Technical Information
Radiant Ceiling Panels

Content

Introduction

Effective, durable, comfortable - radiant heat meets all the requirements of a modern and trend-setting heating system.

Optimal and efficient use of radiant heat can be achieved through the use of radiant ceiling panels. This radiation heats the objects and the surrounding space with the same principle as the Sun. The heat is felt more comfortably due to this natural principle of heat transfer. Comfort, due to a draft-free heating system is also significantly increased.

Sunline Radiant Ceiling Panels are a proven heating system. To meet the requirements of each application, commercial and industrial, there is a continuous further development.

Through the elegant lines and the subtle longitudinal beads, Sunline Radiant ceiling panels meet all the requirements of a modern and an integrated design.

Therme Laa

Functional principle

Radiant panels are static heating elements in the form of profiled strips made of sheet steel with welded in pipes and inlaid thermal insulation.
As a heat source, boilers, heat pumps, solar panels and many other hot water heating systems are used. The flow through of heated water in the Radiant panels leads to tempering the pipes and the radiant surface. These tempered areas emit energy in form of heat radiation.

The radiant heat moves freely through the air and converts into heat energy when hitting the floor, walls, ceilings and the furnishings. The surface temperatures rise by 1 - to 3 K compared to the ambient air temperature.
The size and number of the radiant ceiling panels needed depends on the desired room temperature and the average heating medium temperature.

The radiant panels can be used as single panels (units ready for connection) for heating of small spaces or by assembling elements to long strips for heating of large areas.

Benefit

A higher efficiency compared to other heating systems, e.g. air-heating system, is given by the less tempered room air with the same heat-physiological temperature sensation. To ensure a sense temperature of 20° C, it is sufficient to heat up the roomair to 17° C by radiant panels.
Due to the short heat-up times, the good controllability and optimal temperature distribution in the space, savings of up to 50% are made possible compared to other heating systems.

MPM Environment Intelligence KG, Gittelde

Product discription

Sunline Radiant Ceiling Panels consist of 1.20 mm profiled steel sheet with a lateral upstand of 90 ° and additionally stabilising upstand of 90 ° inward. This upstand also serves in holding the factory-installed thermal insulation.

The maximum length of a single element is 6000 mm.
Radiant panel strips are made up of individual partial lengths which are either welded on site or connected together with compression fittings.

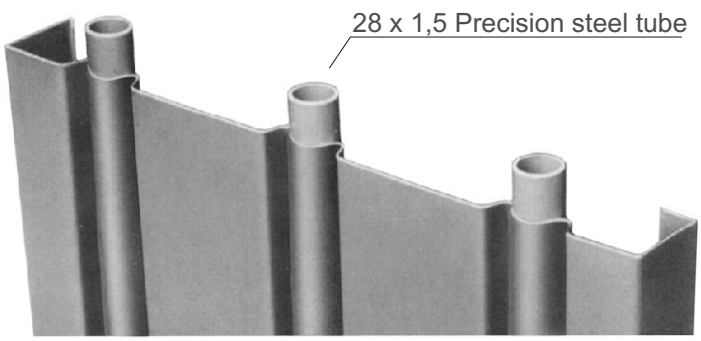
Due the low overall height of 50 mm, the radiant ceiling panels are space saving and with the Sunline mounting kits, they can be mounted on a variety of ceiling systems. The collection boxes with connections for supply and return as well as draining or venting are manufactured according to the customer requirements. A turbulent flow through the plates with optimum energy transmission of heat to the pipes and the radiant surface is guaranteed by the factory welded in buffle discs in the collection boxes.

The eco-friendly powder coating according to DIN 55900 part 2 ensures a high-quality and long-lasting surface sealing. In addition to the standard color RAL 9016 "Verkehrsweiß (Traffic White)" a variety of special colours according to customer request are available at short notice.

Available accessories include: Volumetric flow controllers, connecting hoses, concealed collection boxes, press-fittings, thermal actuators, room control components, energy saving ball guard, covers and mounting kits for fixing the radiant ceiling panels on concrete ceilings, steel girders and trapezoidal sheets and many other structures.

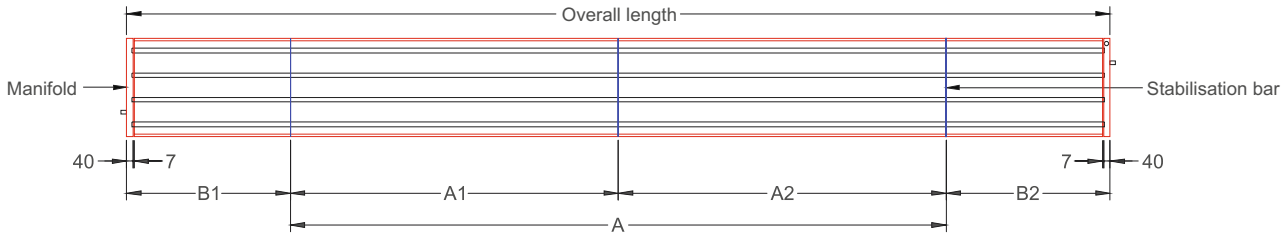
To meet optical and acoustic requirements, the radiant panels can also be produced as perforated version.

To ensure optimal heat transfer, the precision steel pipes are connected, under constant pressure, double-sided, intermittent and at the same time "invisible" welding along the entire length of the radiant ceiling panels.



Individual elements of the radiant ceiling panel

Single radiant ceiling panel
max. overall length up to 6000 mm



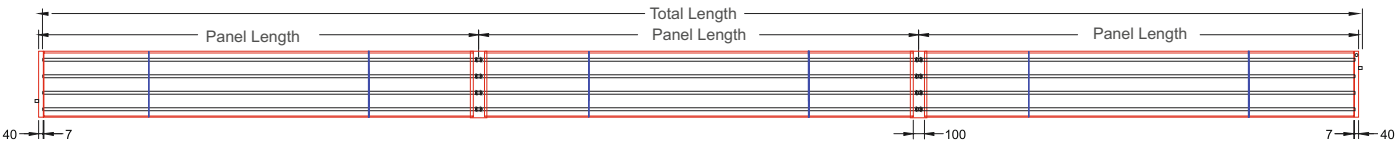
Example: Overall length = 6000 mm

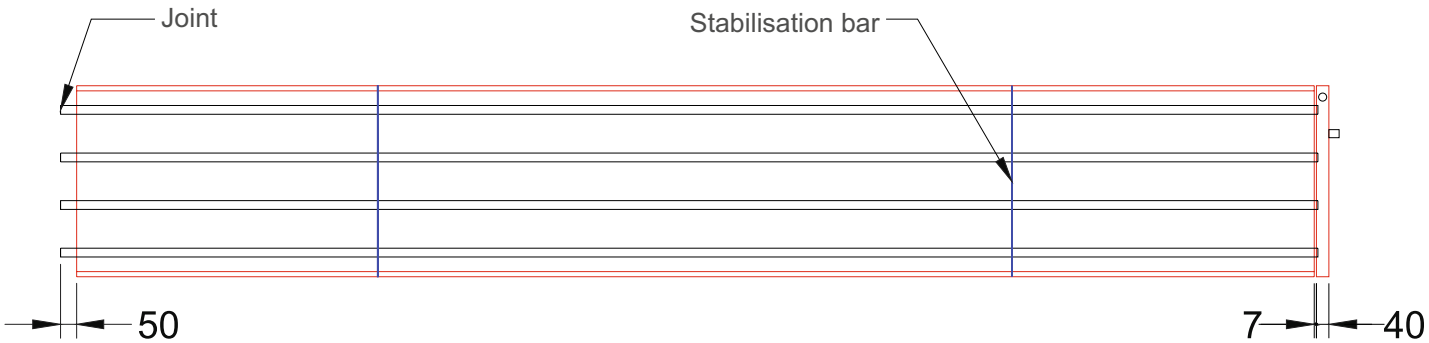
A 1 = 2000 mm	A 2 = 2000 mm
B 1 = 1000 mm	B 2 = 1000 mm

The total length of a single radiant ceiling panel is made out of the sheet metal facing length, the pipe protrusion of 2 x 7 mm and the manifold 2 x 40 mm.

Radiant ceiling panel strip

Radiant ceiling panel strip
Total length > 6000 mm





The total length of a Radiant ceiling panel strip is made up of the starting panel intermediate panels and the end panel.

The metal profile form cover sheets for the respective joints (2 x 50 mm pipe protrusion) are -150 mm wide.

Enercon, Magdeburg

Type overview

The nominal heat output, which is relevant for designing the radiant panels according to DIN EN 14037, part 1-3 was determined by the accredited testing institute, HKL Stuttgart.

DIN EN 14037, part 1-3 is the authoritative standard for testing radiant ceiling panels with water, with a temperature below - 120 ° C.
Specified in it is the test procedure as well as the evaluation methods and the determination of radiant heat performance.

Types of Sunline radiant ceiling panels according to DIN EN 14037, Part 1-3

Width	Number of tubes	Water content	Weight*	Standard-compliant module Heat Output	Nominal Heat Output at t = 55K (EN 14037-3)
mm	Stück	kg/m	kg/m	W/m	W/m
300	2	1	6,2	174	191
450	3	1,6	9,3	240	264
600	4	2,1	12,5	307	338
750	5	2,7	15,7	372	409
900	6	3,2	18,8	436	479
1050	7	3,7	21,9	503	553
1200	8	4,3	25,7	566	623
1350	9	4,8	29,1	644	708
1500	10	5,2	32,3	714	785

* including Water & Isolation

Further construction types

In addition to the above mentioned range with a standard pipe spacing of 150 mm, it is possible to vary the number of pipes on request.

Through the different number of pipes, less or more heating capacity can be achieved with an equal width of the radiant ceiling panels.

to DIN EN 14037, Part 1 to 3

Nominal heat output in W/m for different overtemperatures Δt
Type Sunline

Over-temperature tm-ti ΔtK	Width 300 mm	Width 450 mm	Width 600 mm	Width 750 mm	Width 900 mm	Width 1050 mm	Width 1200 mm	Width 1350 mm	Width 1500 mm
10	28	38	48	57	66	75	84	96	106
12	34	47	59	70	82	94	106	119	132
14	40	56	71	85	98	113	126	143	159
16	47	65	83	100	116	132	148	168	186
18	54	75	96	115	133	152	170	193	214
20	61	85	109	130	151	172	193	219	243
22	68	95	122	146	169	193	217	245	271
24	75	105	136	162	187	214	240	272	301
26	82	117	149	178	207	236	264	300	333
28	90	127	163	195	226	257	288	327	363
30	94	131	168	203	236	269	302	342	380
32	101	141	180	218	255	292	327	371	411
34	109	151	194	234	273	313	352	398	441
36	117	162	208	250	292	335	377	426	472
38	125	172	221	267	313	357	402	454	504
40	132	183	235	284	332	381	428	484	536
42	140	194	248	300	351	403	454	512	568
44	148	204	262	317	371	426	480	542	601
46	156	215	276	334	391	449	507	571	633
48	164	227	290	351	412	473	533	601	666
50	172	238	305	369	432	497	560	632	700
52	180	249	319	386	453	520	586	661	733
54	188	260	333	404	473	544	614	692	767
55	**191**	**264**	**338**	**409**	**479**	**553**	**623**	**708**	**785**
56	196	272	347	421	494	569	641	723	802
58	205	283	361	439	516	593	669	754	836
60	213	294	376	456	536	617	696	785	870
62	222	306	390	475	557	641	725	816	904
64	230	317	406	493	579	667	753	848	940
66	238	329	421	511	600	692	781	880	976
68	247	341	435	529	622	716	811	911	1010
70	255	353	450	547	644	742	839	943	1045
72	264	365	465	566	665	767	868	975	1081
74	273	377	480	585	687	793	896	1008	1118
76	281	388	495	603	710	818	926	1041	1154
78	290	400	511	621	732	845	956	1074	1191
80	299	412	526	640	754	870	985	1106	1226
82	308	424	542	660	776	896	1015	1140	1264
84	317	436	557	678	799	923	1045	1173	1301
86	326	450	572	697	822	949	1075	1206	1338

Through increased contact pressure, the heat output of the radiant panels can be optimised in project-related cases of need.

Nominal cooling capacity

according to EN 14240

Nominal cooling capacity in W/m*
Type Sunline

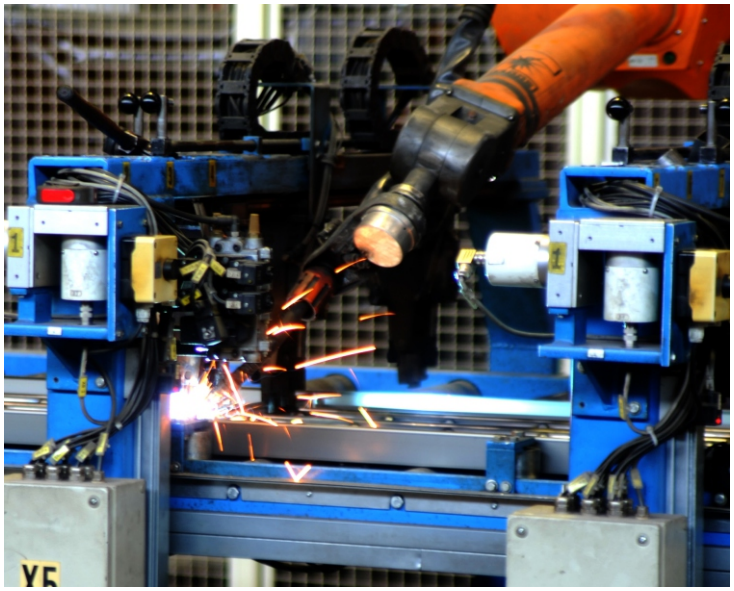
Under-temperature ti-tm Δ tK	Width 300 mm	Width 450 mm	Width 600 mm	Width 750 mm	Width 900 mm	Width 1050 mm	Width 1200 mm	Width 1350 mm	Width 1500 mm
3,0	9	15	19	20	25	30	35	39	44
3,5	11	18	23	25	31	37	42	47	53
4,0	13	20	26	30	36	43	49	55	61
4,5	15	23	30	35	42	50	57	63	71
5,0	17	25	33	40	47	56	65	71	80
5,5	19	28	37	45	53	64	71	80	89
6,0	21	30	40	50	58	69	78	89	98
6,5	23	33	44	56	64	74	85	95	106
7,0	25	36	48	59	69	81	91	104	115
7,5	27	39	52	64	75	89	100	112	123
8,0	29	42	55	68	80	94	107	119	132
8,5	31	45	59	73	86	101	115	128	142
9,0	33	48	63	77	91	107	121	136	152
9,5	35	51	67	82	98	115	128	145	161
10,0	37	54	70	87	102	120	135	153	169
10,5	39	58	74	92	108	127	144	161	179
11,0	41	60	78	96	114	132	151	170	189
11,5	43	63	82	101	121	140	158	179	197
12,0	45	66	86	106	126	145	165	186	207
12,5	47	69	90	111	131	153	174	195	216
13,0	49	73	94	116	137	160	183	204	226
13,5	52	75	98	121	143	166	190	213	235
14,0	54	78	102	126	148	173	197	220	245
14,5	56	81	106	131	154	180	205	229	254
15,0	58	84	110	135	160	187	211	238	264

* without insulation

Removing the insulation increases the portion of convective cooling capacity.
The total cooling capacity of the radiant panel increases.

Through increased contact pressure, the cooling output of the radiant panels can be optimised in project-related cases of need.

Stabilisation and Fastening

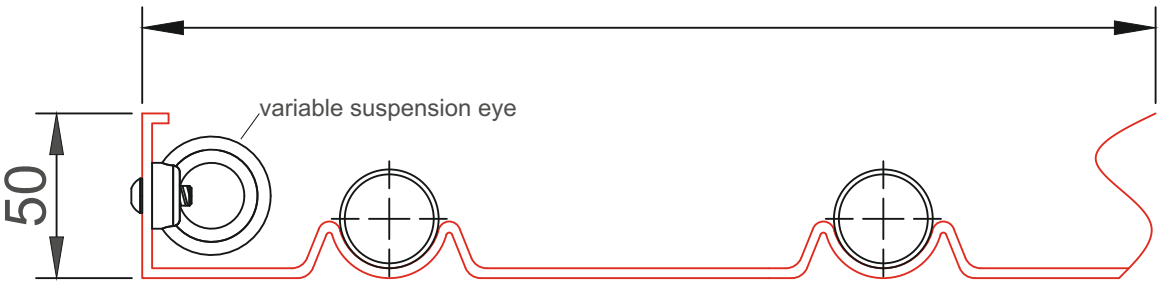


To stabilize the Sunline radiant ceiling panels, crossbars are welded over the entire width of the panel at a distance of approx. 1.5 m - max. 2.0 m.

The positioning of the stabilizing crossbars stems from the length of the individual elements.

Material, assembly and welding all ensure the reliable suitability and stability of the radiant ceiling panel, as well as high longitudinal and torsional stiffness.

Construction width 300 mm - 1200 mm



To prevent bending of the radiant ceiling panels, the maximum distances of the variable suspension within the radiant ceiling panel should not be exceeded.

- Distance from either the beginning or end of the panel - maximum 1000 mm

- Distance between the variable suspension eyes - maximum 2000 mm

Advantages of variable suspension

- easy adaptation to the different structures, this makes accurate positioning possible when mounting
- maximum flexibility in determining the suspension points
- Fixing can be done at the time of assembly
- Integration of existing ceiling installations
- Relief of the individual sections of ceiling installation
- Waiver of cost-intensive and time-consuming mounting rail constructions

For build widths type 150/1350 and type 150/1500 attachment is carried out on the fixed welded sin suspension bars.

System benefits

... up to 50% energy savings compared to other heating systems

... optimal for renewable energy sources

... high thermal comfort even at low heating temperatures

... efficient climate control according to the needs of the user

... quick reaction ability to alternating thermal loads

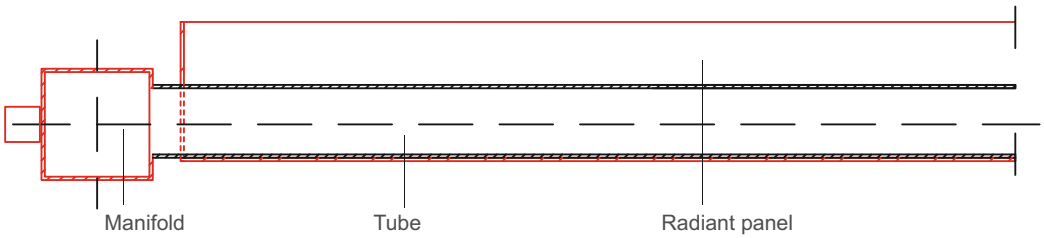
... improvement of the acoustics through the use of perforated radiant surfaces

... no drafts and no noise pollution

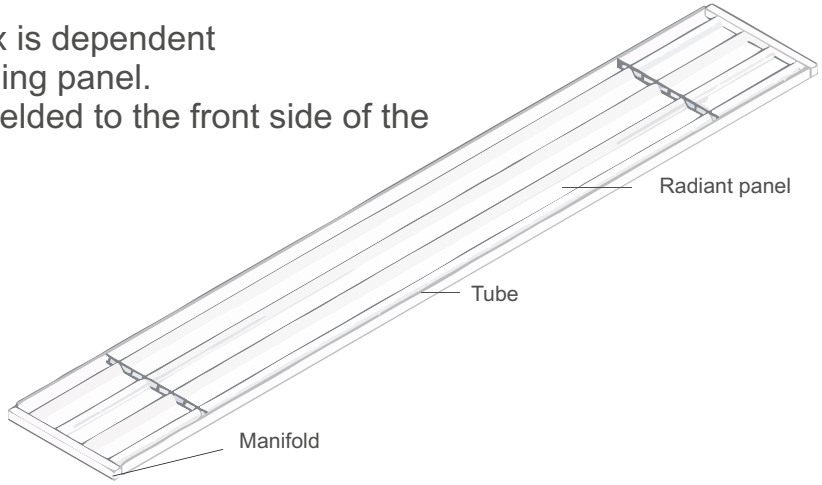
... individual ceiling design


... and therefore a perfect
investment for the future !

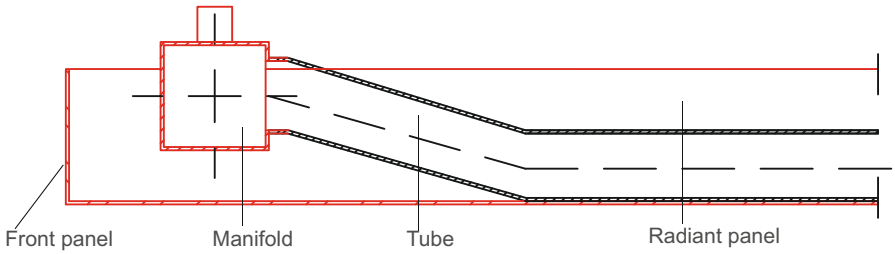
In-line manifold



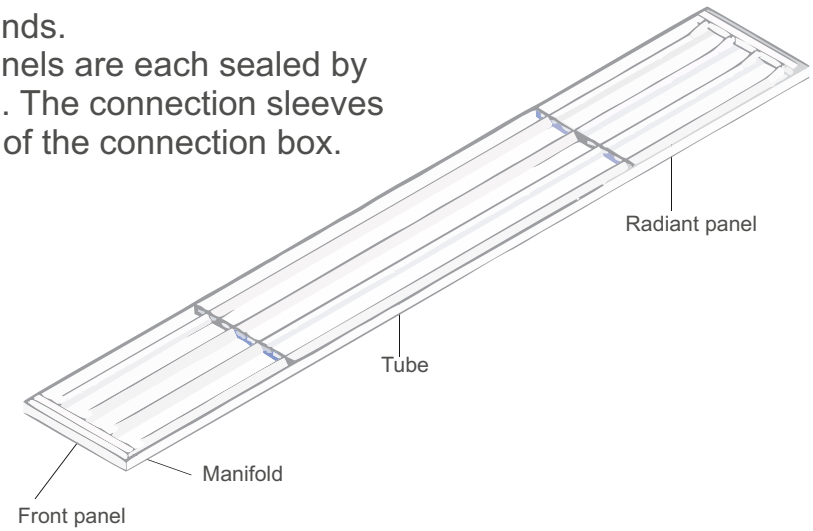
The width of the collection box is dependent on the width of the radiant ceiling panel.
The connection sleeves are welded to the front side of the manifold.



Concealed manifold



The concealed collection boxes are fitted between the radiant panels lateral upstands.
The fronts of the radiant panels are each sealed by factory-welded front panels. The connection sleeves are located on the top side of the connection box.

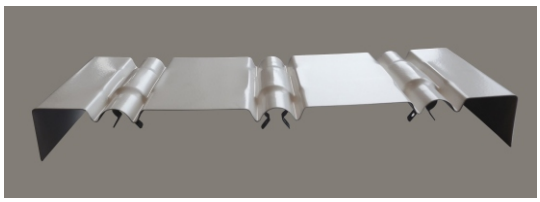


The use of concealed collection boxes meet all the requirements of an aesthetic ceiling. This variant allows a trouble-free integration in grid ceilings.

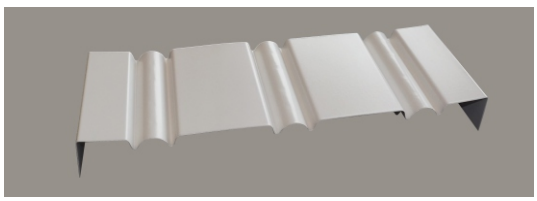
Cover plates for radiant ceiling strips

To ensure the joints are covered (2 x 50 mm), 150 mm cover plates are used. The cover plates are mounted at the construction site by means of special retaining clips, which are pre-prepared on the cover plates at the factory. This saves time during assembly. Then, the retaining clips are additionally secured by the supplied safety spring split pins.

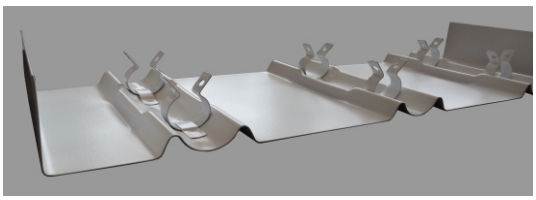
Separate cover plates must be used when using Sunline special press fittings.



Cover plates for press connection



Cover plates for weld connection



Top view, cover plate with retaining clips

Thermal insulation

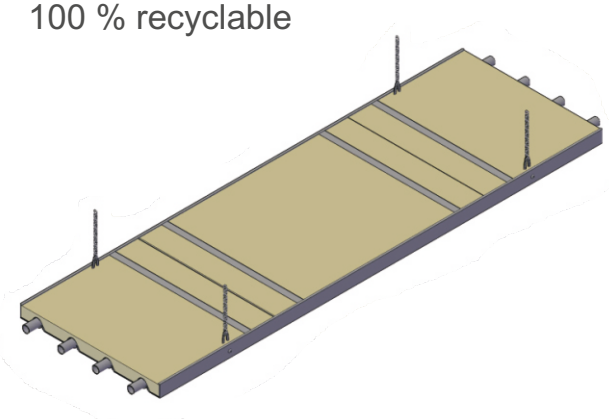
To avoid heat loss towards the ceiling, a high-quality and stable insulating mat made out of technical insulation felt is inserted at the factory:

- Thickness 40 mm
- Building material class A2 according to DIN 4102 non-flammable
- Single-sided aluminium lamination
- Volumetric weight approx. 16 kg/cbm
- Thermal conductivity of 0.04 W/mK

The thermal insulation is held by the lateral upstand of the radiant panels. Additional down-holders ensure a perfect fit for the insulation mat.

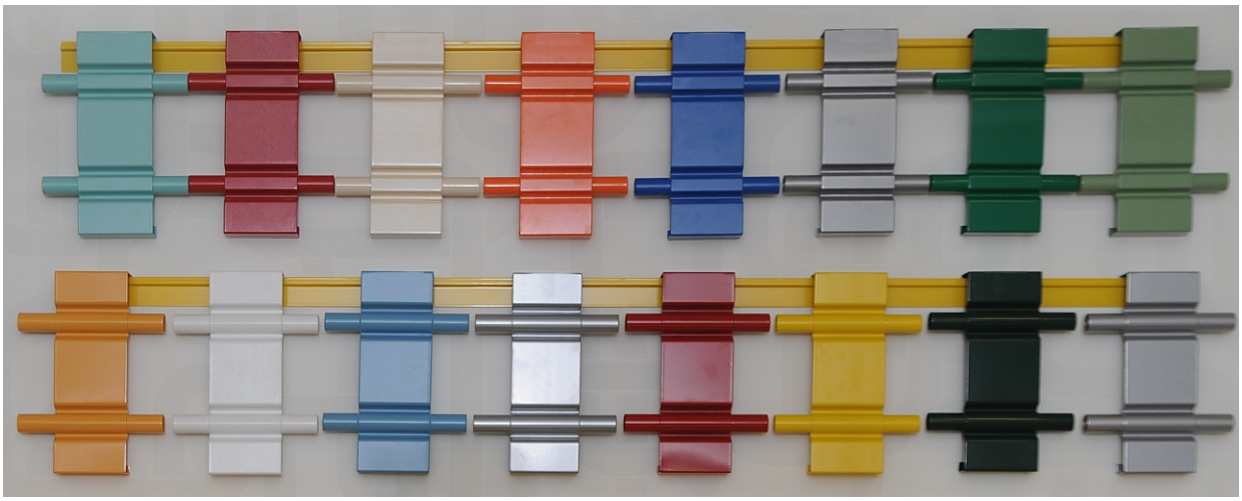
When using perforated radiant panels alternative to the technical insulation sleaze a non trickling polyester fleece insulation can be inserted:

- Thickness 40 mm
- Building material class B1 according to DIN 4102 - flame retardant
- Single-sided aluminium lamination
- Volumetric weight approx. 12 kg /cbm
- Thermal conductivity of 0.035 W/mK
- good sound-absorbing properties
- 100 % recyclable

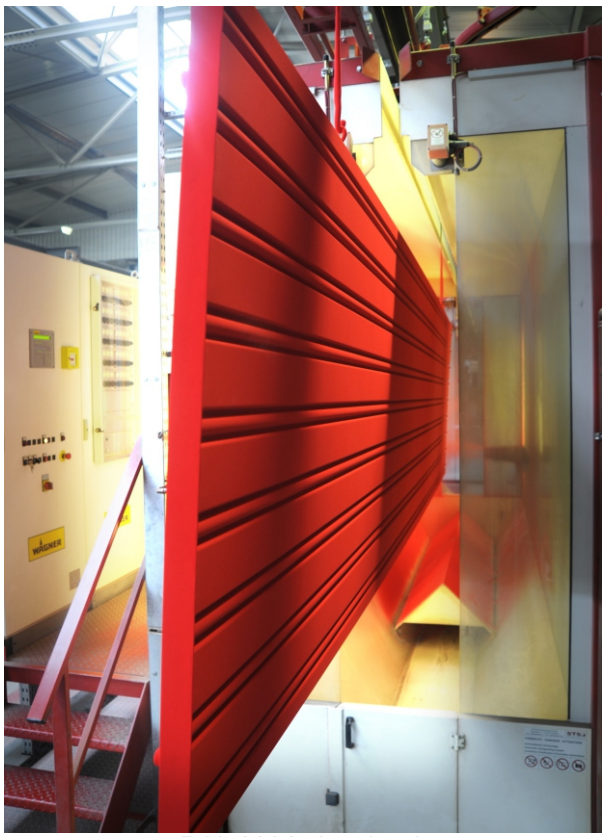


Surface coating

After degreasing and phosphating in a fully automatic powder coating system, Sunline radiant ceiling panels are coated with environmentally friendly epoxy powder according to DIN 55900, part 2.
This ensures a high-quality and long-lasting finish.
In addition to the standard colour „Verkehrsweiß“ (Traffic White) RAL 9016 are a variety of Special colours according to customer request are available at short notice.



Choice of a wide range of special colours



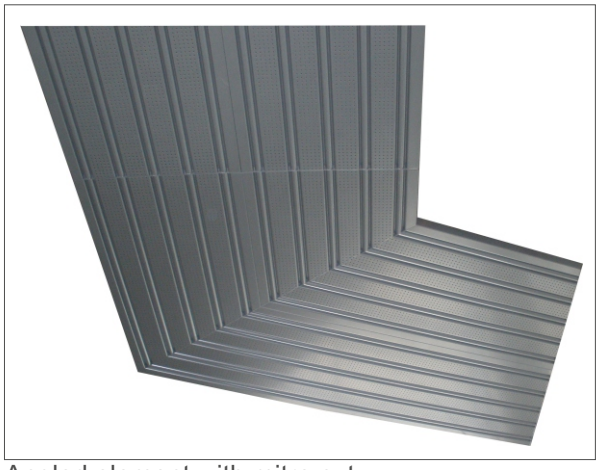
RAL 3001 signal red

RAL 9016 traffic white

Miter cuts

Mitre joints (dummy elements with angle cut) for angled ceiling radiant panels or adaptations to, among others non-rectangular shapes can be produced in conjunction with concealed connection boxes without any problems.

Schwedenkai, Kiel



Angled element with mitre cut

Pointed element

Technical College Wolfenbüttel

Technical College Wolfenbüttel in detail

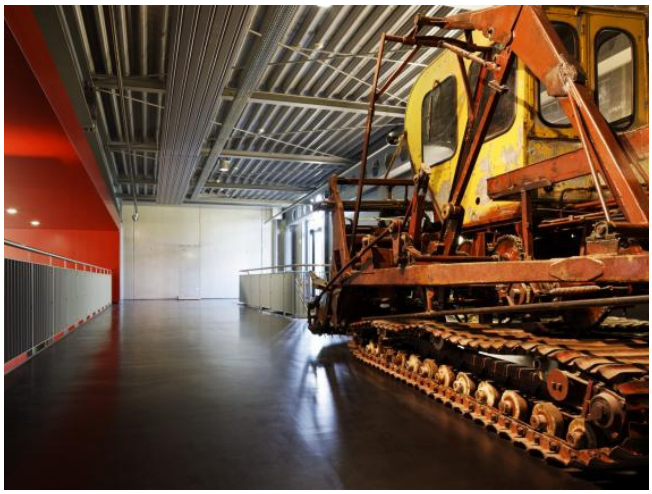
Especially for radiant ceiling panels that are integrated into closed ceilings, removable inspection openings can also be manufactured on request.

Radiant ceiling panels with integrated lighting

Elring Klinger AG, Thale

Multi-purpose hall, Hetzdorf

Radiant ceiling panels with special coating



Moormuseum, Geeste

Gym, Uetze

Radiant ceiling panels with set-up manifolds

car dealership Dinnebier, Loungebereich, Berlin

Primary school Lindenhof, Magdeburg

Acoustic version

Sunline radiant ceiling panels can be manufactured in a perforated design for acoustic or optical reasons. The single elements are manufactured with construction widths from 300 mm to 1200 mm.
The perforated surface of the construction widths 1350 mm and 1500 mm consisting of 2 sections.

Through the perforations of the radiant panels in diameter 5.0 mm and in combination with the thermal insulation, outstanding acoustic properties and significantly reduced reverberation times are achieved. This is of high importance for the use in sports, multi-purpose or assembly rooms.

Industrial hall Winter, Ratingen

Sound absorption is the process for the reduction in sound energy.
Absorb is tantamount to "swallow" and "imbibition".

The noise produced in a room is spreading as a sound wave through the air and hits the room boundary surface area, which partially absorbs the sound and partially reflects it.

In sports halls, during continuous operation, sound levels reach between 84 dB (A) and 91 dB (A).

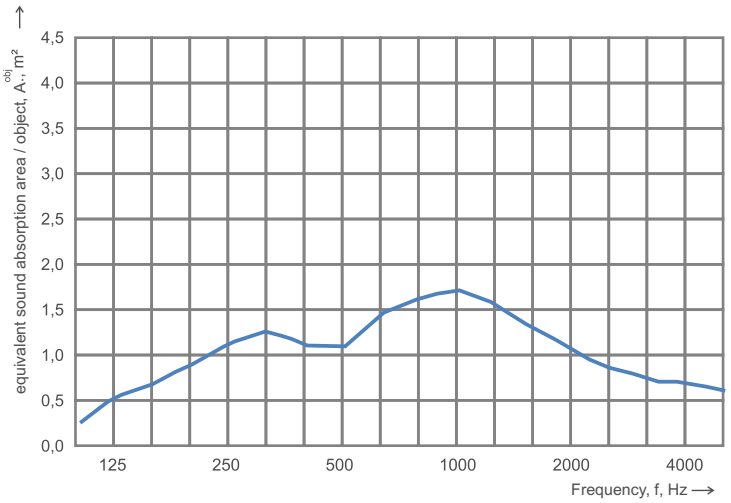
Through the use of perforated radiant ceiling panels, reverberation time can be shortened. The resulting noise level reduction leads to a significant improvement in the room acoustics.

Improving the acoustics has a positive effect on the general working atmosphere, especially in noisy environments.

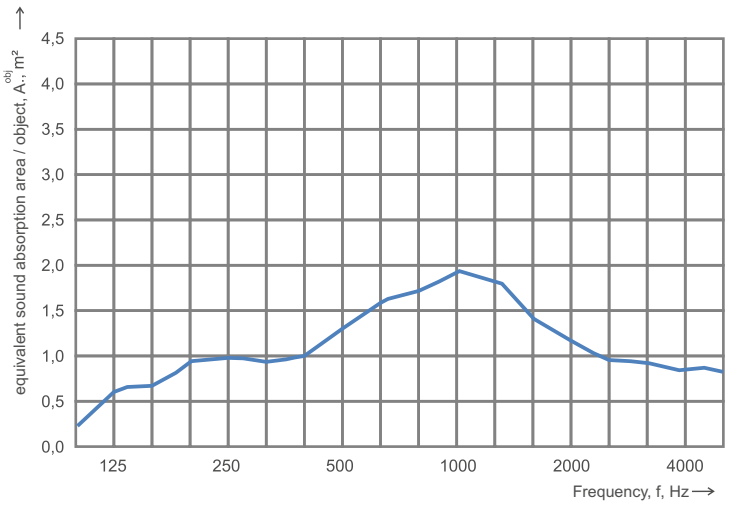
For the assessment and calculation of room acoustics, the determination of the equivalent sound absorption area in the hall space in accordance with DIN EN ISO 354 is necessary.

The following charts are based on measurements of a perforated radiant panel with a total area of 2.1 m² within various frequency bands.

Sound absorption graph
Perforated radiant panel without ball deflector



Sound absorption graph
Perforated radiant panel with PU-ball deflector



Upon request, a project-based sound absorption measurement can be performed.

Ball impact safety

The Sunline ball protection guards consist of a closed-cell polyurethane (PU) with upper stable aluminium shield. The PU ball protection guards have a thickness of 10 mm

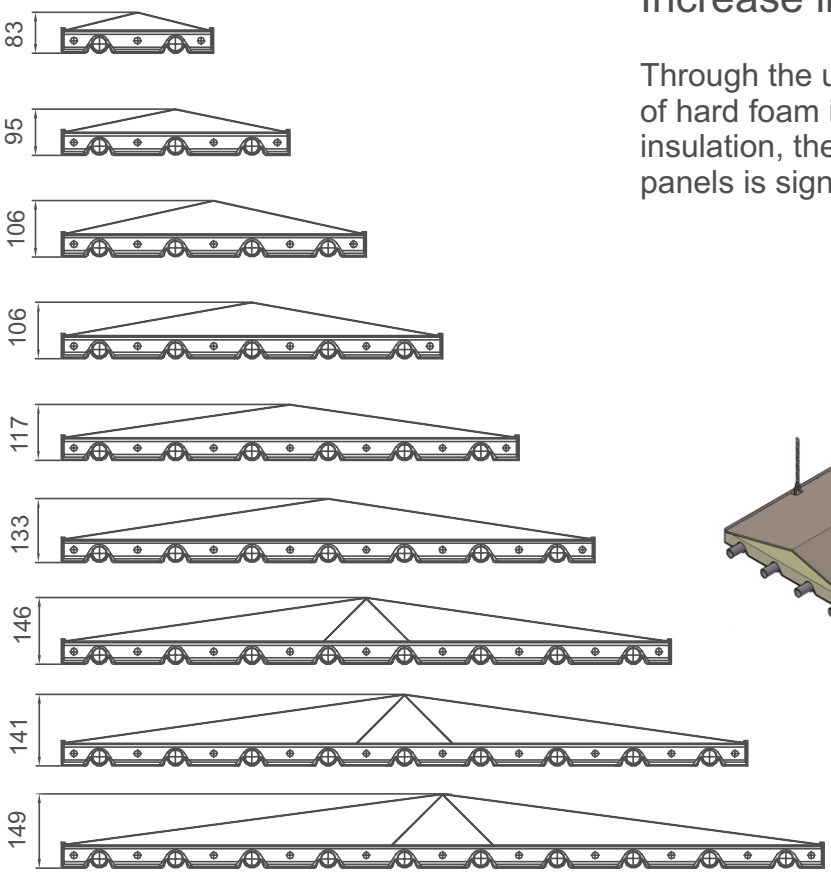
The provisioning of ball impact safety with ball protection guards from Sunline offers many advantages:

- easy handling and processing
- light weight 0.97 kg/m²
- form stable
- additional thermal insulation
- flexible adaptable
- cost savings due to easy assembly
- entire surface closed

Sunline radiant ceiling panels are tested for impact resistance according to DIN EN 18032, the audit was conducted by the accredited testing institute MPA Stuttgart.

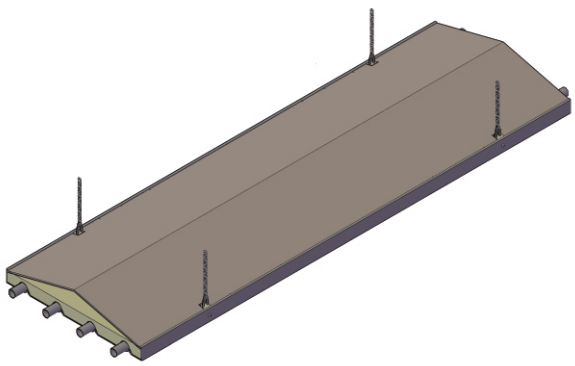
Weight ball deflector hoods made of hard foam

Build width mm	Weight kg/m	Height mm
1500	1,40	149
1350	1,30	141
1200	1,16	146
1050	1,02	133
900	0,87	117
750	0,73	106
600	0,58	106
450	0,44	95
300	0,29	83



Increase in energy savings

Through the use of ball protection guards made of hard foam in conjunction with an inlaid insulation, the upwards heat loss of the radiant panels is significantly reduced.



Ball protection guards are available as galvanised steel sheets for areas with increased fire protection requirements.

The ball protection guard made of steel sheet weighs 4 kg per m ².

athletics centrum, Magdeburg

Auto & Technik Museum, Sinsheim

sample object

Room parameter		
Room length	L =	40,00 m
Room width	W =	24,00 m
Clear room height	H =	8,00 m
Constructed Area	A =	960,00 m²
Room volume	V =	7680,00 m³
Air exchange	=	0,2 times 1536,00 m³/h

Building- / Room loads		Heating
spec. Heating load	Q_{spez} =	68,0 W/m²
		8,5 W/m³
Transmission	Q_T =	48,57 kW
Ventilation losses	Q_L =	16,71 kW
Heating load	$Q_{ges.}$ =	65,28 kW

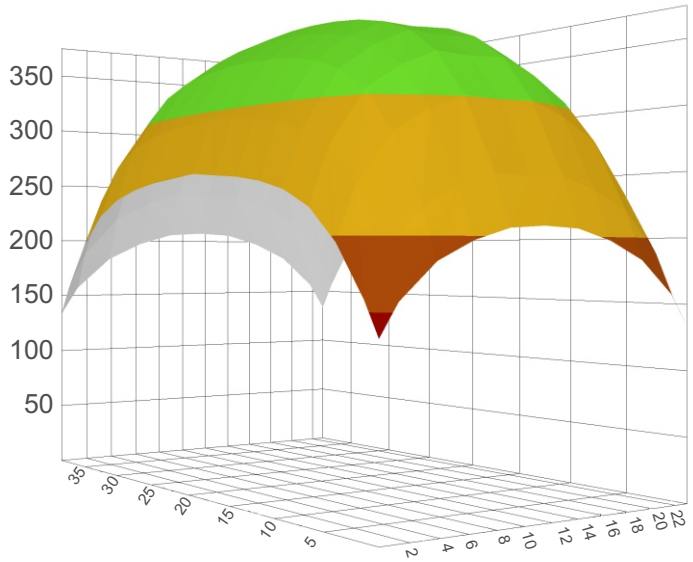
Temperatures		Heating
Supply	θ_{VL} =	70,0 °C
Return flow	θ_{RL} =	50,0 °C
Room	θ_R =	18,0 °C
Outside temperature	θ_A =	-14 °C
Above temperature	$\Delta\theta$ =	42,0 K
Spread	$\Delta\theta_S$ =	20 K

Number	Type	Attachment	Pcs.	Build length	Connector	Output / m	Output / Band	Total operating income
10	Sunline Typ 150 / 1200	TR 1	4	36,00 m	special	454 W/m	16344 W	65376 W
Σ			4	144,00 m			65,38 kW	

Number	Type	Mass flow per strip	Water content per strip	Operating weight per strip	Valve size per strip	Valve settings	Pressure loss	
10	Sunline Typ 150 / 1200	704,48 kg/h	154,80 l	950,40 kg	DN 20	77,5	1561 Pa	16 mbar
Σ			619,20 l	3801,60 kg				

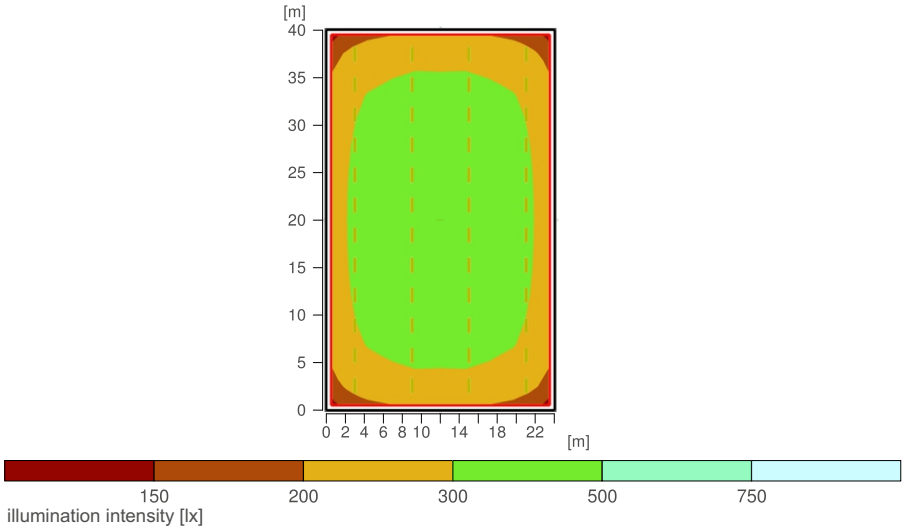
Coverage of the heating load to 100,1 %

LED Lighting design



Room height: 8 m, Assembly height: 7,50 m, Maintenance factor: 0.80 — Lux values

Area	[%]	E_m [lx]	E_{min} [lx]	E_{max} [lx]
Reference plane	/	312	188	375
Floor	20	272	136	363
Ceiling	70	61	38	74
Walls (4)	50	127	28	190



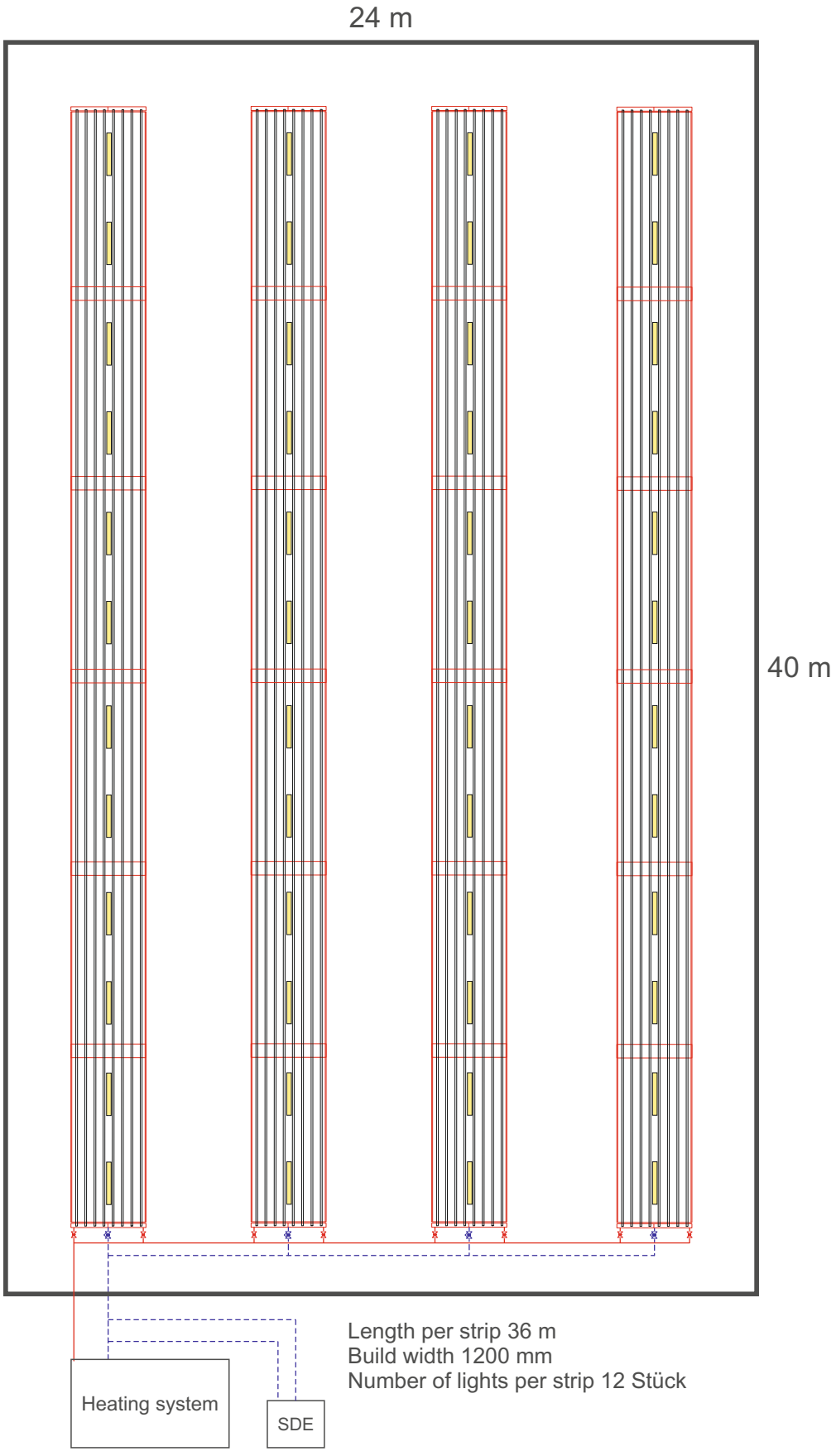
Our service range includes LED light planning for different areas of application.

Benefits of using LED illuminants:

- decrease of power costs - energy savings of up to 90%
- best possible quality of light
- very long life - up to 50,000 hours of operation

Various funding programs from federal and State governments offer extensive investment grants for the conversion to LED lighting.

Schematic diagram



Length per strip 36 m
Build width 1200 mm
Number of lights per strip 12 Stück

Elring Klinger, Thale

Different lighting systems can be integrated into various radiant ceiling panel elements without any problems.

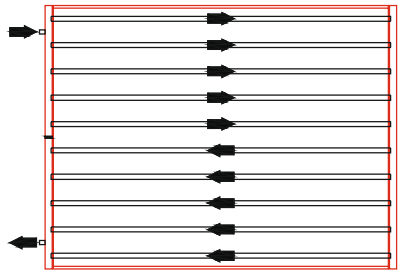
The radiant panels, combined with the ligths as a system, are tested for ball impact safety according to DIN EN 18032.

Sports hall, Gemünden

On request, our planning department will created an individual lighting calculation based on your object specifications.

One-sided connection

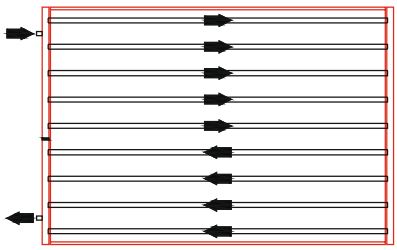
width 1500 mm



Sunline DSP 150/1500

$$\dot{m}_{Rohr} = \frac{\dot{m}}{5}$$

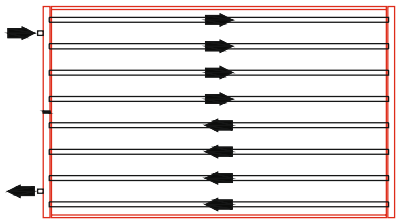
width 1350 mm



Sunline DSP 150/1350

$$\dot{m}_{Rohr} = \frac{\dot{m}}{4,5}$$

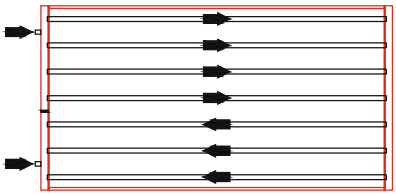
width 1200 mm



Sunline DSP 150/1200

$$\dot{m}_{Rohr} = \frac{\dot{m}}{4}$$

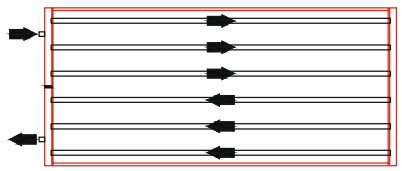
width1050 mm



Sunline DSP 150/1050

$$\dot{m}_{Rohr} = \frac{\dot{m}}{3,5}$$

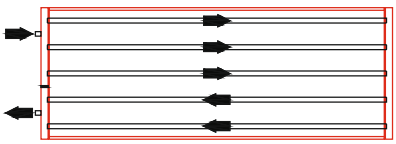
width 900 mm



Sunline DSP 150/900

$$\dot{m}_{Rohr} = \frac{\dot{m}}{3}$$

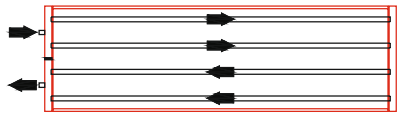
width 750 mm



Sunline DSP 150/750

$$\dot{m}_{Rohr} = \frac{\dot{m}}{2,5}$$

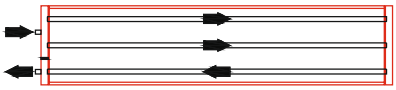
width 600 mm



Sunline DSP 150/600

$$\dot{m}_{Rohr} = \frac{\dot{m}}{2}$$

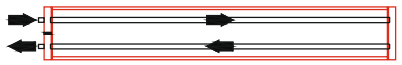
width 450 mm



Sunline DSP 150/450

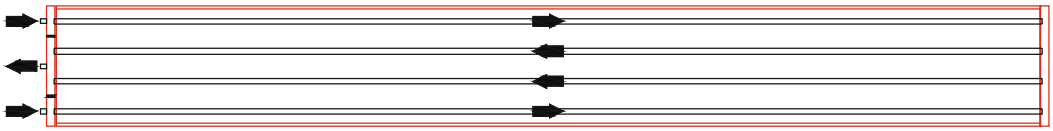
$$\dot{m}_{Rohr} = \frac{\dot{m}}{1,5}$$

width 300 mm



Sunline DSP 150/300

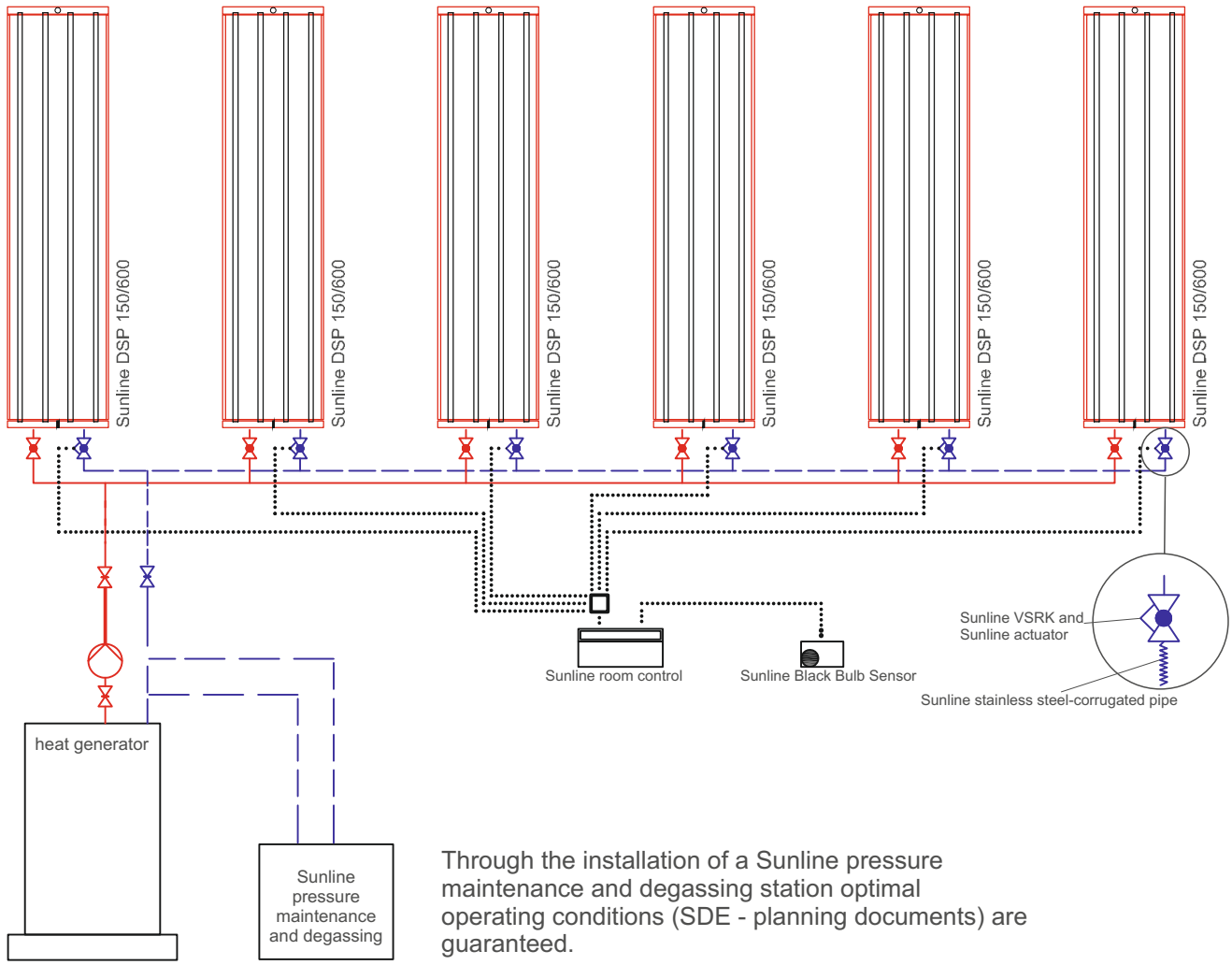
$$\dot{m}_{Rohr} = \frac{\dot{m}}{1}$$



Sunline DSP 150/600

$$\dot{m}_{Rohr} = \frac{\dot{m}}{2}$$

Heating a hall with Sunline radiant ceiling panels



Through the installation of a Sunline pressure maintenance and degassing station optimal operating conditions (SDE - planning documents) are guaranteed.

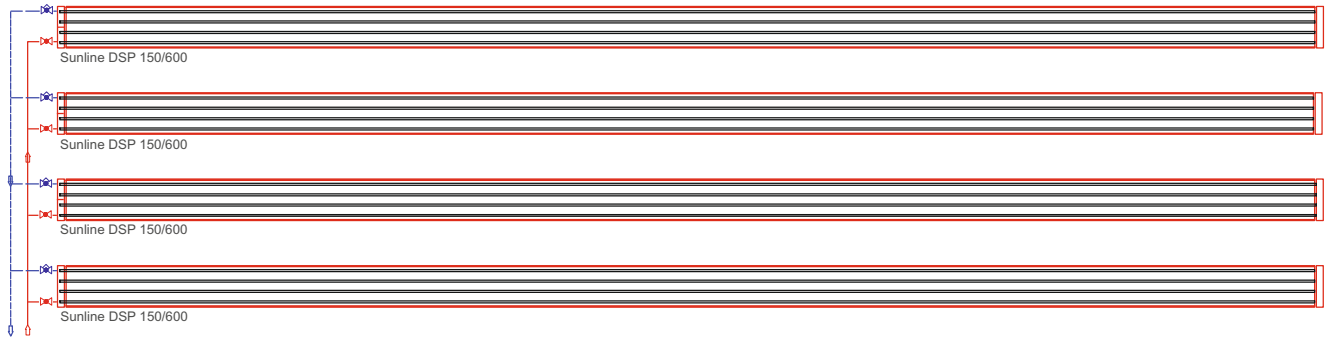
The heated water for the heating system is provided through an on-site heat generator. The temperature is measured with a Black Bulb Sensor, this value is then passed to the electronic room temperature control.

In the example shown, the connection of the radiant ceiling panels to the piping network was carried out with a one-sided connection. The advantage of the unilateral connection as opposed to a mutual connection is the saving of pipelines. The cost of the overall system can be reduced.

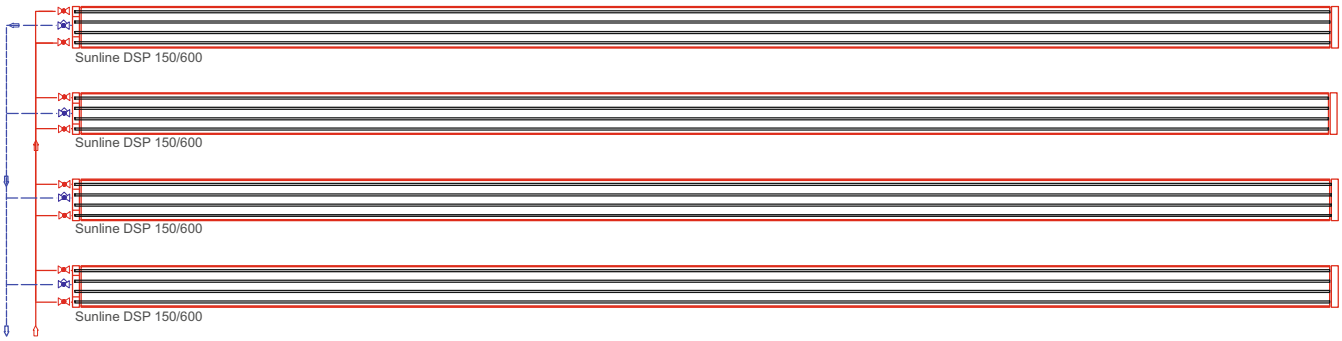
Each radiant ceiling panel is fitted with a connection set consisting of a ball valve in the supply pipe and a volume flow controller in the return pipe. The volume flow controller is required for the hydraulic balance and a constant mass flow of the radiant ceiling panel.

When the room temperature which is set on the room thermostat has been reached the actuator, mounted on the volume flow controller, closes.

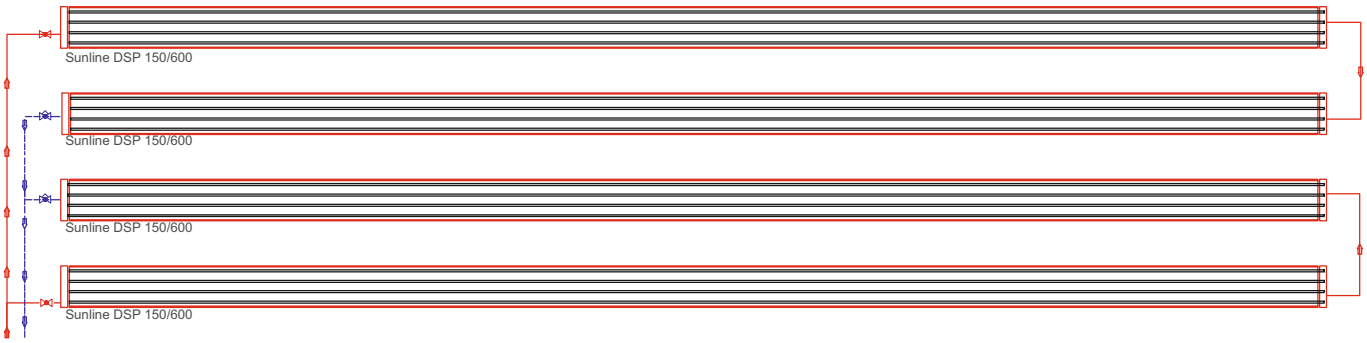
Examples



1. One-sided connection with flow volume and flow regulator controls



2. Special connection with stripes of a length of 30 and more meters



3. Series Connection

For all connection types make sure that the flow rate of the heating stream is at least 0.1 m / s. This can, if not otherwise possible, be achieved through factory welded baffle discs. With inclined mounting of the ceiling panels, such as in shed roofs, the flow velocity should be at least 0.15 m/s.

Permissible surfaces or medium heating temperature

For rooms with normal specific heating demands and a conventional ceiling surface occupancy, the following temperatures (depending on the mounting height and in connection with the related irradiation) should not be exceeded.

Sus-pension	Surface temperature ϑ_{om} °C	medium heating temperature ϑ_m °C
3 m	55	60
4 m	65	70
5 m	75	85
6 m	95	105
7 m	115	130
8 m	140	160

Linear expansion

In determining or selecting the suspension type, the linear expansion of the radiant ceiling strips should be strictly observed, especially for non-free-hanging ceiling radiant panel strips, e.g. when mounting directly beneath the ceiling.

To ensure unhindered expansion when a panel is integrated into a closed ceiling, a surrounding shadow gap or other measures need to be taken to accommodate the expansion.

ϑ_m	Linear expansion
60°C	ca. 5,5 mm
80°C	ca. 8,0 mm
100°C	ca. 10,5 mm
120°C	ca. 12,5 mm
140°C	ca. 13,5 mm
160°C	ca. 14,5 mm

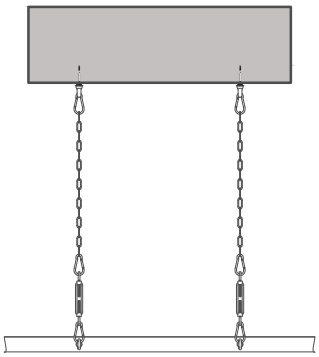
Linear expansion at different heating medium temperatures, based on a strip length of 10 m.

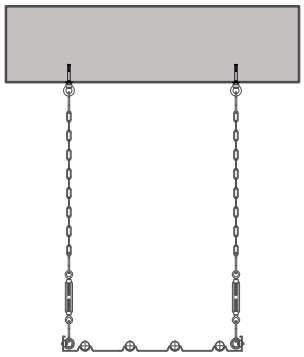
Below are the most common mounting variants for Sunline radiant ceiling panels on concrete ceilings and steel and trapezoidal sheet metal roofs.
In addition, there are more mounting options available for different installation conditions, for example: wire rope attachment, heavy-duty clamps etc.

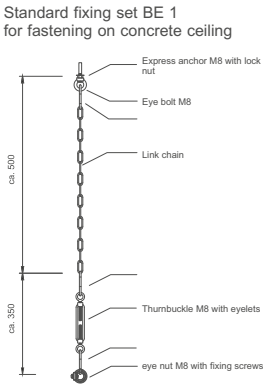
Fixing to concrete ceiling

with express anchors, eye bolt M8, turnbuckle M8 with eyelets, 500 mm link chain, three karabiners and eye nut M8 with fixing screws

The link chain is supplied in bundles, cutting to length takes place on site.



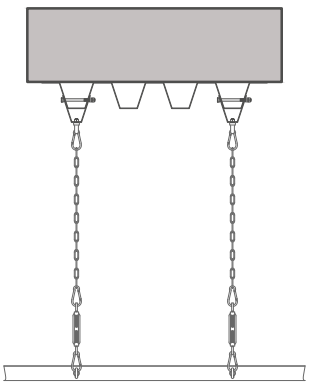


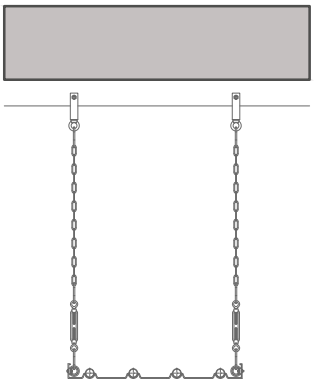


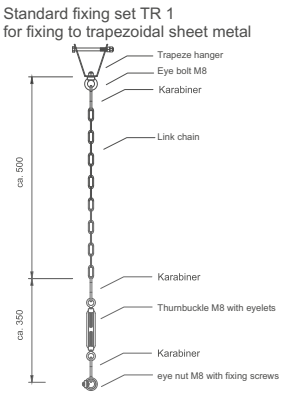
Fixing to trapezoidal roof construction

with trapezoidal attachment, eye bolt M8, turnbuckle M8 with eyelets, 500 mm link chain, three karabiners and eye nut M8 with fixing screws

The link chain is supplied in bundles, cutting to length takes place on site.





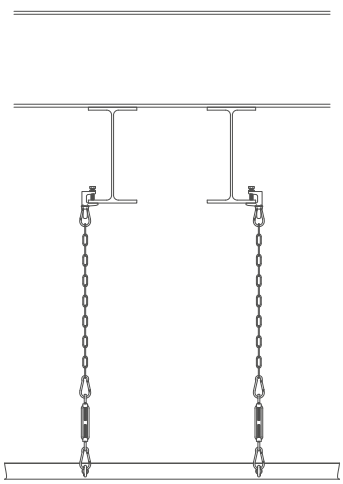


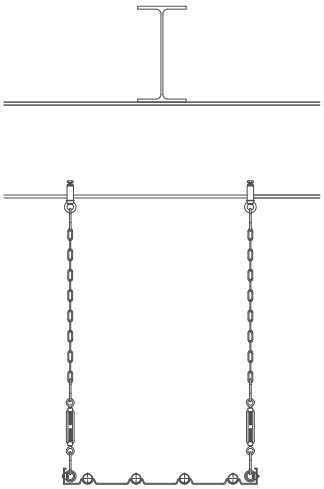
We will gladly assist you in the selection of the best fixing method.

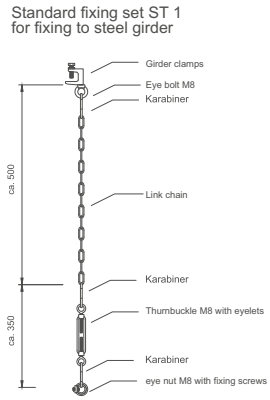
Fixing to T, U or angular steel profiles

with girder clamps, eye bolt M8, turnbuckle M8 with eyelets, 500 mm link chain, three karabiners and eye nut M8 with fixing screws

The link chain is supplied in bundles, cutting to length takes place on site.





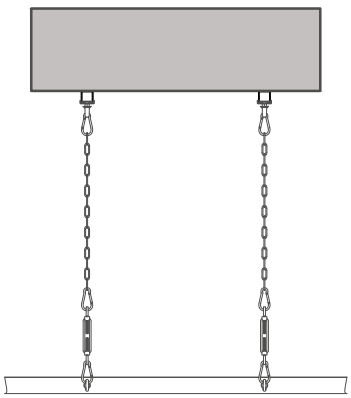


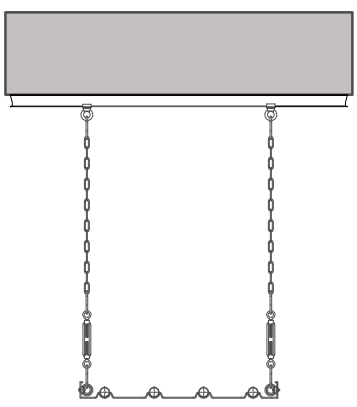
Wire rope fittings can additionally be supplied on request.

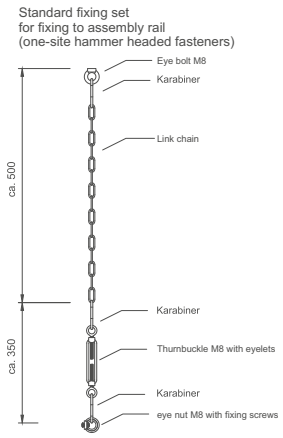
Fixing to rails (on-site hammer headed fasteners)

eye bolt M8, turnbuckle M8 with eyelets, 500 mm link chain, three karabiners and eye nut M8 with fixing screws

The link chain is supplied in bundles, cutting to length takes place on site.







Sunline radiant ceiling panels are manufactured on a per project basis, inspected and transported.

Pallet stacks are wrapped in stretch film. A stack contains a maximum of nine overlapping radiant panels inlaid with wood separators.

For delivery to site, a special vehicle with forklift is available at customers request.

The radiant panels must be stored dry and on a flat solid surface and protected against weather elements.

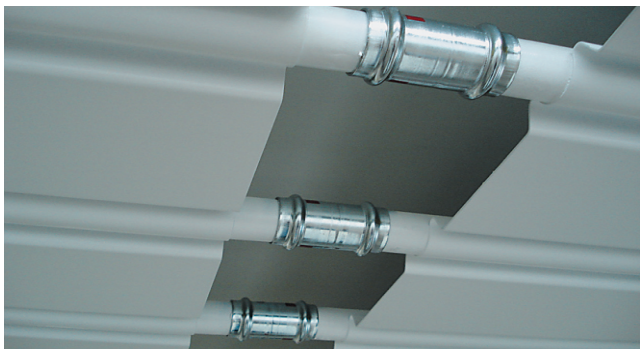
As ready to connect elements, the radiant panels are manufactured to a length of up to maximum 6 m. Strips over 6 m in length will be connected on site by welding together several partial lengths of radiant panels or by special press fittings.

Before the radiant ceiling panels can be hung, the fastening or mounting kits must be attached to the ceiling.

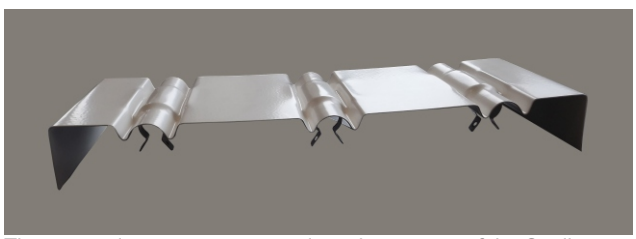
To ensure a perpendicular suspension of the mounting kits, are variable suspension eyes available as accessories, which can be screwed into the desired position in the radiant panels.

To avoid bending of the panel, a maximum distance of 2 m between the suspension bars and 1 m the beginning and end of the radiant ceiling panel should not be exceeded.

The suspension points must withstand the operating weight of radiant ceiling panels. Also, the suspension points must (depending on the construction length of the radiant panels and the heating medium temperature) compensate the expansion, without damaging the cailing or roof.



Specially developed Sunline “sliding sleeves” enable the pressing together of the individual panels to long strips



The pressed contour corresponds to the contour of the Sunline „sliding sleeves“.

The individual radiant ceiling panels are fixed to the mounting kits under the ceiling and assembled into strips using suitable equipment such as a scissor lift platform or a cherry picker.

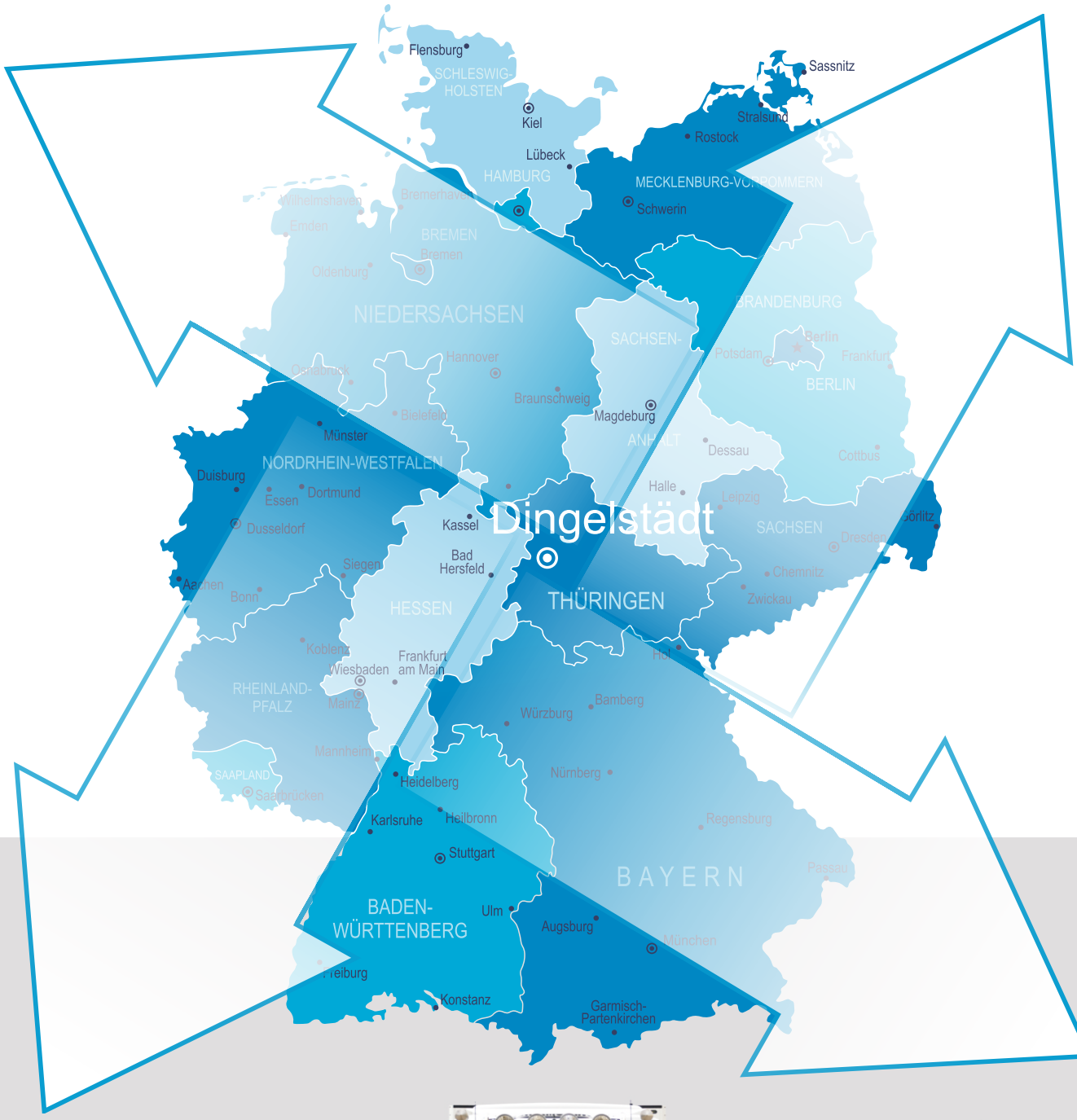
The radiant ceiling strips must be necessarily in aligned, possibly different lateral distances of pipes to be averaged out before the pipes are welded or pressed.

For pressing together and as an alternative to welding, special Sunline “sliding sleeves” are available.

After the leak test the cover plates (which cover the joints of the strips) are attached. Attachment of the cover plates is by means of mounting brackets, including the supplied safety spring split pins.

After completion of the installation work, proper sitting of the thermal insulation must be checked and corrected if necessary with the help of the down holders.

Our central location in the heart of Germany and Europe
ensures reliable and prompt delivery...

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Wärmen wie die Sonne
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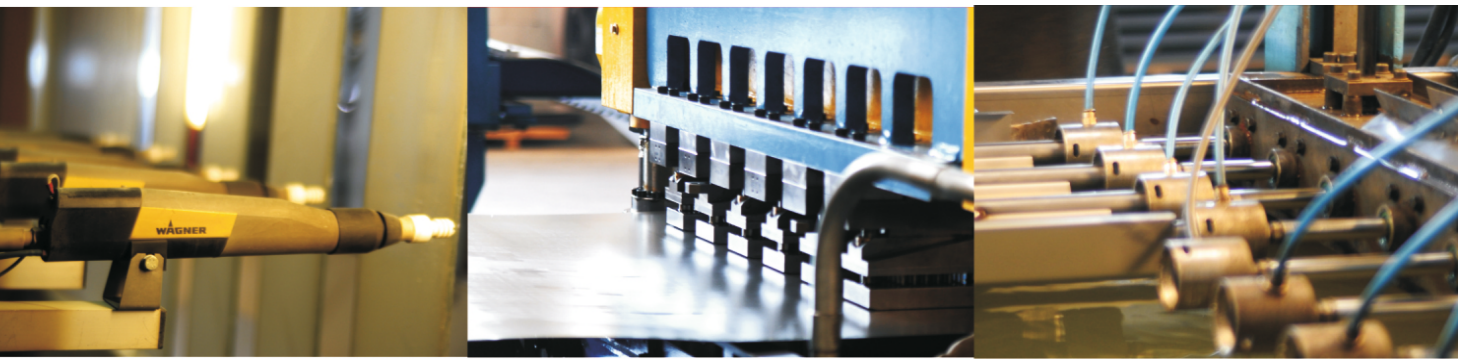


Sunline offers everything from one source...

... Advice from our sales staff

... Planning by our factory technicians

... State of the art production line

... Installation by our technicians

... Acceptance of the entire system

Sunline products are ...

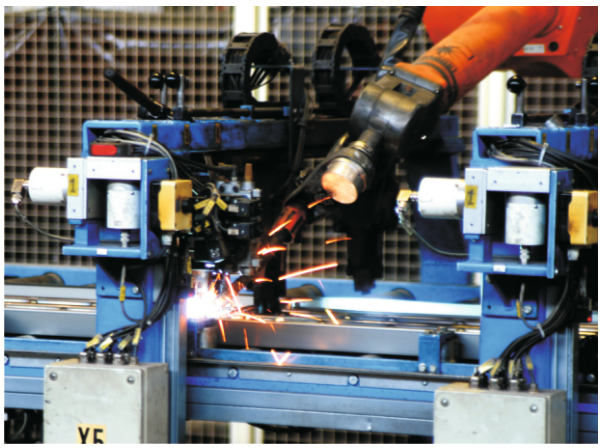
... energy efficient and maintenance free

... durable and hygienic

... comfortable and silent

... future-proof and draft-free

SUNLINE Deckenstrahlungsheizungen GmbH



Sunline assists you during the entire construction phase. We provide individual and competence advice; we find solutions and implement these in planning, production and installation, costumised to your premisses. The joint acceptance ensures transparent and flawless implementation of the entire project.

SUNLINE

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