificate.



The active quality system ensures control over each and every step of the technological process, from designing the devices and procuring materials and components to shipment and warranty service.

The thermotechnical characteristics of our heating devices are confirmed through tests in certified laboratories of the Russian Federation, the Czech Republic and Germany.

Our appliances are represented in such design and engineering software as Autodesk Revit, MagiCad, Auditor C.O., etc. BIM models, as well as the entirety of the technical documentation are available for download on our official website: [www.isoterm.ru](http://www.isoterm.ru).

The Ecoterm Pro radiating panels have a 4-year warranty period.

All products manufactured have the mandatory certificate of compliance with GOST 31311 «Heating devices. General specifications».

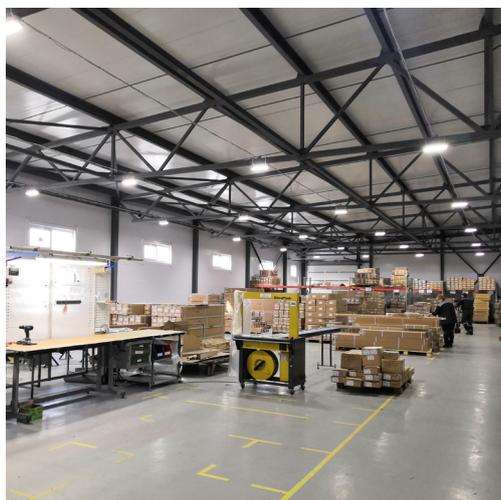
Our company boasts a wide dealer network across 33 regions of the Russian federation, as well as the CIS countries.

Order fulfillment time starts from 14 days.

Flexible price policy.

Technical specialists' visit to the site is possible per request.

Manufacturing heating appliances according to individual parameters, in any color of customer's choice, with or without a thermostatic valve is possible.





# ECOTERM PRO RADIATING CEILING PANELS

***Ecoterm Pro radiating ceiling heating panels are used for heating and / or cooling large-area buildings and structures - production and assembly halls, warehouses, car dealerships, gyms, supermarkets, etc.***

Radiating ceiling panels are incorporated into hot-water heating systems and use the natural principle of solar thermal energy.

The thermal flow passes through the air and heats the object surfaces within the radiation area. Subsequently, the objects heated re-radiate heat, releasing it into the air through the principle of convection. On top of this, the heat is released slowly, continuously and is dis-

tributed evenly, without causing drafts and dust streams, which, importantly, makes heating the area with the use of radiating ceiling panels feel especially comfortable to the people working there. Thermal radiation accounts for 60% of the heating performance of the Ecoterm Pro radiating ceiling panels.

These devices are optimally suited for heating large areas, since the heat is concentrated

in the necessary areas, for example, those used by people visiting the sports, shopping and exhibition facilities, production and warehouse areas, etc. This is especially relevant in situations where it is necessary to create several work zones with different climatic comfort conditions in one large area.

The temperature felt by a person approximately corresponds to the average value between the air temperature

and that of the surrounding surfaces. Heat transfer carried out by floor, ceiling and / or wall surfaces in a large area allows to lower the air temperature by 2 - 4 °C without compromising the comfort.

Radiating ceiling panels are much more energy efficient than conventional heating systems. A comfortable indoor microclimate can be achieved even at a lower air temperature in the work area, reducing energy consumption required for heating the coolant. Moreover, due to their functional principle, heating an area with the use of radiating ceiling panels helps avoid overheating the upper air layer of the room, which further reduces heat loss through the building envelope.

Furthermore, the amount of energy saving increases in proportion to the size of the premises heated. Therefore, in spaces of greater height, i.e. hangars, museums, production halls, sports complexes,

etc., energy savings can reach 40-50%.

Ecoterm Pro radiating ceiling panels are quick response, which speaks for itself and allows a faster response to changes in temperature conditions and swifter transition into operating mode, which is achieved, among other things, thanks to the small amount of heat-transfer agent used in the appliances.

Ecoterm Pro ceiling heat-

ing panels are designed for use in heating systems with heat-transfer agent temperatures up to 120 °C and a maximum operating pressure of 12 bar, with the coolant being water, that reaches the necessary temperature via the heating systems, boilers, thermal pumps, etc. It is allowed to use non-freezing liquids based on ethylene glycol and propylene glycol with a glycol content of no more than 50% as a heat-transfer medium.

**// The scope of application of radiating heating systems, permissible temperatures of emitters, as well as the values of permissible surface density of radiant heat flux for radiant heating of permanent work stations are established in "SP 60.13330.2020. Regulations. Heating, ventilation and air conditioning. SNiP 41-01-2003".**



# ECOTERM PRO

The versatility, simplicity and mounting variability, as well as the light weight of the ceiling panels allow them to be used in a wide variety of areas. Additionally, the installation of the appliances is possible even at later stages of construction, as well as in already functioning areas without interfering with the work and the processes that take place in the space.

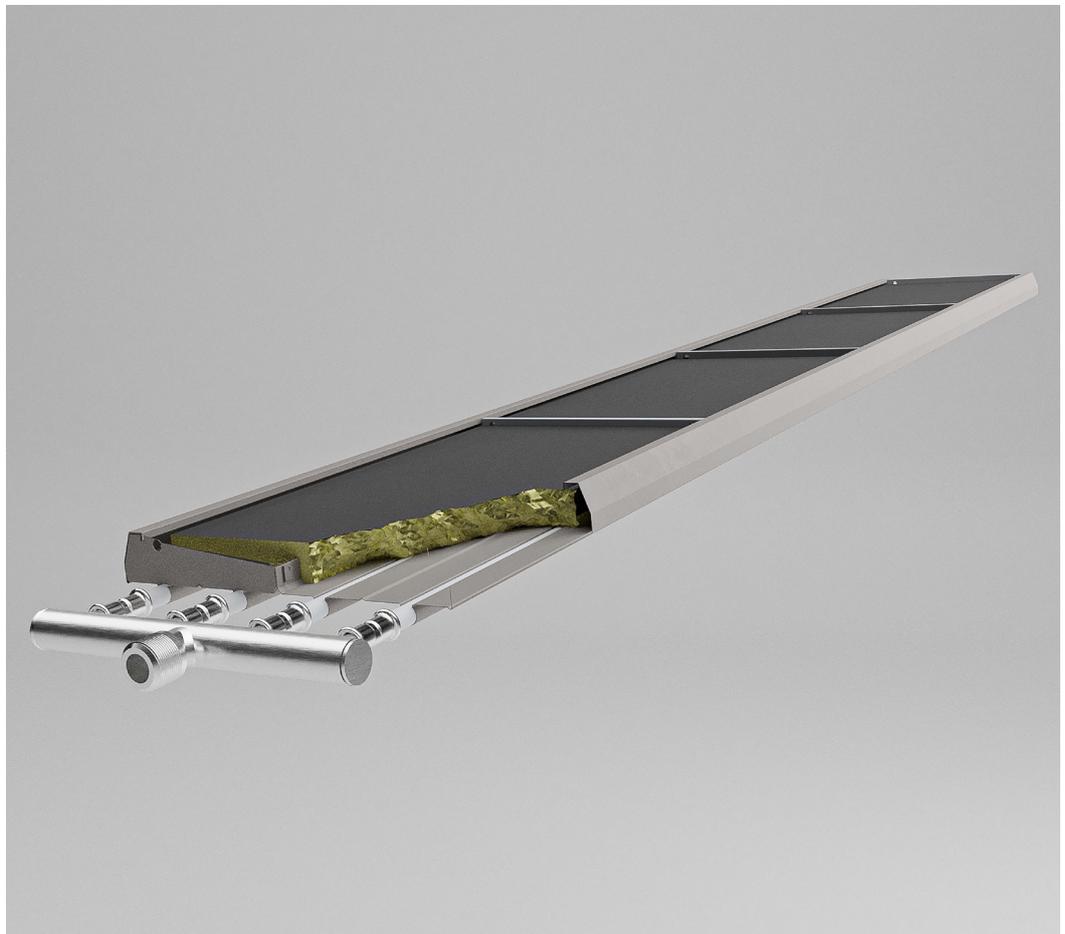
Moreover, due to the simplicity of installation and the modular system implemented in the Ecoterm Pro radiating ceiling panels, replanning or any other changes in operating conditions and / or heat demand will not pose a problem, since it is possible to quickly change the configuration of the heating system at minimal cost.

Isoterm Firm JSC also offers manufacturing ceiling heating panels according to the customer's individual parameters, which allows to take into account all the nuances of non-standard rooms.

Where connecting to a source of cold and condensation preventing automatics is possible, the Ecoterm Pro ceiling heating system can be used for both heating during the colder seasons and for cooling the air during the hotter months.

Ecoterm Pro radiating ceiling panels are cost- and energy-efficient, fireproof, harmless to people, silent, odorless, nor do they raise dust or burn oxygen.

Among the advantages are a long service life, no maintenance necessary during its entirety, as well as the versatility of the appliance. Without taking up useful space in the room, radiating ceiling panels allow the walls and the floor to remain free.



# ECOTERM PRO RADIATING CEILING PANEL DESIGN

*The body of the Ecoterm Pro radiating ceiling panels is made of galvanized steel plates, shaped into a specialized profile and coated with a high-quality polymer enamel. The pipes pressed into the body of the appliances have galvanized surfaces and are protected with heat-insulated material on top.*

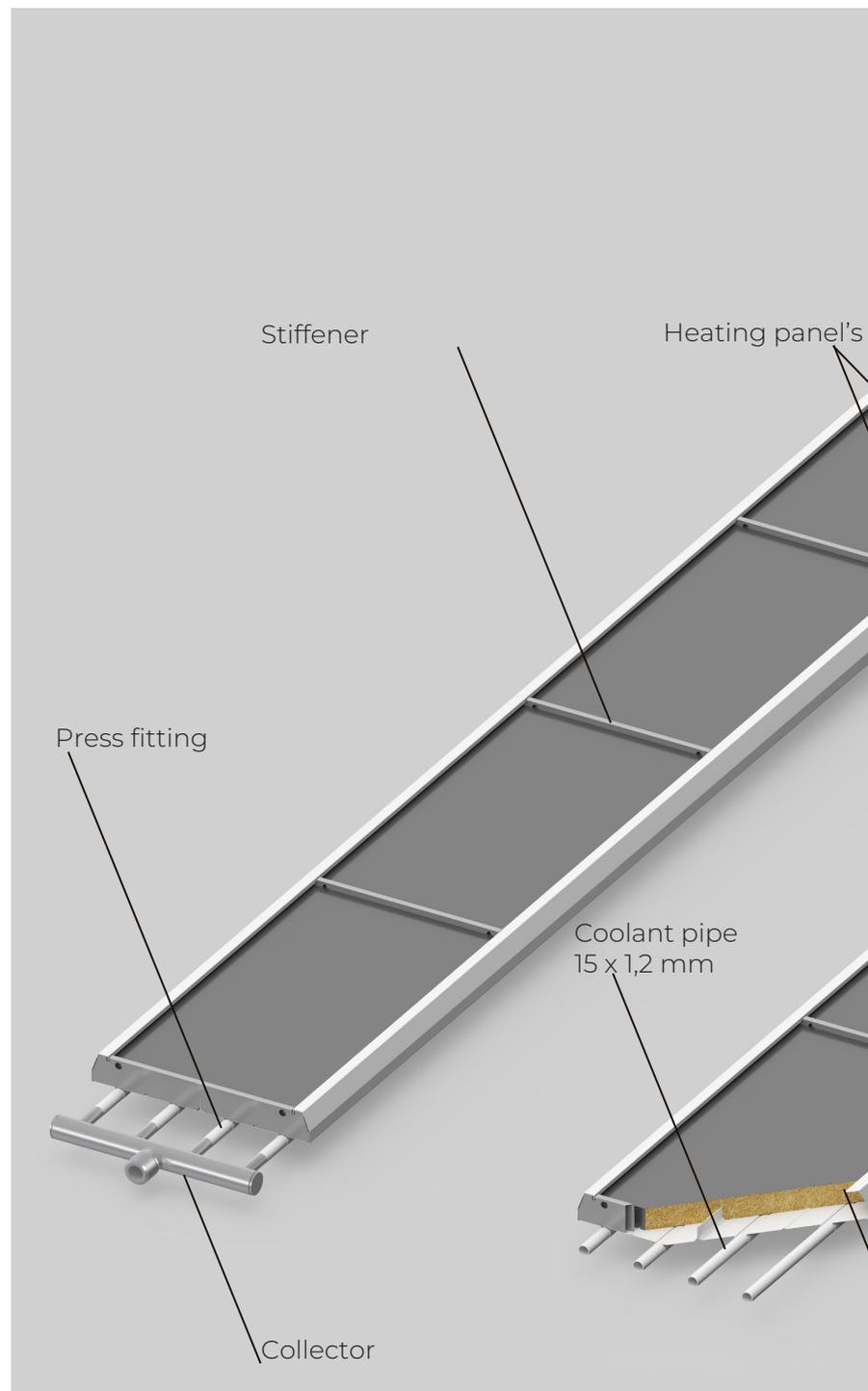
The heating panel consists of a body - a profiled steel heat-transfer surface - to which steel pipes are connected by pressing, guaranteeing maximum heat transfer. The profile of the heat-transfer surface replicates the shape of the pipes conducting the heat-transfer agent.

In contrast to the analogues, the body of the Ecoterm Pro radiating ceiling panel is solid, not having welds or other joints, which provides additional structural stiffness.

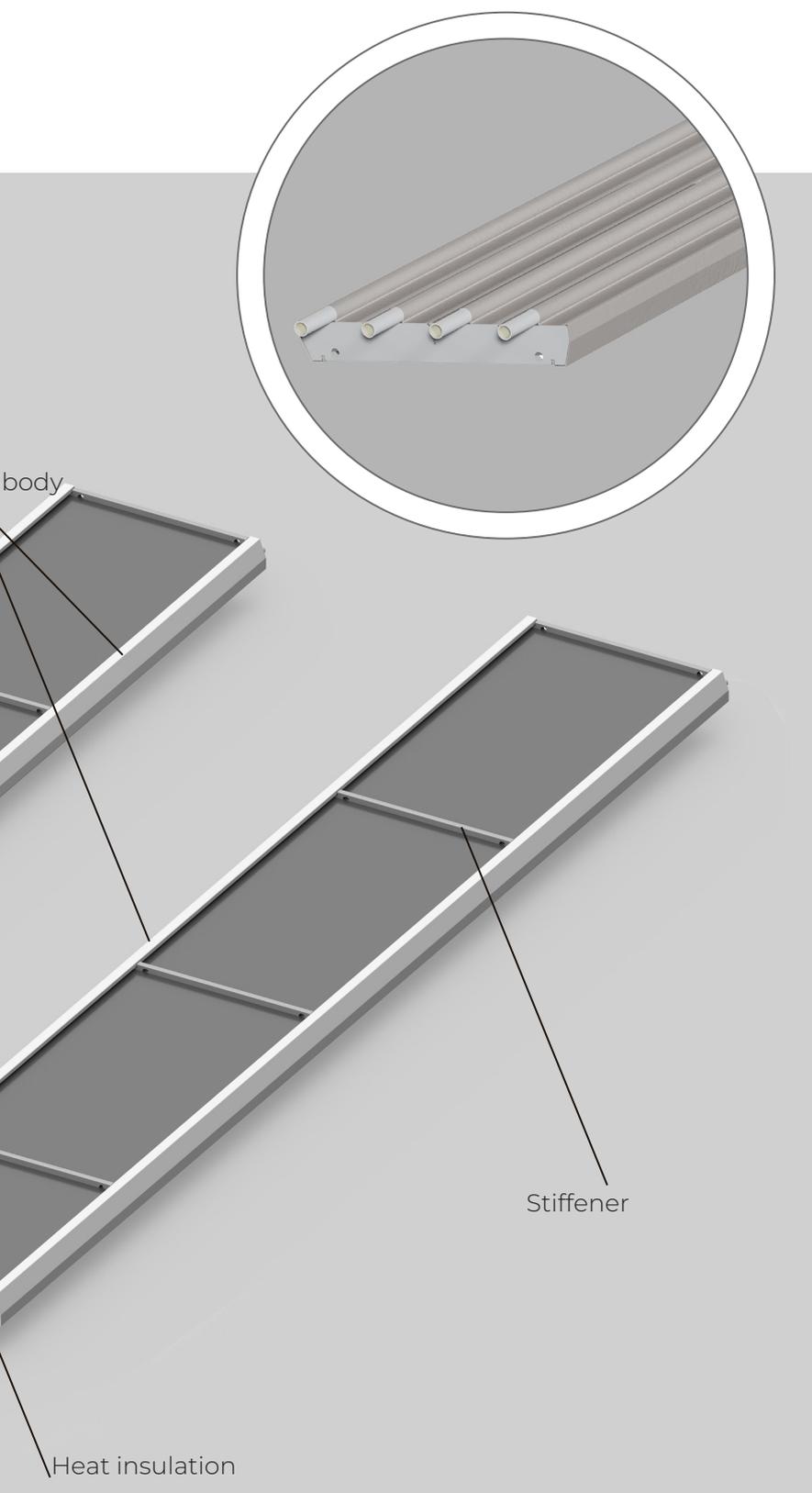
In addition, due to the side bevels and ridges that prevent convective currents, the unique design of the ceiling panel body allows to eliminate the convective component as much as possible and direct more useful radiant thermal energy to the work area.

It also allows natural dust flows to be reduced to a minimum, which is an important factor for the health and comfort of the people in the work area.

Another advantage of the Ecoterm Pro radiating ceiling panels is that the surface area of the body, that covers the heat-transfer medium conducting pipes pressed into it, is larger than that of their analogues, which provides a more vast heat-transfer area and more reliable fixation of the coolant pipe to the panel body. Thus, compared to their analogues, Ecoterm Pro panels have increased efficiency, which does not change throughout their entire service life.



The unique design of the Ecoterm Pro radiating ceiling panels has a number of significant advantages, distinguishing it from well-known analogues, increasing its energy efficiency, reliability and operational safety.



An additional feature distinguishing the Ecoterm Pro radiating ceiling panels from their analogues is the extra stiffeners necessary to protect the panel body, which is suspended from several points, from temporary deformation, such as “sagging”, which can negatively affect the appliance’s efficiency.

The collectors are made of circular pipes and are equipped with the tubes and plugs necessary for connection.

Profiling the heat-transferring surface serves to increase the stiffness of the panel, which allows the panel suspension axes to be located at a distance of up to 3000 mm from each other without compromising the stability of the structure.

The upper flanging of the heat-transfer surface also increases the static stiffness of the panel. In addition, it serves to secure thermal insulation.

The heat insulation is located on the back of the appliance and allows to direct the radiant flux down into the heated area, as well as help absorb noise.

# ECOTERM PRO radiating ceiling panels symbol structure

## Ceiling heating panel Ecoterm Pro MPO 30.200

### Type

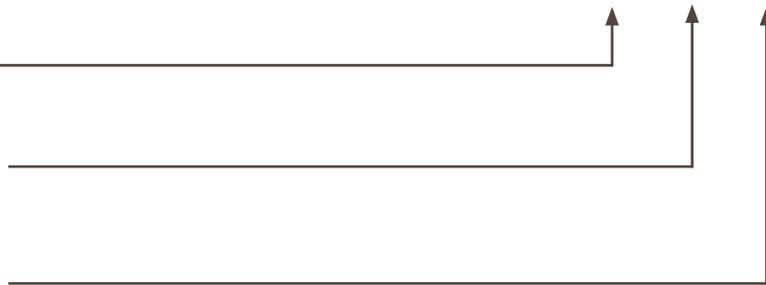
MPO – Ceiling heating module

### Panel width, cm

30, 66, 102, 138

### Panel length, cm

100, 200, 300, 400, 500, 600, 700



## Default set

Ecoterm Pro radiating ceiling panels are supplied packed in film on pallets with wooden strapping and cardboard inserts. The default set includes a ceiling heating module with pre-installed heat-insulation, consisting of a front panel coated with polymer enamel, four 15 mm coolant pipes with galvanized surfaces, and stiffeners. The length of the panel and coolant pipes, as well as the number of stiffeners included in the set, is determined according to the selected model.

## Optional equipment\*

- Collector
- Decorative panel for the module connections
- Press fitting
- Multi-axis
- Air bleeders
- Installation kit, including the parts necessary for mounting the modules on the ceiling
- Thermostatic valves
- Automation for heat flux regulation

\* The quantity, models and type of additions to the default set are determined according to the order.

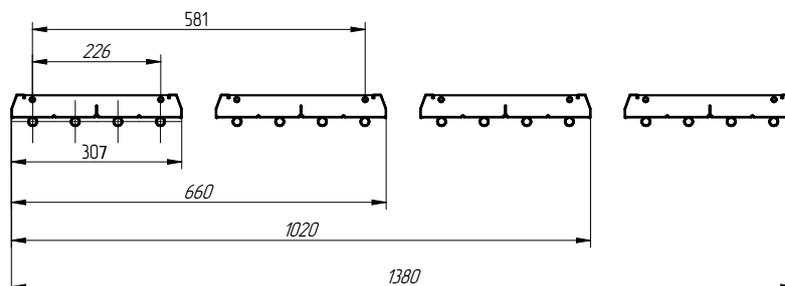
## Mass of ceiling heating system

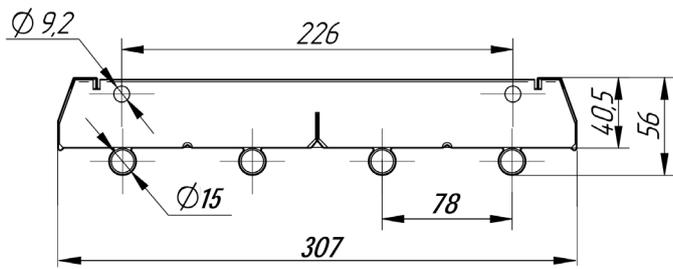
		Width, mm	307	660	1020	1380
Mass without heat-transfer fluid	Panel	kg/m	3,6	7,1	10,7	14,3
	Collector	kg	0,8	1,6	2,4	3,2
Mass with heat-transfer fluid	Panel	kg/m	4,1	8,2	12,3	16,4
	Collector	kg	1,4	2,7	4,0	5,3

# ECOTERM PRO

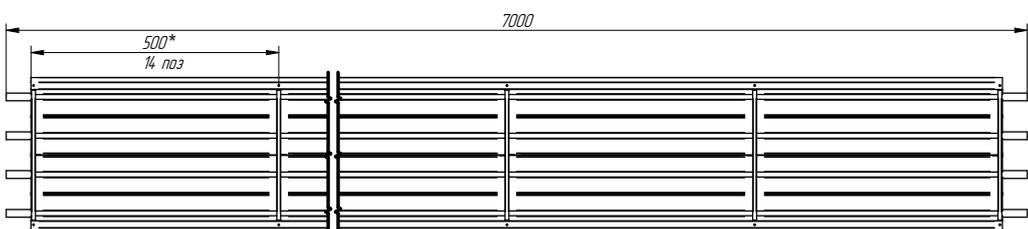
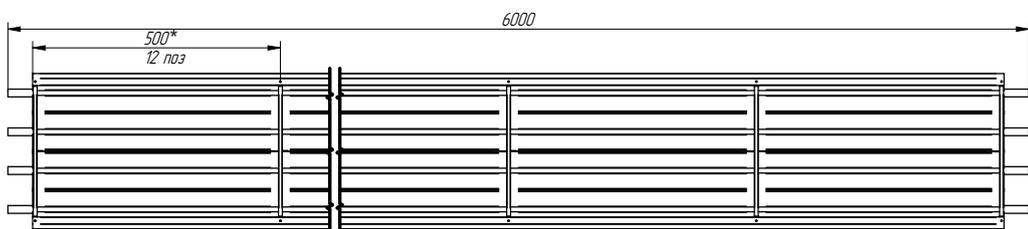
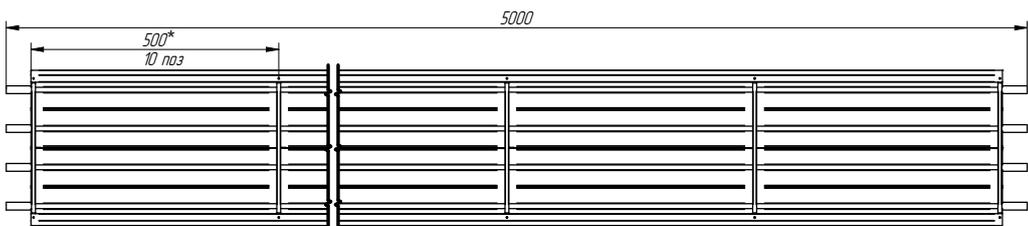
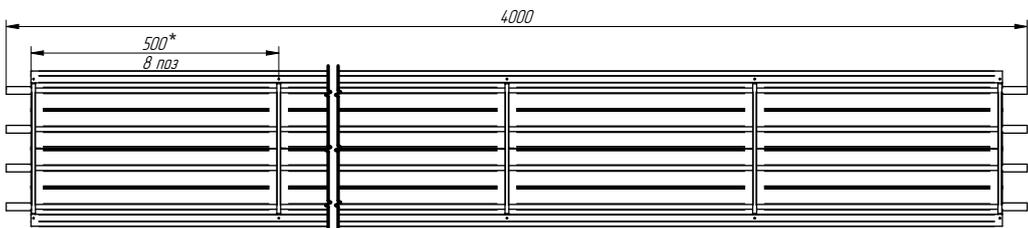
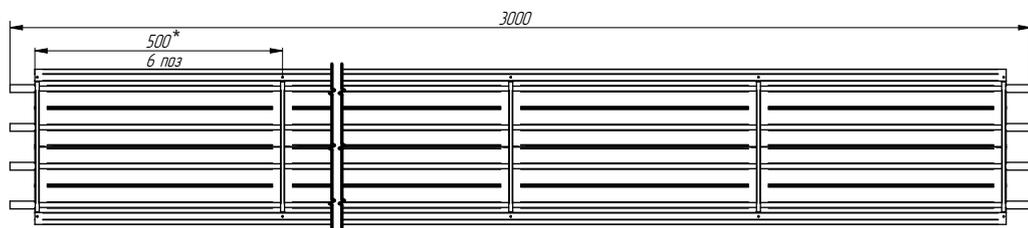
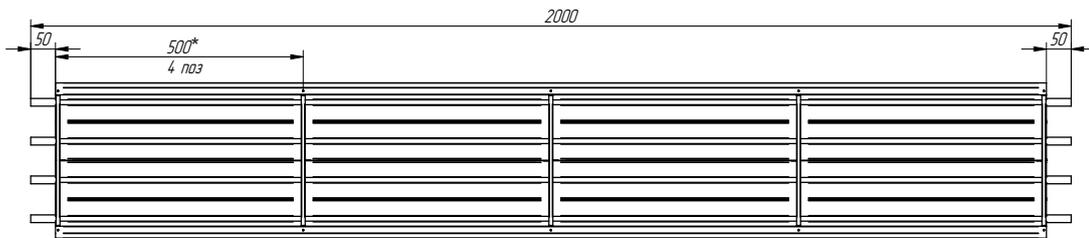
## radiating ceiling panels dimensions

Panel type	Dimensions (width * height * length)	Number of rows
<b>Single row system</b>		
MPO 30.1000	307x56x1000	1
MPO 30.2000	307x56x2000	1
MPO 30.3000	307x56x3000	1
MPO 30.4000	307x56x4000	1
MPO 30.5000	307x56x5000	1
MPO 30.6000	307x56x6000	1
MPO 30.7000	307x56x7000	1
<b>Double row system</b>		
MPO 66.1000	660x56x1000	2
MPO 66.2000	660x56x2000	2
MPO 66.3000	660x56x3000	2
MPO 66.4000	660x56x4000	2
MPO 66.5000	660x56x5000	2
MPO 66.6000	660x56x6000	2
MPO 66.7000	660x56x7000	2
<b>Triple row system</b>		
MPO 102.1000	1020x56x1000	3
MPO 102.2000	1020x56x2000	3
MPO 102.3000	1020x56x3000	3
MPO 102.4000	1020x56x4000	3
MPO 102.5000	1020x56x5000	3
MPO 102.6000	1020x56x6000	3
MPO 102.7000	1020x56x7000	3
<b>Quadruple row system</b>		
MPO 138.1000	1380x56x1000	4
MPO 138.2000	1380x56x2000	4
MPO 138.3000	1380x56x3000	4
MPO 138.4000	1380x56x4000	4
MPO 138.5000	1380x56x5000	4
MPO 138.6000	1380x56x6000	4
MPO 138.7000	1380x56x7000	4





Number of stiffeners	
Panel length	Number
1000 mm	3
2000 mm	5
3000 mm	7
4000 mm	9
5000 mm	11
6000 mm	13
7000 mm	15



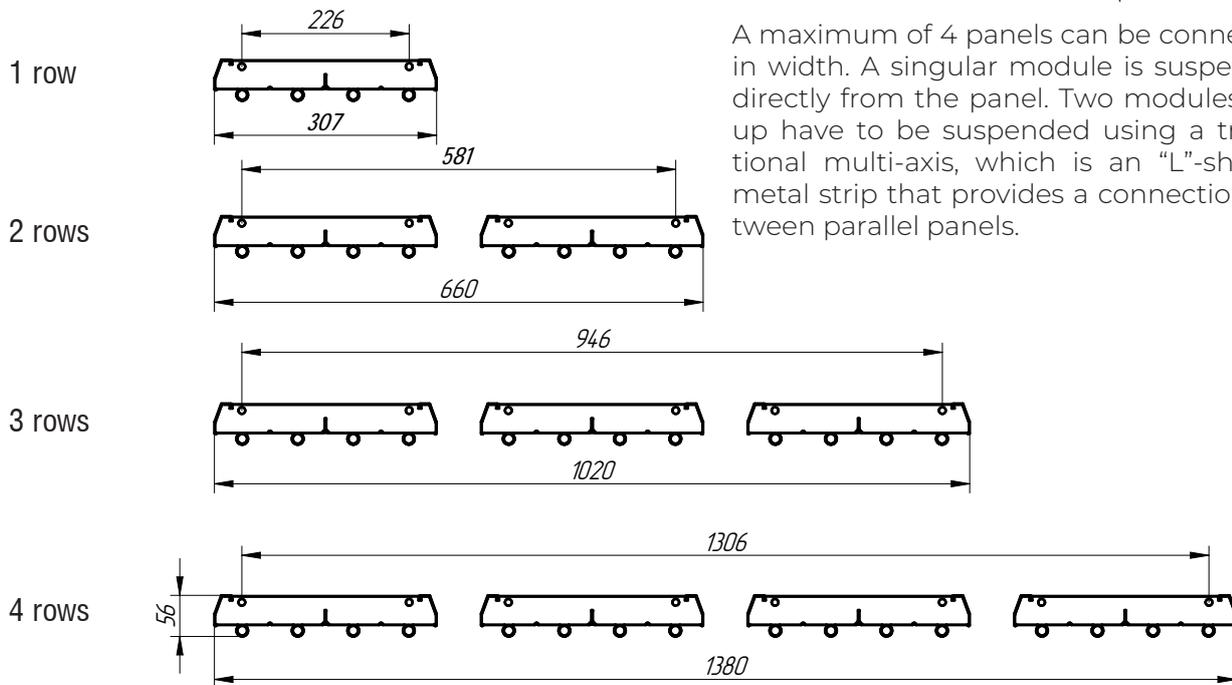
\*Size for reference

# ECOTERM PRO radiating ceiling panel connection options

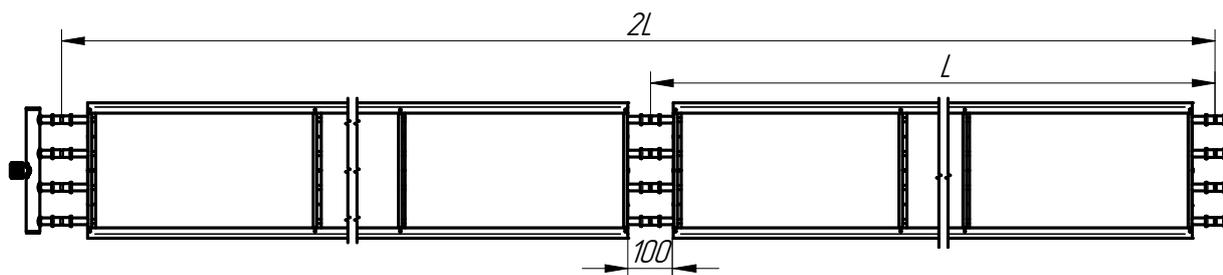
## Parallel connection

The panels are modules with a standard width of 307 mm and a length of 1 to 7 m with intervals of 1 m. Depending on what is needed in a particular situation, both parallel and series connection are possible.

A maximum of 4 panels can be connected in width. A singular module is suspended directly from the panel. Two modules and up have to be suspended using a transitional multi-axis, which is an "L"-shaped metal strip that provides a connection between parallel panels.



## Series connection

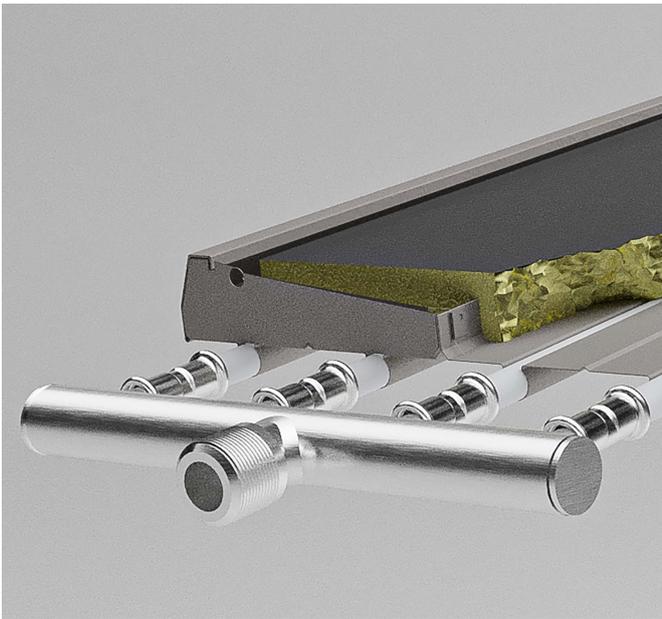


The panels can be connected in series to form a structure of almost any required length. In case of series connection, the steel pipes of the water circuit are connected using press fittings, supplied as optional equipment, all of which is discussed when placing the order.

Using a crimp fitting allows to get a reliable and tight joint that does not require any additional sealing. There is no need to monitor them during pipeline operation.

The connection is made using a special tool, without complex technical devices or welding, which makes this method cost-efficient and quick, as well as allows for a significantly less complex installation, that does not require special skills.

The joints can be obscured with the use of decorative covers.

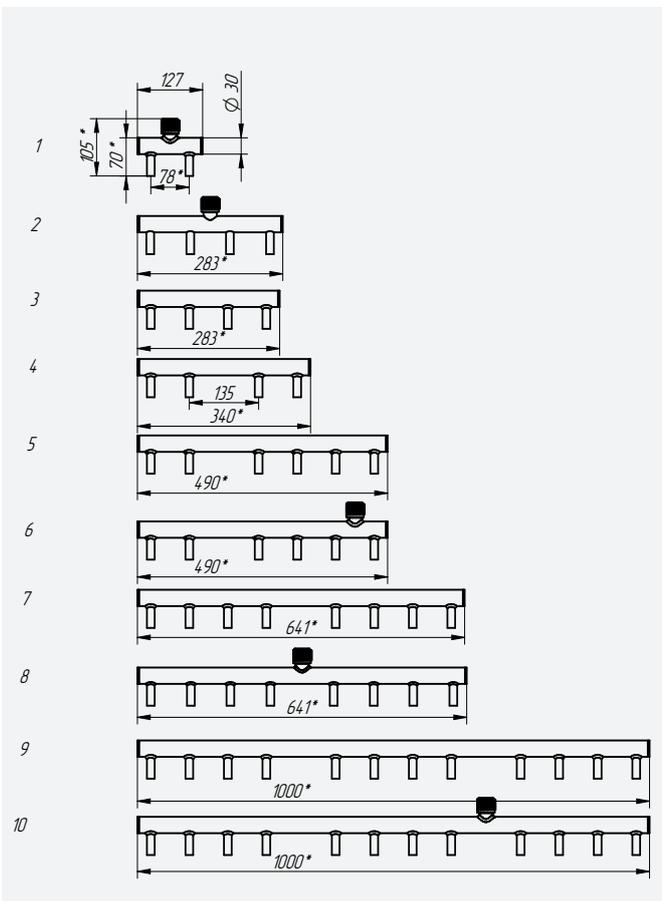


Depending on the customer's request, open and closed collectors with varying numbers of connecting tubes of the required diameter are used to connect the panels.

The variability of collector connections makes different hydraulic connection options possible.

The collectors are made of steel, have a 1" external thread at the point of connection and a 1/2" internal thread at the end for the air bleeder.

Air bleeders are installed on each collector during the on-site assembly of the modules. The air bleeders are not included in the default set and must be ordered separately. It is possible to install a manual or an automatic air bleeder.



* Size for reference		
Nº	Designation	Name
1	KP2	Open collector for 2 pipes
2	KP4	Open collector for 4 pipes
3	KG4	Closed collector for 4 pipes
4	KG4R	Closed collector for 4 pipes, extended
5	KG6R	Closed collector for 6 pipes, extended
6	KP6R	Open collector for 6 pipes, extended
7	KG8	Closed collector for 8 pipes
8	KP8	Open collector for 8 pipes
9	KG12	Closed collector for 12 pipes
10	KP12	Open collector for 2 pipes

## ECOTERM PRO radiating ceiling panels' heat capacity

$\Delta t$	Power, W/m	Width, mm	Power according to panel length, W						
			1000 mm	2000 mm	3000 mm	4000 mm	5000 mm	6000 mm	7000 mm
80	388	307	388	775	1163	1550	1938	2325	2713
78	377	307	377	754	1131	1507	1884	2261	2638
76	366	307	366	732	1099	1465	1831	2197	2564
74	356	307	356	711	1067	1422	1778	2134	2489
72	345	307	345	690	1035	1380	1725	2070	2415
70	335	307	335	669	1004	1338	1673	2007	2342
68	324	307	324	648	972	1296	1620	1944	2268
66	313	307	313	627	940	1254	1567	1881	2194
64	303	307	303	606	909	1212	1515	1818	2121
62	293	307	293	585	878	1171	1463	1756	2048
60	282	307	282	564	847	1129	1411	1693	1976
58	272	307	272	544	816	1088	1359	1631	1903
56	262	307	262	523	785	1046	1308	1569	1831
55	256	307	256	513	769	1026	1282	1539	1795
54	251	307	251	503	754	1005	1257	1508	1759
52	241	307	241	482	723	964	1205	1446	1687
50	231	307	231	462	693	923	1154	1385	1616
48	221	307	221	441	662	883	1104	1324	1545
46	211	307	211	421	632	842	1053	1264	1474
44	201	307	201	401	602	802	1003	1203	1404
42	191	307	191	381	572	762	953	1143	1334
40	181	307	181	361	542	722	903	1083	1264
38	171	307	171	341	512	682	853	1024	1194
36	161	307	161	321	482	643	804	964	1125
34	151	307	151	302	453	604	755	906	1057
32	141	307	141	282	424	565	706	847	988
30	131	307	131	263	394	526	657	789	920
28	122	307	122	244	366	487	609	731	853
26	112	307	112	225	337	449	562	674	786
24	103	307	103	206	308	411	514	617	720
22	93	307	93	187	280	374	467	561	654
20	84	307	84	168	252	336	421	505	589
19	79	307	79	159	238	318	397	477	556
18	75	307	75	150	225	300	374	449	524
17	70	307	70	141	211	281	352	422	492
16	66	307	66	132	197	263	329	395	460
15	61	307	61	123	184	245	306	368	429
14	57	307	57	114	170	227	284	341	397
13	52	307	52	105	157	209	262	314	366
12	48	307	48	96	144	192	240	287	335
11	44	307	44	87	131	174	218	261	305

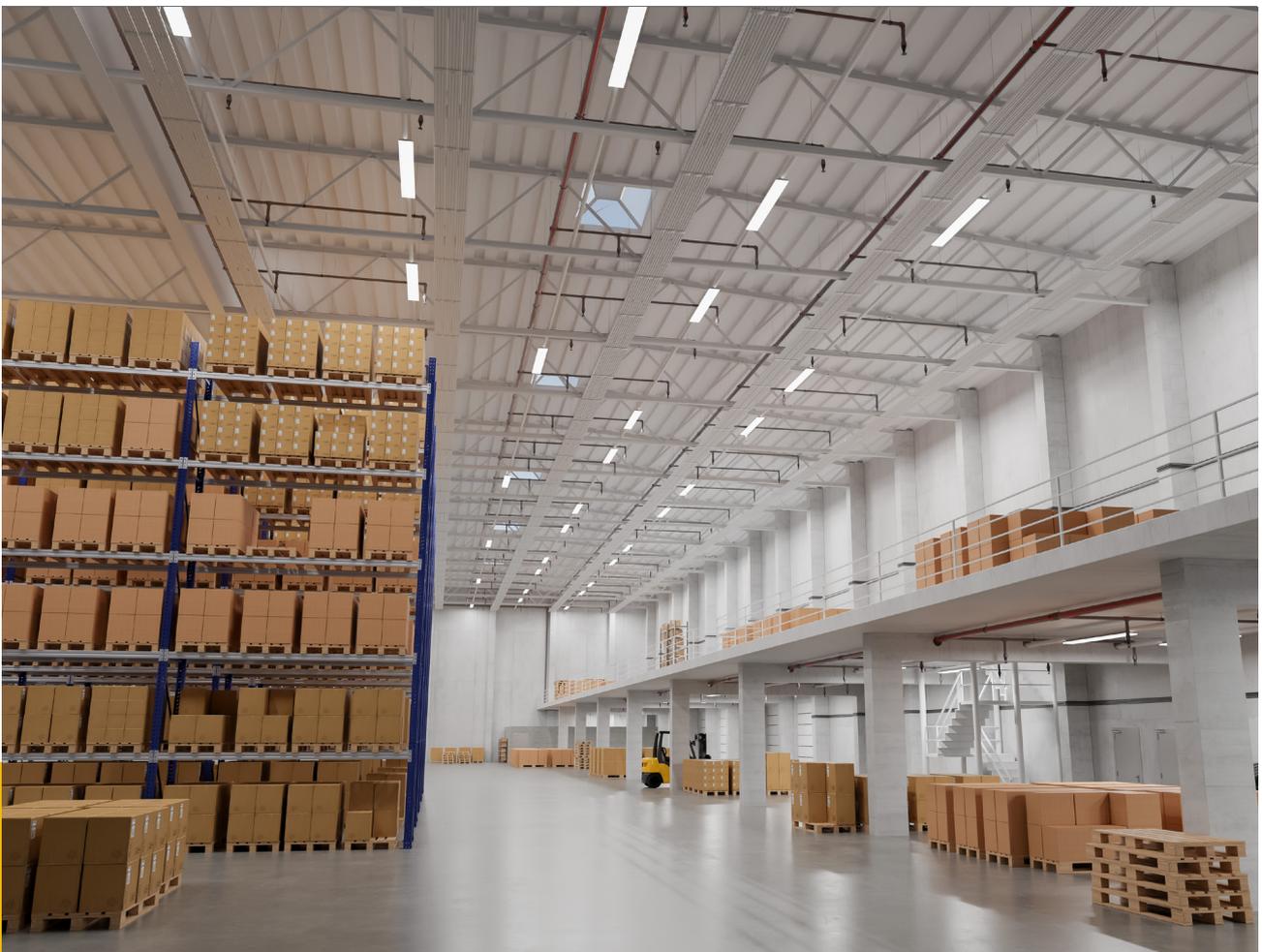
$\Delta t$	Power, W/m	Width, mm	Power according to panel length, W						
			1000 mm	2000 mm	3000 mm	4000 mm	5000 mm	6000 mm	7000 mm
10	39	307	39	78	118	157	196	235	274
9	35	307	35	70	105	140	174	209	244
8	31	307	31	61	92	123	153	184	214
7	26	307	26	53	79	106	132	159	185
6	22	307	22	45	67	89	112	134	156
5	18	307	18	37	55	73	91	110	128
80	775	660	775	1550	2325	3100	3875	4650	5425
78	754	660	754	1507	2261	3015	3769	4522	5276
76	732	660	732	1465	2197	2930	3662	4395	5127
74	711	660	711	1422	2134	2845	3556	4267	4979
72	690	660	690	1380	2070	2760	3450	4141	4831
70	669	660	669	1338	2007	2676	3345	4014	4683
68	648	660	648	1296	1944	2592	3240	3888	4536
66	627	660	627	1254	1881	2508	3135	3762	4389
64	606	660	606	1212	1818	2424	3030	3637	4243
62	585	660	585	1171	1756	2341	2926	3512	4097
60	564	660	564	1129	1693	2258	2822	3387	3951
58	544	660	544	1088	1631	2175	2719	3263	3806
56	523	660	523	1046	1569	2093	2616	3139	3662
55	513	660	513	1026	1539	2051	2564	3077	3590
54	503	660	503	1005	1508	2010	2513	3016	3518
52	482	660	482	964	1446	1929	2411	2893	3375
50	462	660	462	923	1385	1847	2309	2770	3232
48	441	660	441	883	1324	1766	2207	2649	3090
46	421	660	421	842	1264	1685	2106	2527	2948
44	401	660	401	802	1203	1604	2005	2406	2807
42	381	660	381	762	1143	1524	1905	2286	2667
40	361	660	361	722	1083	1444	1805	2166	2528
38	341	660	341	682	1024	1365	1706	2047	2389
36	321	660	321	643	964	1286	1607	1929	2250
34	302	660	302	604	906	1207	1509	1811	2113
32	282	660	282	565	847	1129	1412	1694	1977
30	263	660	263	526	789	1052	1315	1578	1841
28	244	660	244	487	731	975	1219	1462	1706
26	225	660	225	449	674	898	1123	1348	1572
24	206	660	206	411	617	823	1028	1234	1440
22	187	660	187	374	561	747	934	1121	1308
20	168	660	168	336	505	673	841	1009	1178
19	159	660	159	318	477	636	795	954	1113
18	150	660	150	300	449	599	749	899	1048
17	141	660	141	281	422	563	703	844	984
16	132	660	132	263	395	526	658	789	921
15	123	660	123	245	368	490	613	735	858
14	114	660	114	227	341	454	568	681	795

$\Delta t$	Power, W/m	Width, mm	Power according to panel length, W						
			1000 mm	2000 mm	3000 mm	4000 mm	5000 mm	6000 mm	7000 mm
13	105	660	105	209	314	419	523	628	732
12	96	660	96	192	287	383	479	575	671
11	87	660	87	174	261	348	435	522	609
10	78	660	78	157	235	313	392	470	549
9	70	660	70	140	209	279	349	419	488
8	61	660	61	123	184	245	306	368	429
7	53	660	53	106	159	212	264	317	370
6	45	660	45	89	134	179	223	268	312
5	37	660	37	73	110	146	183	219	256
80	1163	1020	1163	2325	3488	4650	5813	6976	8138
78	1131	1020	1131	2261	3392	4522	5653	6784	7914
76	1099	1020	1099	2197	3296	4395	5493	6592	7691
74	1067	1020	1067	2134	3201	4267	5334	6401	7468
72	1035	1020	1035	2070	3105	4141	5176	6211	7246
70	1004	1020	1004	2007	3011	4014	5018	6021	7025
68	972	1020	972	1944	2916	3888	4860	5832	6804
66	940	1020	940	1881	2821	3762	4702	5643	6583
64	909	1020	909	1818	2727	3637	4546	5455	6364
62	878	1020	878	1756	2634	3512	4389	5267	6145
60	847	1020	847	1693	2540	3387	4234	5080	5927
58	816	1020	816	1631	2447	3263	4078	4894	5710
56	785	1020	785	1569	2354	3139	3924	4708	5493
55	769	1020	769	1539	2308	3077	3847	4616	5385
54	754	1020	754	1508	2262	3016	3770	4523	5277
52	723	1020	723	1446	2170	2893	3616	4339	5062
50	693	1020	693	1385	2078	2770	3463	4156	4848
48	662	1020	662	1324	1986	2649	3311	3973	4635
46	632	1020	632	1264	1895	2527	3159	3791	4423
44	602	1020	602	1203	1805	2406	3008	3610	4211
42	572	1020	572	1143	1715	2286	2858	3429	4001
40	542	1020	542	1083	1625	2166	2708	3250	3791
38	512	1020	512	1024	1536	2047	2559	3071	3583
36	482	1020	482	964	1447	1929	2411	2893	3376
34	453	1020	453	906	1358	1811	2264	2717	3170
32	424	1020	424	847	1271	1694	2118	2541	2965
30	394	1020	394	789	1183	1578	1972	2367	2761
28	366	1020	366	731	1097	1462	1828	2194	2559
26	337	1020	337	674	1011	1348	1685	2021	2358
24	308	1020	308	617	925	1234	1542	1851	2159
22	280	1020	280	561	841	1121	1401	1682	1962
20	252	1020	252	505	757	1009	1262	1514	1766
19	238	1020	238	477	715	954	1192	1431	1669
18	225	1020	225	449	674	899	1123	1348	1573
17	211	1020	211	422	633	844	1055	1266	1477

$\Delta t$	Power, W/m	Width, mm	Power according to panel length, W						
			1000 mm	2000 mm	3000 mm	4000 mm	5000 mm	6000 mm	7000 mm
16	197	1020	197	395	592	789	987	1184	1381
15	184	1020	184	368	551	735	919	1103	1286
14	170	1020	170	341	511	681	852	1022	1192
13	157	1020	157	314	471	628	785	942	1099
12	144	1020	144	287	431	575	719	862	1006
11	131	1020	131	261	392	522	653	783	914
10	118	1020	118	235	353	470	588	705	823
9	105	1020	105	209	314	419	523	628	733
8	92	1020	92	184	276	368	460	552	643
7	79	1020	79	159	238	317	397	476	555
6	67	1020	67	134	201	268	335	402	469
5	55	1020	55	110	164	219	274	329	383
80	1550	1380	1550	3100	4650	6200	7751	9301	10851
78	1507	1380	1507	3015	4522	6030	7537	9045	10552
76	1465	1380	1465	2930	4395	5860	7325	8790	10254
74	1422	1380	1422	2845	4267	5690	7112	8535	9957
72	1380	1380	1380	2760	4141	5521	6901	8281	9661
70	1338	1380	1338	2676	4014	5352	6690	8028	9366
68	1296	1380	1296	2592	3888	5184	6480	7776	9072
66	1254	1380	1254	2508	3762	5016	6270	7524	8778
64	1212	1380	1212	2424	3637	4849	6061	7273	8485
62	1171	1380	1171	2341	3512	4682	5853	7023	8194
60	1129	1380	1129	2258	3387	4516	5645	6774	7903
58	1088	1380	1088	2175	3263	4350	5438	6525	7613
56	1046	1380	1046	2093	3139	4185	5232	6278	7324
55	1026	1380	1026	2051	3077	4103	5129	6154	7180
54	1005	1380	1005	2010	3016	4021	5026	6031	7036
52	964	1380	964	1929	2893	3857	4821	5786	6750
50	923	1380	923	1847	2770	3694	4617	5541	6464
48	883	1380	883	1766	2649	3531	4414	5297	6180
46	842	1380	842	1685	2527	3370	4212	5054	5897
44	802	1380	802	1604	2406	3209	4011	4813	5615
42	762	1380	762	1524	2286	3048	3810	4572	5334
40	722	1380	722	1444	2166	2889	3611	4333	5055
38	682	1380	682	1365	2047	2730	3412	4095	4777
36	643	1380	643	1286	1929	2572	3215	3858	4501
34	604	1380	604	1207	1811	2415	3019	3622	4226
32	565	1380	565	1129	1694	2259	2824	3388	3953
30	526	1380	526	1052	1578	2104	2630	3156	3682
28	487	1380	487	975	1462	1950	2437	2925	3412
26	449	1380	449	898	1348	1797	2246	2695	3145
24	411	1380	411	823	1234	1645	2056	2468	2879
22	374	1380	374	747	1121	1495	1868	2242	2616
20	336	1380	336	673	1009	1346	1682	2019	2355

$\Delta t$	Power, W/m	Width, mm	Power according to panel length, W						
			1000 mm	2000 mm	3000 mm	4000 mm	5000 mm	6000 mm	7000 mm
19	318	1380	318	636	954	1272	1590	1908	2226
18	300	1380	300	599	899	1198	1498	1797	2097
17	281	1380	281	563	844	1125	1406	1688	1969
16	263	1380	263	526	789	1052	1315	1579	1842
15	245	1380	245	490	735	980	1225	1470	1715
14	227	1380	227	454	681	908	1135	1363	1590
13	209	1380	209	419	628	837	1046	1256	1465
12	192	1380	192	383	575	766	958	1150	1341
11	174	1380	174	348	522	696	870	1045	1219
10	157	1380	157	313	470	627	784	940	1097
9	140	1380	140	279	419	558	698	837	977
8	123	1380	123	245	368	490	613	735	858
7	106	1380	106	212	317	423	529	635	741
6	89	1380	89	179	268	357	446	536	625
5	73	1380	73	146	219	292	365	438	511

**Note:** Power data was obtained through tests performed in compliance with GOST R 53583 and EN 14037-2. Nominal thermal output is determined under reference conditions (rc): temperature difference between the arithmetic mean temperature of the heat-transfer medium and the estimated air temperature in the heated room is 70 °C; coolant flow through the connecting tubes is 0.1 kg/s (360 kg/h); atmospheric pressure - 1013.3 hPa (760 mm Hg).



## ECOTERM PRO ceiling heating systems design guidelines

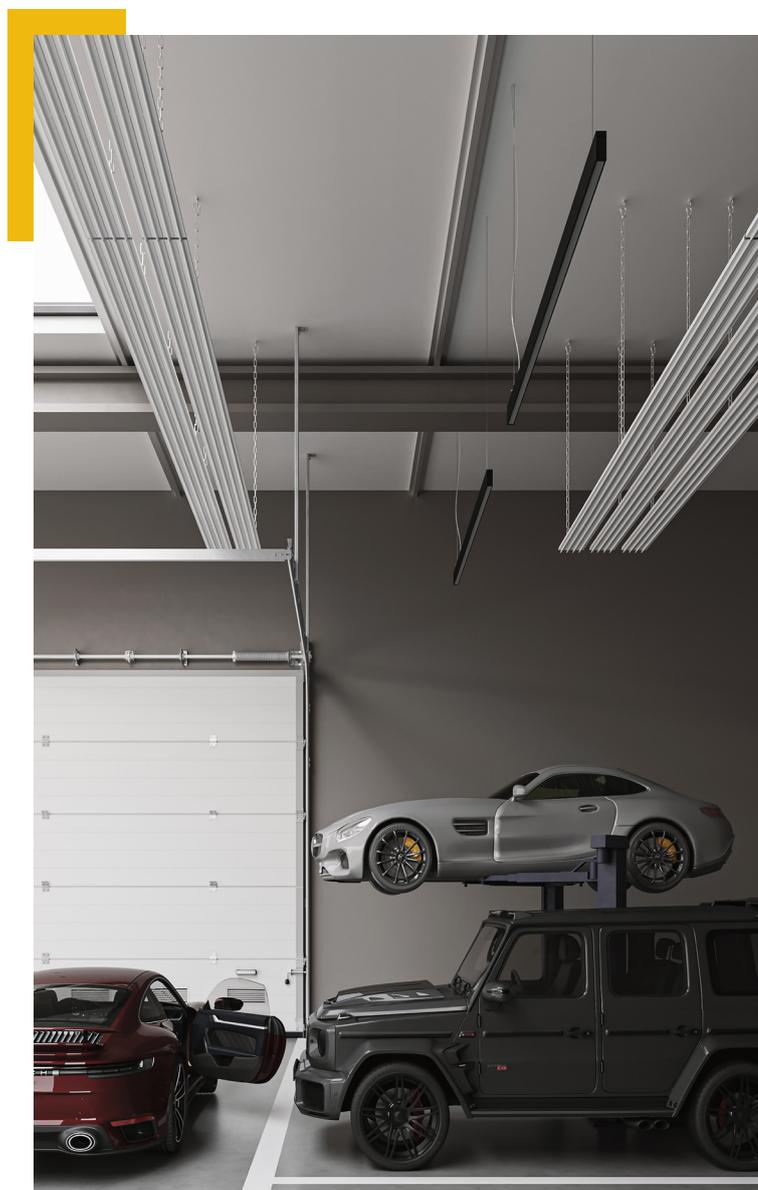
Heating systems designed using Ecoterm Pro radiating ceiling panels must be devised to ensure that at the estimate levels of the outside air for the relevant construction areas and during the heating period the internal air temperature of the room is within the permissible limits established in GOST 30494-2011 for residential and public buildings and in GOST 12.1.005-88\* for administrative, amenity and industrial buildings, as well as taking into account the requirements of SNiP 41-01-2003.

The surface temperature of the panels used for heating individual workplaces should not exceed 60 °C.

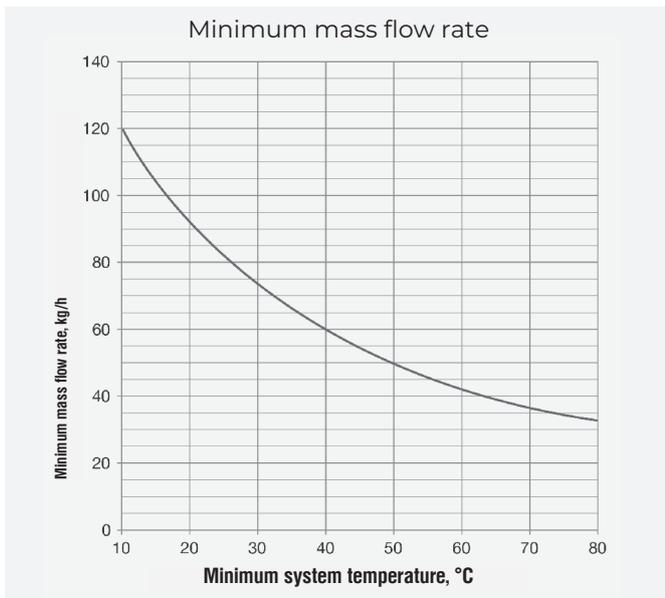
The heating system must be designed for a constant heat-transfer agent pressure, but not less than 0.4 MPa at the estimate coolant temperature. The test water pressure exceeds the operating pressure in the heating system by 1.5 times, but no less than 0.6 MPa at a constant water temperature of 95 °C.

The system is considered to have passed the test if, within 5 minutes of being under test pressure, the pressure loss does not exceed 0.02 MPa and there is no draft in welds, pipes, thread connections, fittings, heating appliances and other equipment.

When using radiating heating panel systems in permanent workplaces, the resulting room temperature is considered equal to the standard air temperature in the serviced area of the room. In this case, the air temperature in the serviced area of the room should not be more than 3 °C below the resulting room temperature, and the surface density of radiant heat flux in the workplace should not exceed 35 W/m<sup>2</sup>.

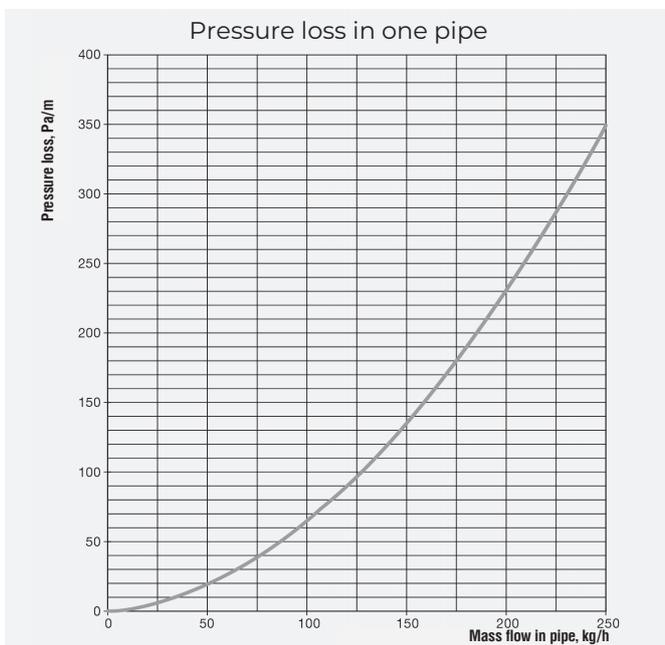


**// Comfortable microclimate parameters when using radiating panel heating systems should be in compliance with GOST 30494-2011 and SNiP 41-01-2003**



## MINIMUM MASS FLOW RATE

To reach the heating output indicated in the tables on pages 13 - 17, a turbulent flow must be created in the panel pipes. The minimum mass flow depends on the minimum parameters of the heat-transfer agent. With the system in heating mode, the latter correspond to the parameters in the return pipeline. With the system in cooling or combined mode, the parameters correspond to those in the supply pipeline. If the minimum mass flow rate in each pipe is below the specified minimum value, the panel capacity will be reduced by approximately 15%.



## PRESSURE LOSS CALCULATION

The pressure loss in the Ecoterm Pro radiating ceiling panels is calculated as the sum of the pressure loss in the pipes and the pressure loss in the collectors. When using volumetric flow regulators, the pressure loss in these regulators is additionally taken into account.

1. Determine the total mass flow of the corresponding radiating heating ceiling panel.

e.g.:  $m = 601 \text{ kg/h}$

Calculation formula:

$$m = (Q \times 0.86) / \Delta t$$

$Q = \text{Power (W)}$

$\Delta t = \text{Temperature difference (K)}$

$m = \text{Mass flow (kg/h)}$

2. Determine the pressure loss in a collector pair using the graph.

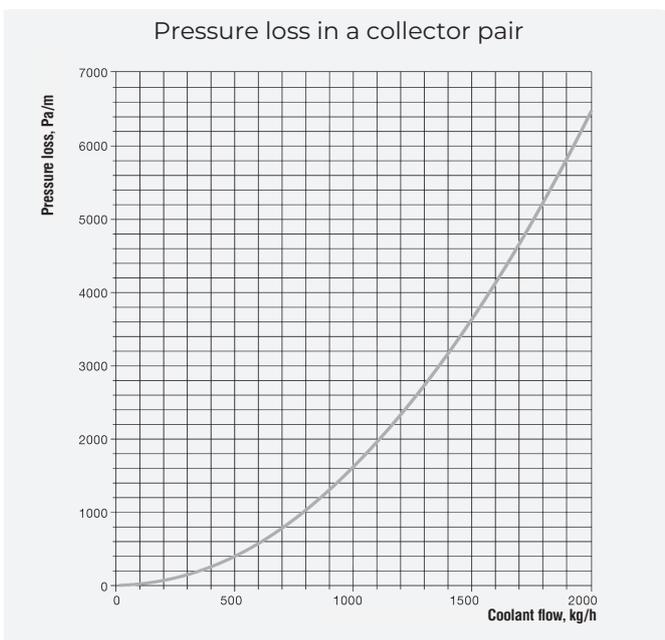
e.g.:  $\Delta p = 600 \text{ Pa/pair of collectors.}$

3. Determine the pressure loss in the pipe using the data from the graph. To determine the mass flow, it is necessary to divide the total mass flow by the number of parallel pipes conducting the heat-transfer agent.

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

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

(both directions) = 6480 Pa.

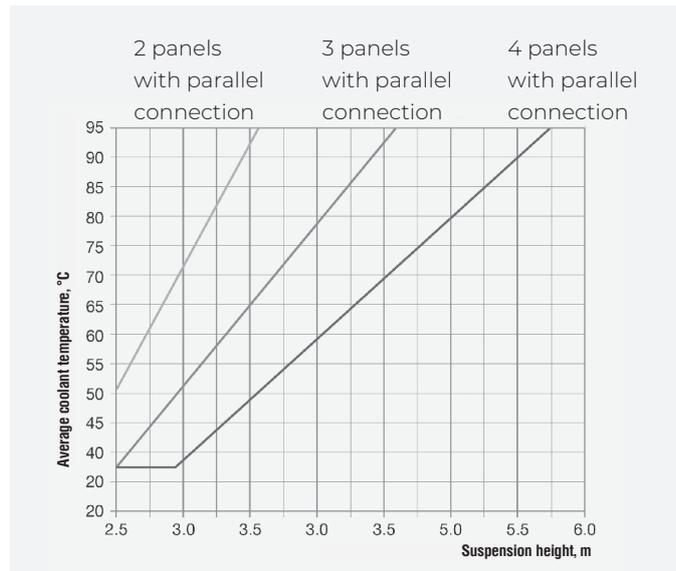


## TEMPERATURE LIMITS

To ensure optimal comfort when using the Ecoterm Pro radiating ceiling panel system, it is necessary to select the correct design temperature, which can be determined using the table and the diagram below.

The design temperature value must be less than the maximum temperature values (average coolant temperature). Higher temperature limits may be set for areas used only for short periods of time.

The values given are indicative.



Temperature limits						
Suspension height, m	Percentage of ceiling coverage with Ecoterm Pro radiating ceiling panels					
	10%	15%	20%	25%	30%	35%
	Average coolant temperature, °C					
≤ 3	73	71	68	64	58	56
4			91	78	67	60
5				83	71	64
6				87	75	69
7				91	80	74
8					86	80
9					92	87
10						94

## THERMAL CALCULATION

Thermal calculations are carried out using existing methods and basic design correlations outlined in special and reference literature.

$$\text{Power } Q = 335 \left(\frac{\Delta t}{70}\right)^{1.102}$$

For example, for  $\Delta t = 80$

$$Q = 335 \left(\frac{80}{70}\right)^{1.102} \cdot Q = 388 \text{ W/m linear}$$

The actual temperature difference, °C, during heating and cooling with the use of Ecoterm Pro radiating ceiling panels is determined by the formulas:

$$t_p = t_E = \frac{(t_b + t_n)}{2} - t_p$$

$$\Delta t_{\text{отопл}} = \frac{(t_H + t_K)}{2}$$

$$\Delta t_{\text{охл}} = t_p - \frac{(t_{\text{HO}} + t_{\text{KO}})}{2}$$

### Conventions:

$t_b$  — air temperature, °C

$t_n$  — temperature of surrounding surfaces, °C

= average radiation temperature, °C

= average temperature of all surrounding surfaces, °C

$t_p = t_E$  — room temperature (°C)

= sensible temperature (°C)

$t_H$  and  $t_K$  — the initial and final temperatures of the coolant respectively (at the inlet and outlet) in the heating appliance, °C;

$t_{\text{HO}}$  and  $t_{\text{KO}}$  — the initial and final temperatures of the refrigerant respectively (at the inlet and outlet), with the appliance in cooling mode, °C;

$\Delta t_{\text{отопл}}$  — temperature difference during heating

$\Delta t_{\text{охл}}$  — temperature difference during cooling

$n$  — empirical indicator

$Q$  — power

$Q_o$  — total heating power

## HYDRAULIC BALANCING

In any extensive heating and / or cooling system, proper distribution of heat-transfer agent flow is necessary for efficient operation. In addition, it is recommended for there to be a possibility of any singular panel to be filled, drained, and disconnected from the system separately.

For heating systems that use panels of the same type with the same coolant flow value per each panel, it is advisable to use a system with parallel movement of the coolant (Tichelmann system), which requires an additional pipeline.

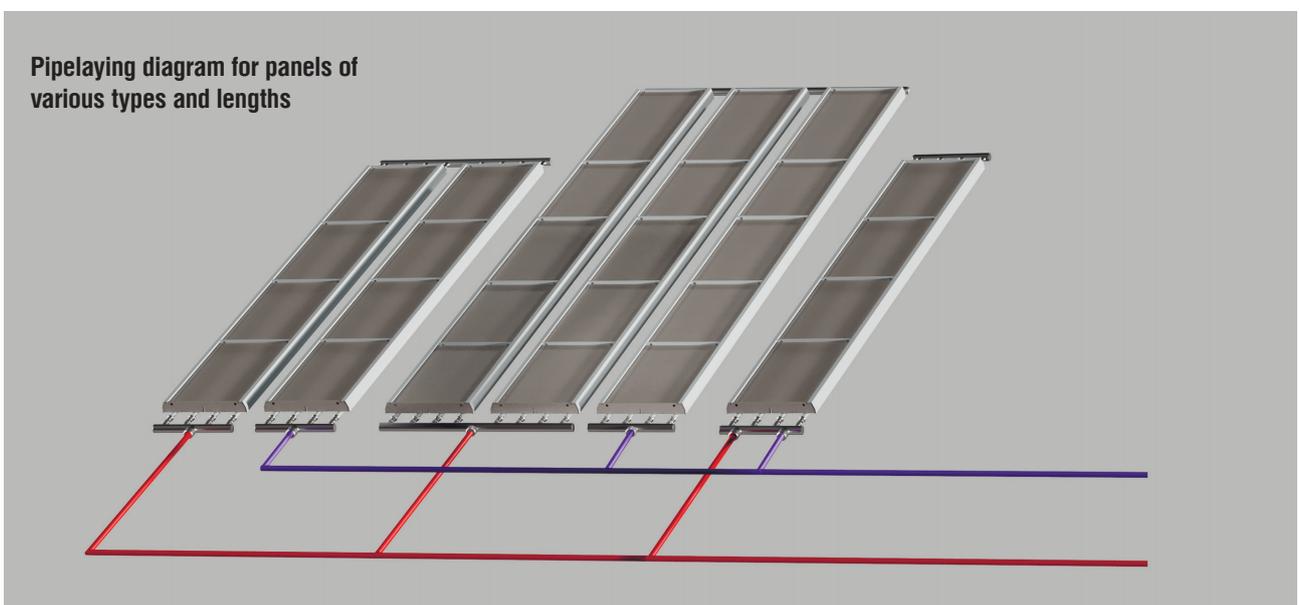
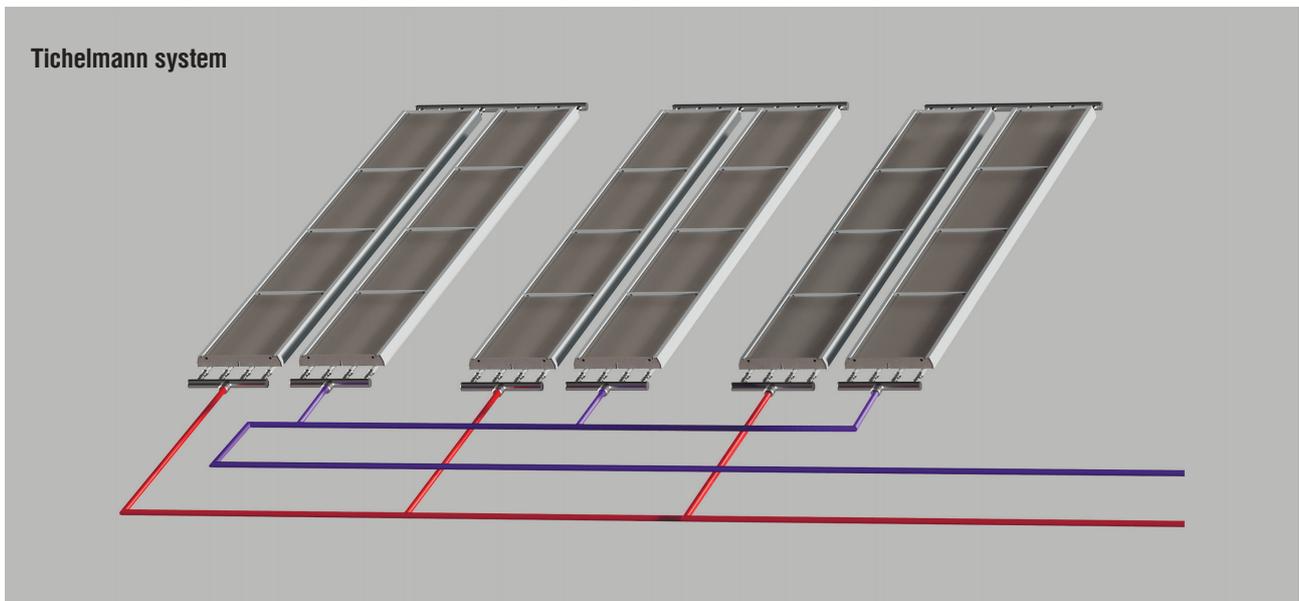
The latter heat-transfer agent flow pattern is not suitable if panels of different types and lengths are used in the same system.

When designing heating and / or cooling systems that use panels of different types

and capacities, hydraulic balancing through adjusting pipeline and the system, while being a rather labor-intensive process, is required. However, it can be significantly simplified by using flow regulators for hydraulic balancing.

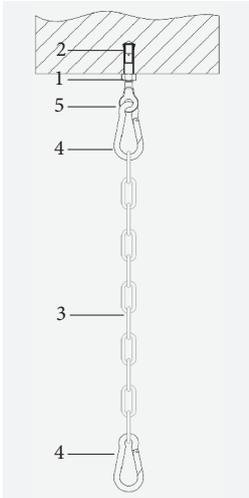
The flow control set includes: flow regulator, ball valves, as well as fill and drain valves. In such cases, the panel collector is made with additional tubes of the required diameter to connect the set to during installation.

The regulator is preset to a specific flow rate per each panel. With sufficiently high pressure losses and constant coolant flow, the regulator allows hydraulic balancing of panels of various types and lengths.

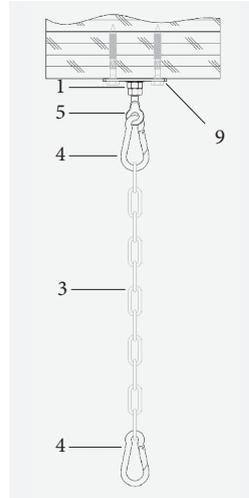


# INSTALLATION OF ECOTERM PRO RADIATING CEILING PANELS

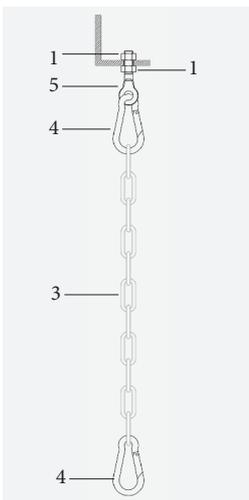
## STANDARD INSTALLATION KITS



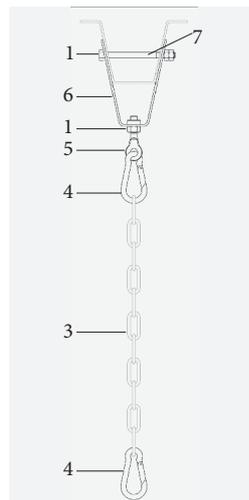
**Installation kit PS-1:**  
 mounting at one point using a dowel.  
 The minimum suspension height without the chain is 141 mm.  
 1 - M8 hex nut  
 2 - steel dowel M8  
 3 - twist link chain 4 mm\*  
 4 - carabine 5 x 50  
 5 - M8 eye bolt



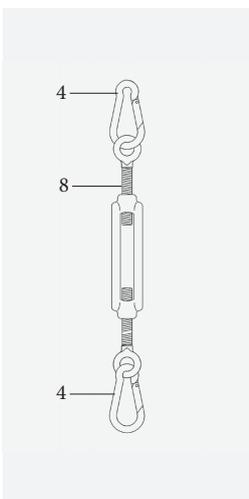
**Installation kit PS-2:**  
 mounting at one point to a wooden ceiling.  
 The minimum suspension height without the chain is 141 mm.  
 1 - M8 hex nut  
 3 - twist link chain 4 mm\*  
 4 - carabine 5 x 50  
 5 - M8 eye bolt  
 9 - base plate M8



**Installation kit PS-3:**  
 mounting at one point to an angle.  
 The minimum suspension height without the chain is 141 mm.  
 1 - M8 hex nut  
 3 - twist link chain 4 mm\*  
 4 - carabine 5 x 50  
 5 - M8 eye bolt



**Installation kit PS-4:**  
 mounting at one point to using a trapezoidal suspension.  
 The minimum suspension height without the chain is 421 mm.  
 1 - M8 hex nut  
 6 - bracket for M8 profiled sheeting  
 3 - twist link chain 4 mm\*  
 4 - carabine 5 x 50  
 5 - M8 eye bolt  
 7 - hex bolt M8 x 110



**Installation kit extension PS-5:**  
 ensuring reliable fastening of different elements.  
 4 - carabine 5 x 50  
 8 - M8 ring-to-ring open turn-buckle

Ecoterm Pro radiating ceiling panels are attached to the ceiling using standard installation kits. The installation kit includes all the necessary parts for mounting the panels. The required length of the link chain is determined per the customer's order.

Depending on the ceiling design, Ecoterm Pro radiating ceiling heating panels can be positioned at an angle along their length or width. The maximum permissible angle depends on the mounting option used.

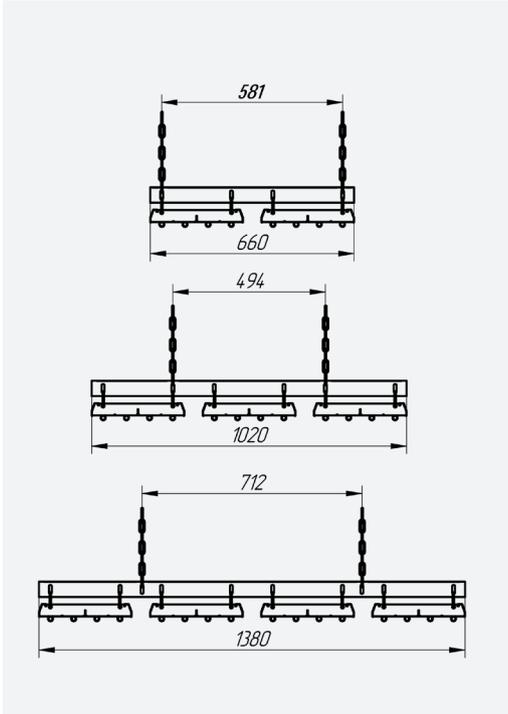
In cases with more complex or unstandard design and construction features a variety of individual solutions is possible.

Number of installation kits per ceiling heating module							
Panel length, mm	1000	2000	3000	4000	5000	6000	7000
Number, pcs	4	4	4	4	6	6	6

## SUSPENSION WITH THE USE OF MULTI-AXES

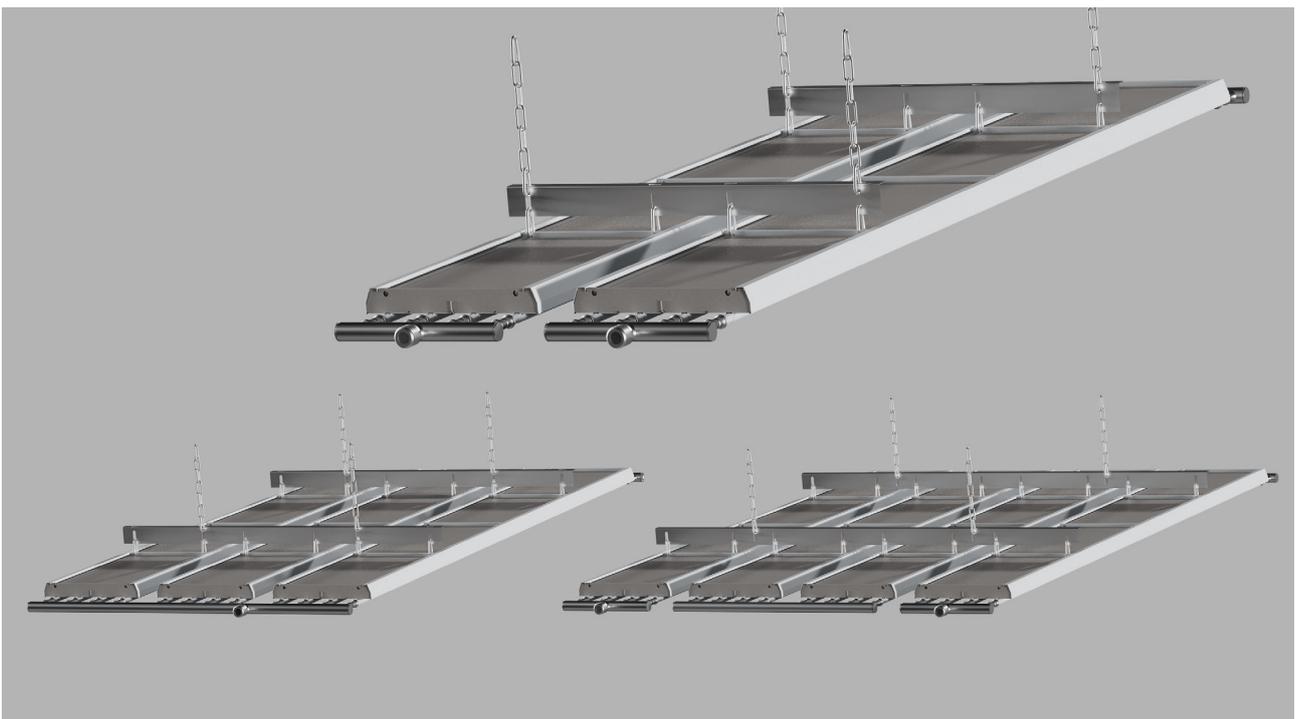
The use of multi-axes allows parallel installation of up to 4 Ecoterm Pro radiating ceiling panels. This type of mounting helps save on the cost of the heating system installation, since the number of required installation kits is reduced.

Moreover, this type of mounting allows the panels to be installed at an incline: at a possible angle of 45° in length and at an angle of 30° in width.

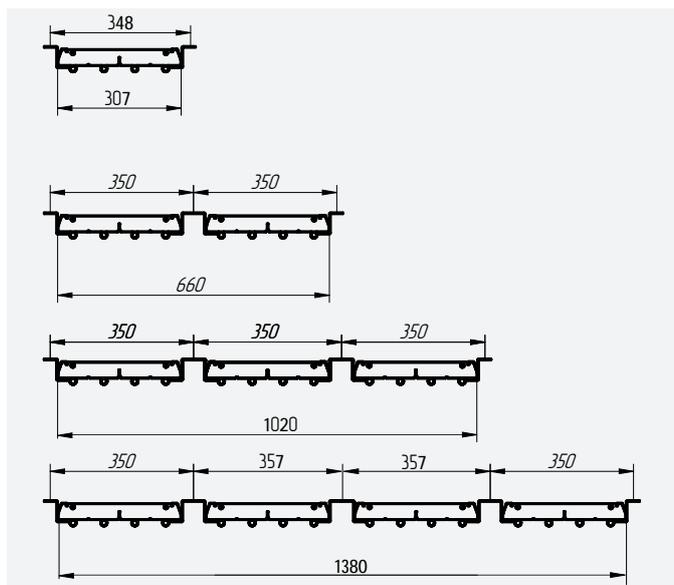


Number of installation kits per multi-axis			
Designation	Name	Distance between suspension points	pcs
MO2	Double multi-axis	581	2
MO3	Triple multi-axis	494	2
MO4	Quadruple multi-axis	712	2

Advised number of multi-axes per panel	
Panel length	pcs
1000 mm	2
2000 mm	2
3000 mm	2
4000 mm	2
5000 mm	3
6000 mm	3
7000 mm	3



## SUSPENSION CLOSE TO THE CEILING



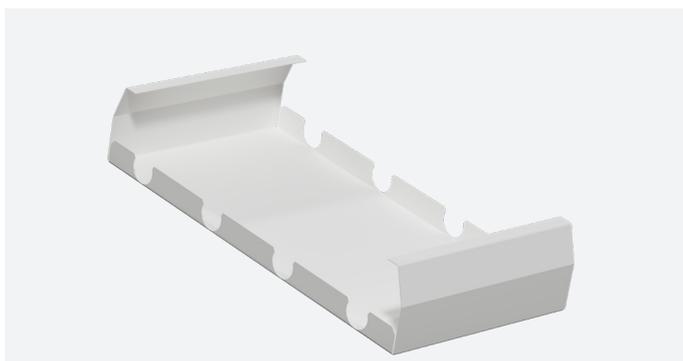
The thrust plate is bolted to the ceiling structures, which makes it possible to install Ecoterm Pro radiating ceiling panels close to the ceiling.

This mounting option allows installing the panels at an angle of 45° along the width of the panel (e.g. in an area with a pitched roof).

Please note that this type of panel mounting does not allow installation at an angle along the length of the panel.



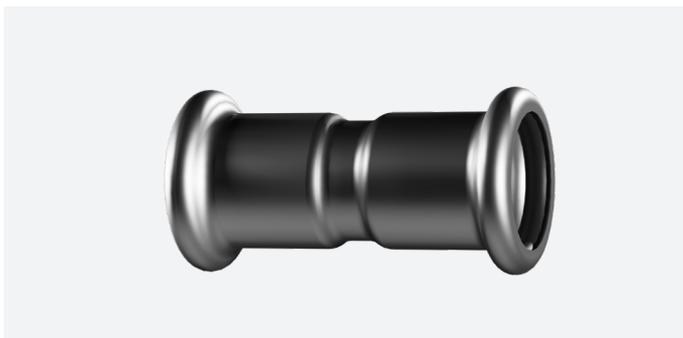
## DECORATIVE PANEL



An additional element of the ceiling heating system, installed at the joints between ceiling heating modules, designed to hide the intermodule connections. Made from galvanized steel and painted to match the color of the ceiling panel.

The quantity is determined according to the customer's order.

## CONNECTING COUPLING (PRESS FITTING)



An element of the ceiling heating system designed to connect ceiling heating modules and collectors to each other.

The quantity is determined according to the customer's order.

## HERZ THERMOSTATIC VALVES

Description	Overview	Articles
HERZ BP-BP ball valve, lever handle DN15/ DN20/ DN25		1220121/ 1220122/ 1220123
Combi valve - flow regulator		1400613/ 1400614/ 1400615/ 1400630/ 1400639/ 1400651/ 1400652 1799032 - привод 24V/0-10V
HERZ balancing valve with measuring diaphragm		1401701/ 1401702/ 1401703/ 1401711
Bypass valve for differential pressure maintenance, open		1400431/ 1400432 DN15-20
Three-way mixing and distributive valve		1403715/ 1403720/ 1403725 привод 1771211/ 50/ 51
Spring check valve		1262241/ 1262242/ 1262243
Mesh mudguard		1266201/ 1266202/ 1266203

## S+S REGELTECHNIK HEAT FLOW REGULATION AUTOMATICS

Description	Overview	Articles
RTR-S – room thermostat, climate control system		RTR-S 010/ RTR-S 011
Room radiation temperature sensor		RSTF PT1000/ RSTF NTC10K
Radiation temperature sensor for open areas		ASTF PT1000/ ASTF NTC10K

## THERMOKON SENSORTECHNIK

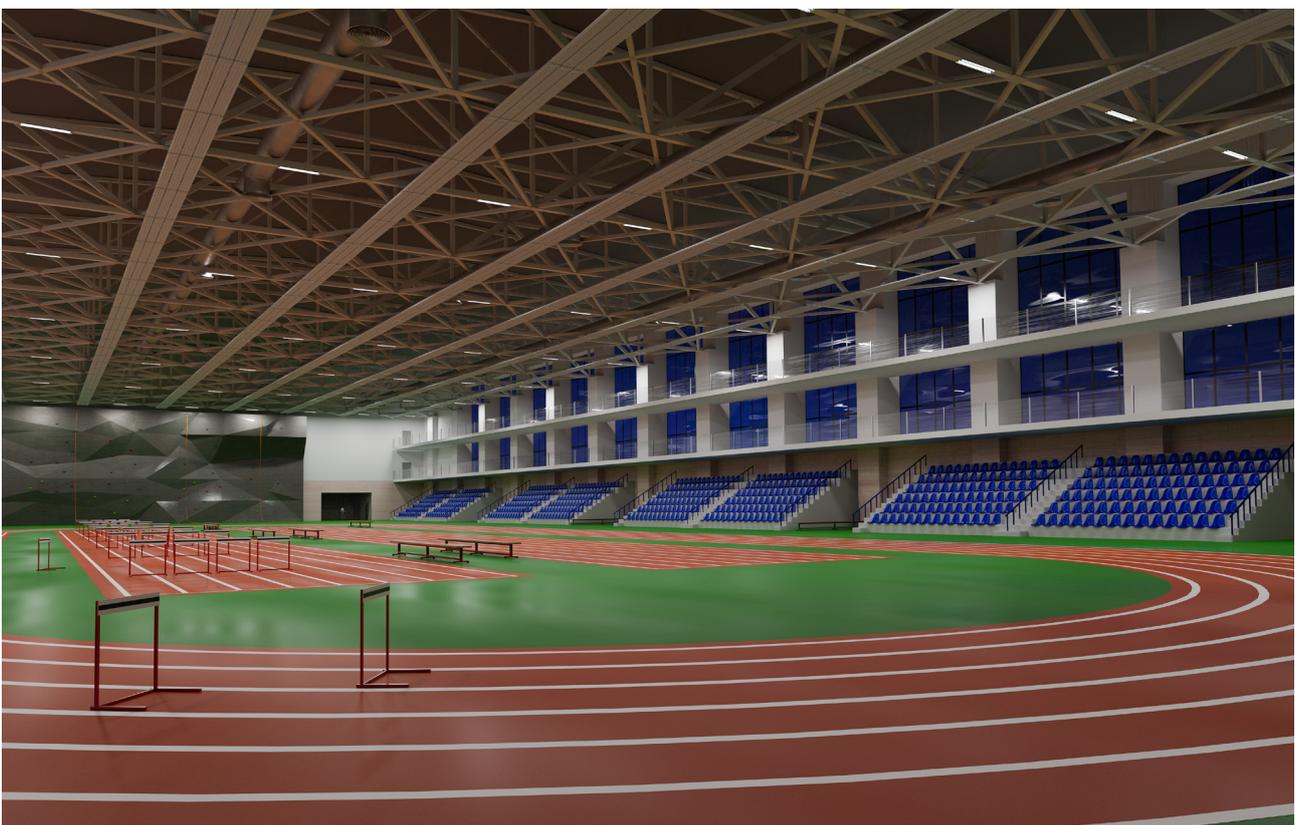
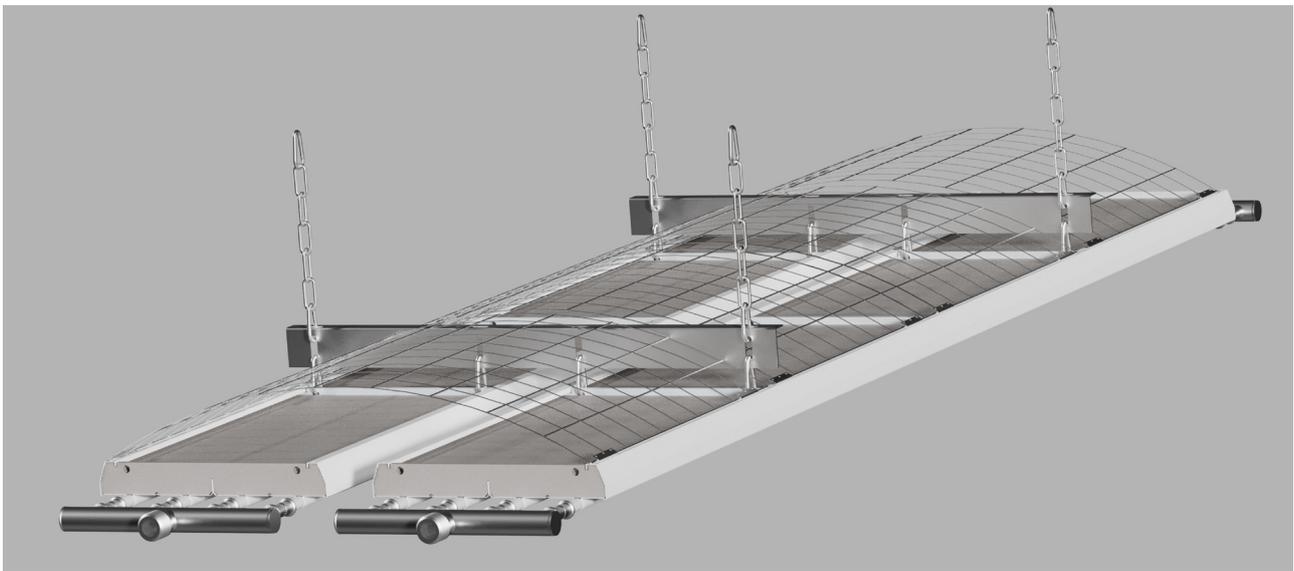
Description	Overview	Articles
Room heating/cooling controller, pure white		725002
Room heating/cooling controller, black		725019

## SPECIAL DESIGNS

A wide range of standard sizes and installation versatility allow the Ecoterm Pro radiating ceiling panels to be used in any type of premises. The panels can be painted in any color of the customer's choice, which allows devising a solution that best suits the interior of the space.

In addition to that, it is possible to manufacture heating ceiling panels according to individual sizes, taking into account the geometry of the room, as well as in a special design depending on its purpose.

- When using radiating panels in sports facilities, it is possible to install a convex galvanized steel "anti-ball" mesh on their back side.
- It is possible to design panels with a protective cover to prevent influence of external factors on the thermal insulation layer.
- The panels can also be adapted to rooms with high humidity (swimming pools, car washes, specific production facilities, etc).





 **ISOTERM**<sup>®</sup>

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НАГРАДА  
ПРАВИТЕЛЬСТВА  
САНКТ-ПЕТЕРБУРГА  
ЗА КАЧЕСТВО

