EmmetiString

01.11.25

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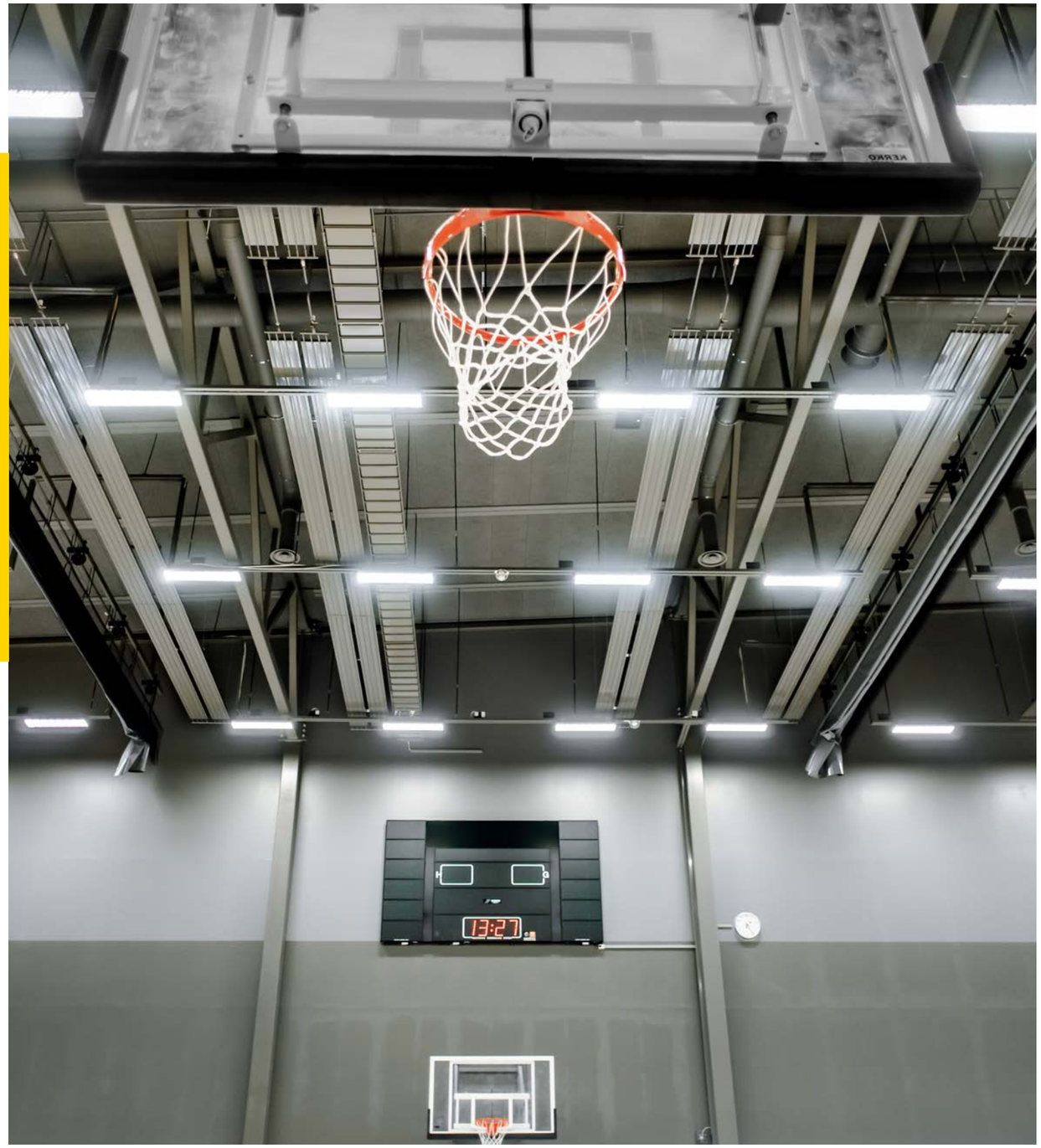

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Optimal Indoor Comfort

The EmmetiString radiant ceiling system is an economical option, in terms of both investment and operating costs.

Comfort Heating & Cooling:

- The EmmetiString radiant ceiling system enables an even distribution of heat
- It provides heating and cooling with no noise or draught
- The fanless EmmetiString system meets stringent hygiene requirements and saves on cleaning
- The system does not transport impurities in the air

Modular Construction:

- Easy installation & lightweight
- Locations include all 3-30 metre high spaces such as factories, warehouses, shopping centres, sports halls and much more

Features:

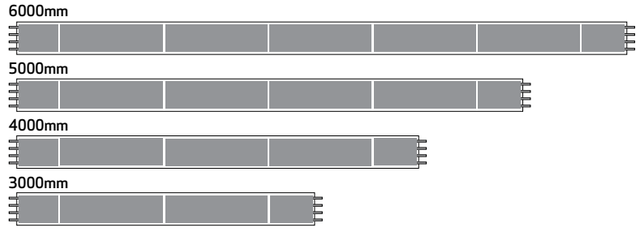
- Fully galvanised ensuring resistance to corrosion
- Durable
- Low water content
- Quick to react to change in system temperatures
- Modules can be connected with crimp fittings in excess of 50 metres length

Range Overview

All Emmeti radiant products and systems are made easy to install and durable. EmmetiString radiant panels create a uniform indoor temperature and do not circulate dust. Radiant panels are installed on the ceiling and thus allow for unrestricted use of floor and wall space. In large halls and industrial production facilities, energy savings up to 40% can be achieved.

- EmmetiString radiant ceiling panels are available in standard sizes of 3, 4, 5 and 6 metres in length
- EmmetiString can be powder coated in different RAL colours for your project

EmmetiString radiant ceiling panel standard lengths



Safe and Easy Installation

- Quick installation thanks to modular sections of 3, 4, 5 and 6m lengths
- Rigid, yet lightweight construction ensuring easy installation
- Factory-fitted thermal insulation
- Connected with crimp fittings (M-Type)
- Wet room option on request

Economy

- It is possible to design up to 3K lower in heating mode and up to 3K higher in cooling mode than the resultant temperature
- De-stratification fans not required, reducing energy consumption
- Very fast response to temperature changes

Optimal Indoor Comfort

- Thermal radiation works naturally
- Consistent temperature levels throughout radiant heated spaces
- Hygienic - radiant heat will not move dust within spaces

Technical Data

Description	
Maximum operating temperature of hot water	95°C
Maximum operating pressure	8 bar
Pipe-to-pipe distance	80mm
Pipe outer diameter	15mm
Panel standard width	320mm
Test pressure	10.4 bar
Panel weight with water and with insulation	4.5kg/m
Panel weight without water and with insulation	4kg/m

	EmmetiString1	EmmetiString2	EmmetiString3	EmmetiString4
Operating Weight	4.7kg/m	9.6kg/m	14.5kg/m	19.3kg/m
Width	320mm	704mm	1088mm	1472mm

NOTE: The panel weight of EmmetiString1/2 (2-pipe panel) is 0.8kg/m less compared to the EmmetiString1.

Heating & Cooling Outputs

The following tables show the heating and cooling capacity of the EmmetiString radiant ceiling panel as an over/under-temperature function. Over-temperature means the difference between the panel's average flow and return water temperature and the room design temperature (+). Under-temperature means the difference between the panel's average flow and return water temperature and the room design temperature (-).

$$\Delta t = \left(\frac{t_1 + t_2}{2}\right) - t_i$$

t_1 = Inlet Water Temperature °C
t_2 = Outlet Water Temperature °C
t_i = Indoor Temperature °C

$$K \times \Delta t^n = \text{Output (w)}$$

K = Constant
Δt = Delta T
n = Exponent

Heating

Heating output for EmmetiString panel according to EN 14037-3

	2-Pipe Panels	4-Pipe Panels							
	Emmeti-String1/2	EmmetiString1		EmmetiString2		EmmetiString3		EmmetiString4	
K	0.8913	1.8453	0.4766	3.6906	0.9532	5.5359	1.4298	7.3812	1.9064
n	1.2206	1.1776	1.3329	1.1776	1.3329	1.1776	1.3329	1.1776	1.3329
Δ t (K)	W / m	W / m	Connected Manifold Headers	W / m	Connected Manifold Headers	W / m	Connected Manifold Headers	W / m	Connected Manifold Headers
70	159	275	137	549	274	824	412	1099	549
68	154	265	132	531	264	796	396	1062	528
66	148	256	127	513	254	769	381	1025	508
64	143	247	122	494	244	742	365	989	487
62	137	238	117	476	233	714	350	952	467
60	132	229	112	458	224	687	335	916	447
58	127	220	107	440	214	660	320	881	427
56	121	211	102	422	204	634	306	845	408
55	**119**	**207**	**100**	**414**	**199**	**620**	**299**	**827**	**398**
54	116	202	97	405	194	607	291	809	388
52	111	194	92	387	185	581	277	774	369
50	106	185	88	370	175	554	263	739	351
48	100	176	83	352	166	528	249	705	332
46	95	168	78	335	157	503	235	670	314
44	90	159	74	318	148	477	222	636	296
42	85	151	69	301	139	452	208	602	278
40	80	142	65	284	130	426	195	568	260
38	76	134	61	268	122	401	182	535	243
36	71	126	57	251	113	377	170	502	226
34	66	117	52	235	105	352	157	469	210
32	61	109	48	219	97	328	145	437	193
30	57	101	44	203	89	304	133	405	177
28	52	93	40	187	81	280	121	374	162
26	48	86	37	171	73	257	110	342	147
24	43	78	33	156	66	234	99	312	132
22	39	70	29	141	59	211	88	281	117
20	35	63	26	126	52	188	78	251	103
18	30	55	22	111	45	166	67	222	90
16	26	48	19	97	38	145	58	193	77
14	22	41	16	83	32	124	48	165	64
12	19	34	13	69	26	103	39	138	52
10	15	28	10	56	21	83	31	111	41

Cooling

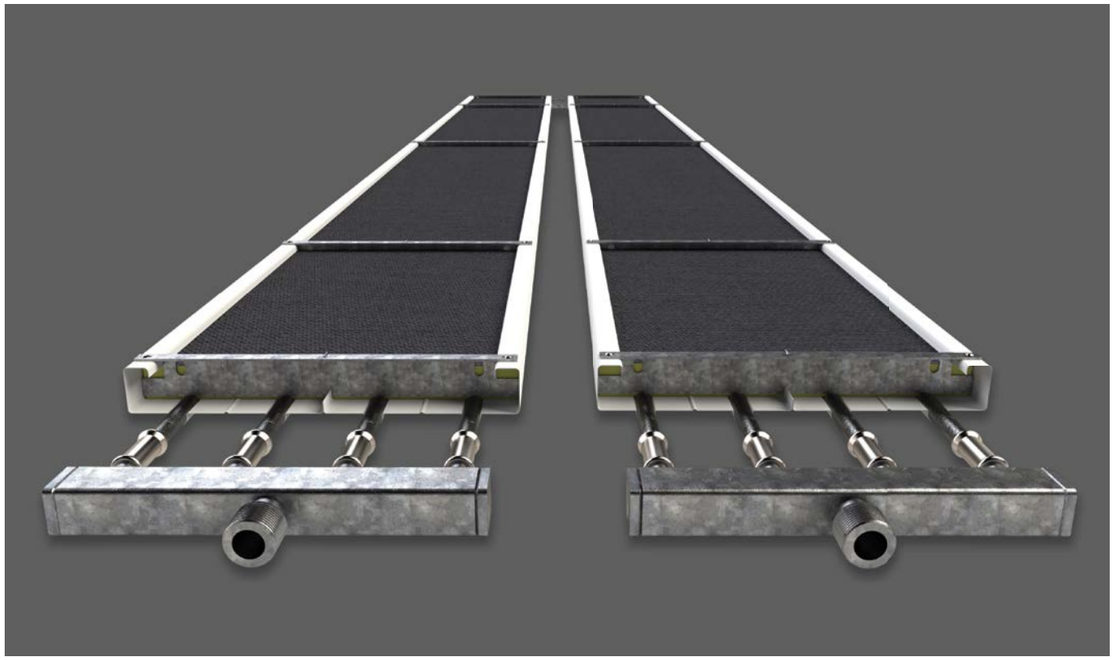
Cooling capacity for 4-pipe EmmetiString panel according to EN 14037-4

	4-Pipe Panels			
	Emmeti-String1	Emmeti-String2	Emmeti-String3	Emmeti-String4
K	2.5846	5.1692	7.7538	10.3384
n	1.1000			
Δ t (K)	W / m	W / m	W / m	W / m
15	51	102	152	203
14	47	94	141	188
13	43	87	130	174
12	40	80	119	159
11	36	72	108	145
10	33	65	98	130
9	29	58	87	116
8	**25**	**51**	**76**	**102**
7	22	44	66	88
6	19	37	56	74
5	15	30	46	61
4	12	24	36	48
3	9	17	26	35
2	6	11	17	22
1	3	5	8	10

Most Common Hydraulics Techniques

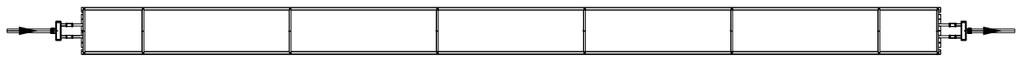
EmmetiString radiant ceiling panels can be installed separately or side by side. Depending on system requirements the water flow can be influenced by different header configurations. When selecting the correct header configuration, consideration must be given to ensure that turbulent flow is achieved.

The picture shows the manifolds to be used for the installation and the amount of the panels to be installed side by side. More information about the coupling techniques and the flow directions can be found below.



EmmetiString1/2

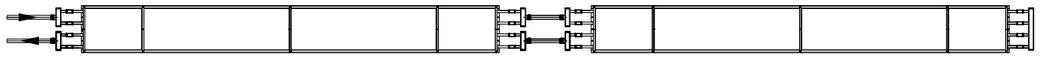
EmmetiString1/2, 1A2-1A2



EmmetiString1/2, 2A1-1B2

EmmetiString1

EmmetiString1, 2A2-2A2-2A2-1B4 (MAX, LENGTH 12M)



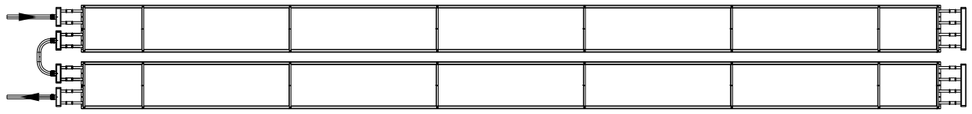
EmmetiString1, 1A4-1A4

EmmetiString1, 2A2-1B4

EmmetiString2

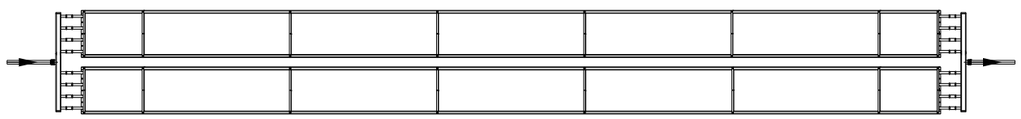
EmmetiString2, 2A4-2A4

EmmetiString2, 4A2-2B4



EmmetiString2, 2A4-2A4-z

EmmetiString2, 1A8-1A8-z

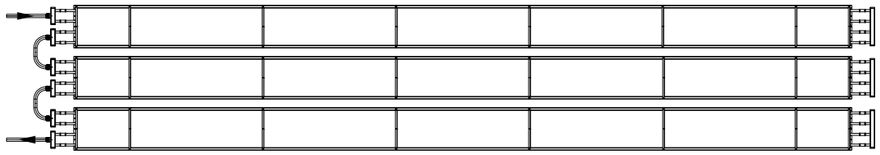


EmmetiString2, 2A4-1B8

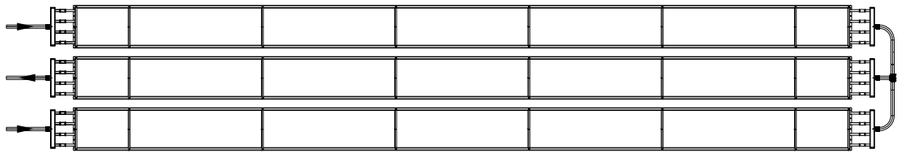
Most Common Hydraulics Techniques

EmmetiString3

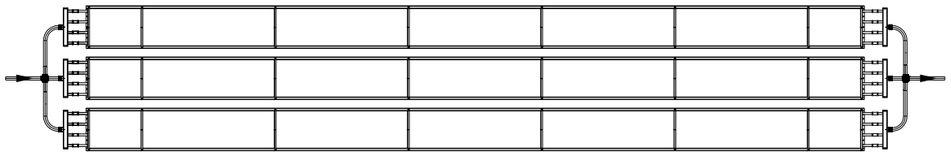
EmmetiString3, 6A2-3B4



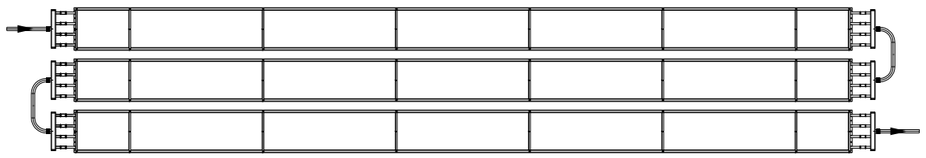
EmmetiString3, 3A4-3A4-x



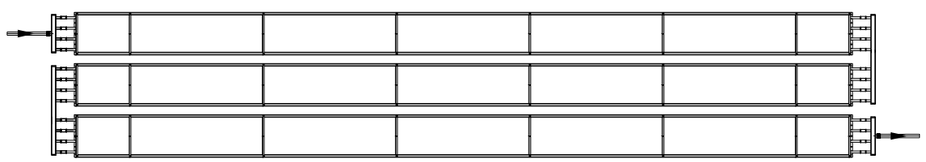
EmmetiString3, 3A4-3A4-z



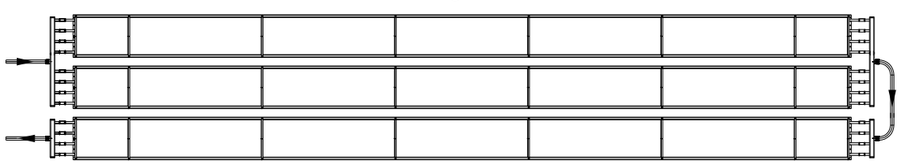
EmmetiString3, 3A4-3A4-z3



EmmetiString3, A4B8-B8A4-z3

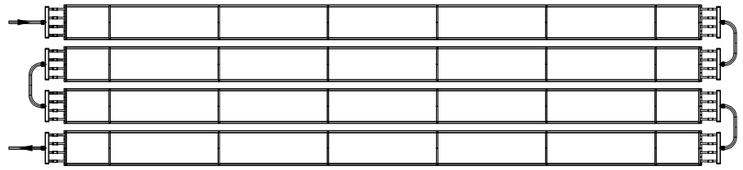


EmmetiString3, A8A4-A8A4

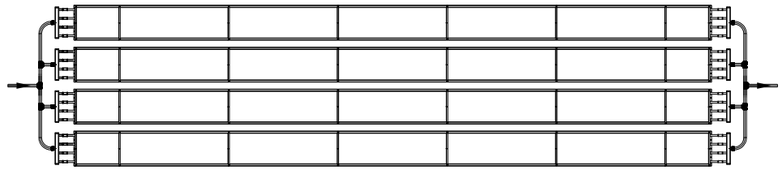


EmmetiString4

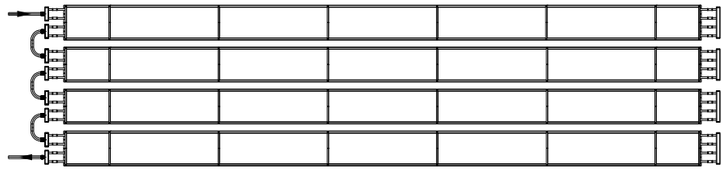
EmmetiString4, 4A4-4A4-2



EmmetiString4, 4A4-4A4-z

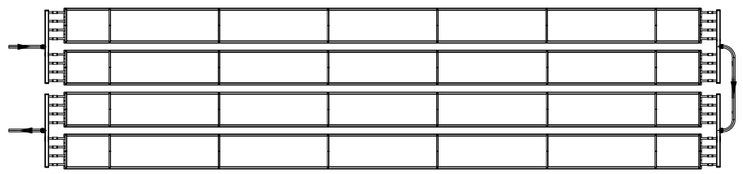


EmmetiString4, 8A2-4B4

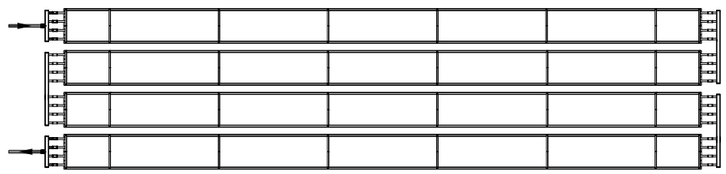


EmmetiString4, 4A4-4A4

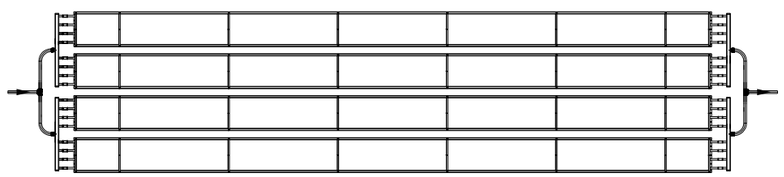
EmmetiString4, 2A8-2A8



EmmetiString4, A4B8A4-2B4

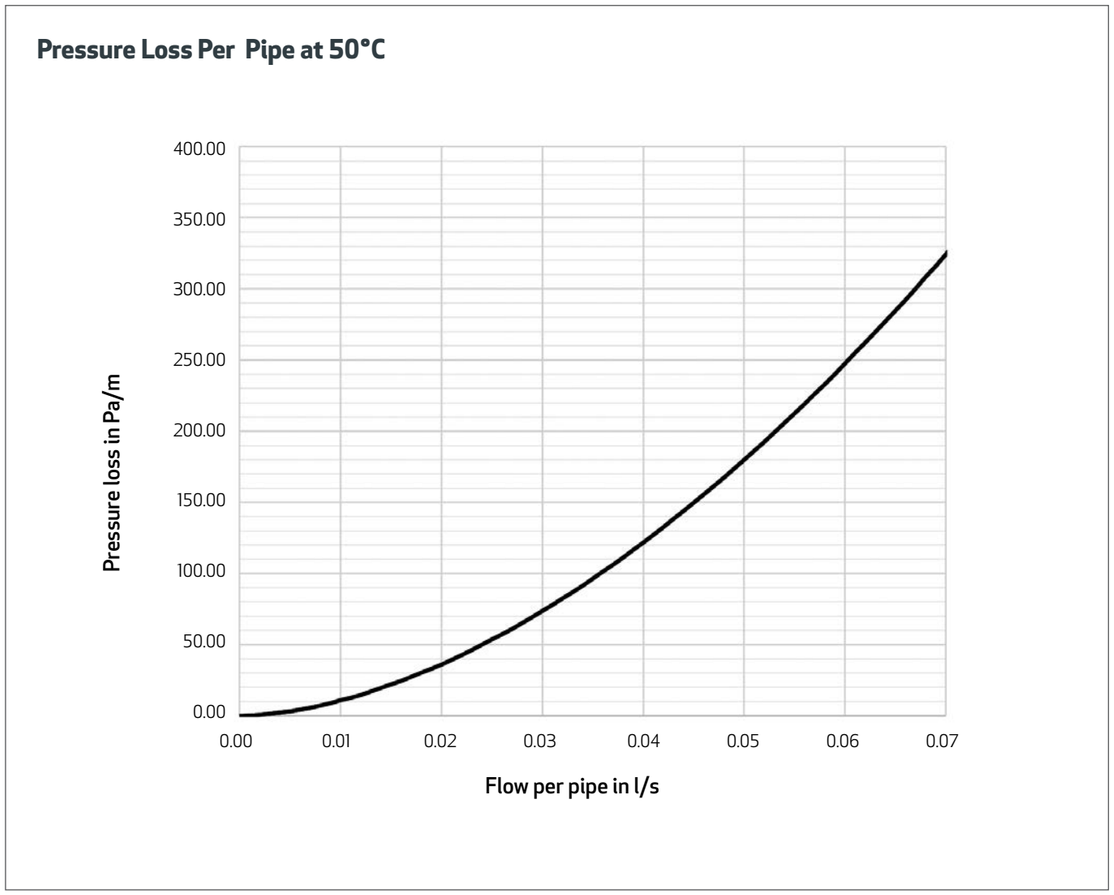


EmmetiString4, 2A8-2A8-z



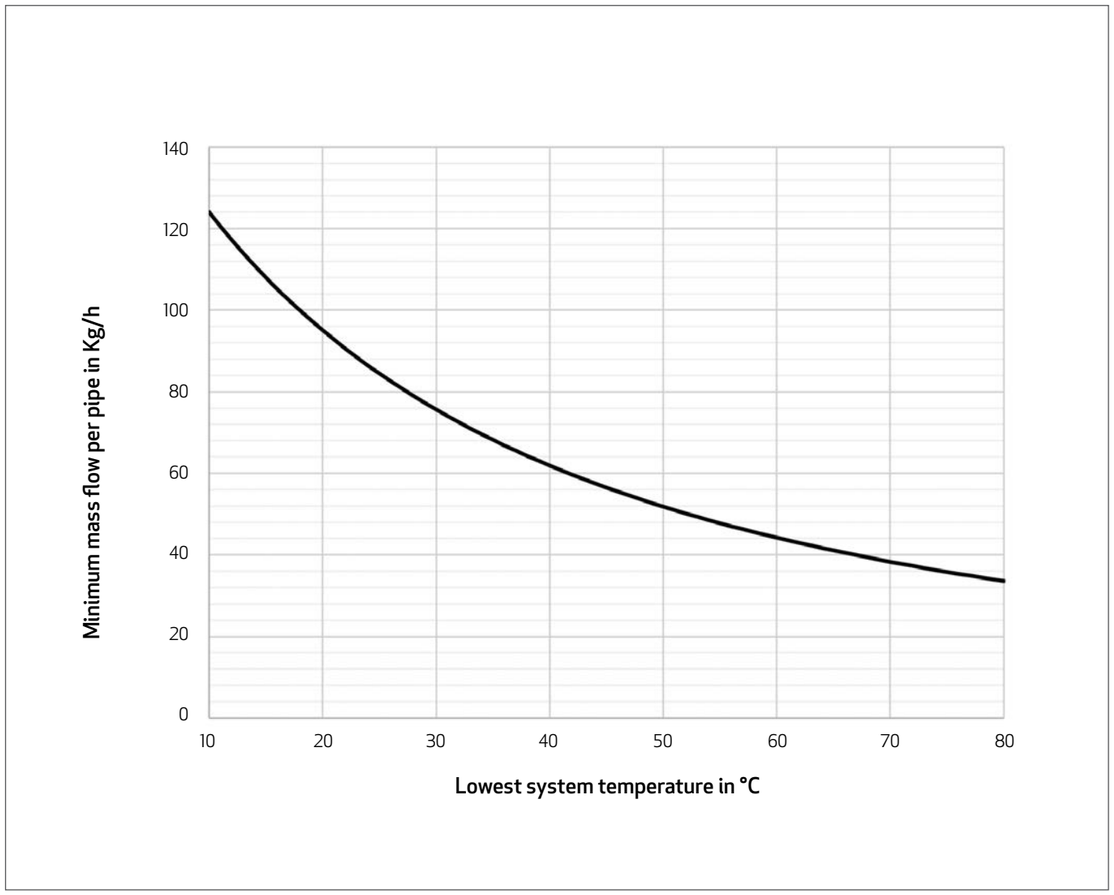
Pressure Loss Data

Pressure loss data are presented in the following diagram as a flow function.



Minimum Mass Flow

The diagram below represents the minimum mass flow in 15mm pipe in order to achieve turbulent flow. Turbulent flow in the pipes must be ensured to achieve the rated output. The minimum mass flow rate is determined by the system's lowest temperature. During heating, this aligns with the return temperature, while during cooling, or both cooling and heating, it corresponds to the cold water flow temperature. Failure to meet the minimum mass flow rate per pipe can result in a potential performance decrease of up to 15% in radiant panel systems.



Installation & Mounting

EmmetiString radiant ceiling panels are available as ready-to-install systems. EmmetiString1 is mounted by attaching the mounting kit to the fixed frame. If more than one panel is installed side by side, the panels are attached to a suspension bar, which, in turn, is fixed to the ceiling every 3 metres (distance). Individual panels are connected with crimp fittings.

Example of Bracket Axis Position for 18m Length Panel

NOTE: The distances between suspension bars can be found in the suspension axes document on the Merriott website.

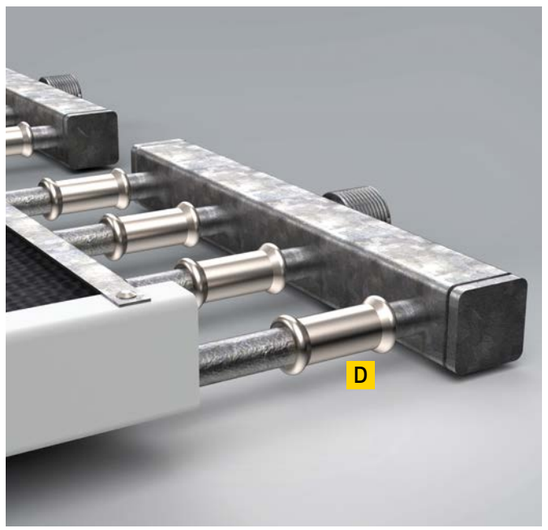
NOTE: Hangers must be positioned in a vertical position and aligned with each other to allow thermal expansion is possible.

After mounting and installation, the radiant panels must be pressure tested under controlled conditions, and the results documented.

Crimp Fittings:

All EmmetiString radiant panels must be connected with crimp fittings. Manifolds should also be be attached with crimp fitting (M-Type).

Manifold attached with crimp fittings D

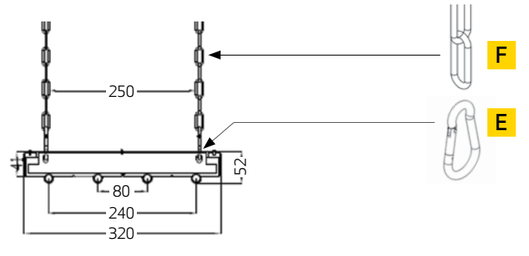


Individual panels connected with crimp fittings D

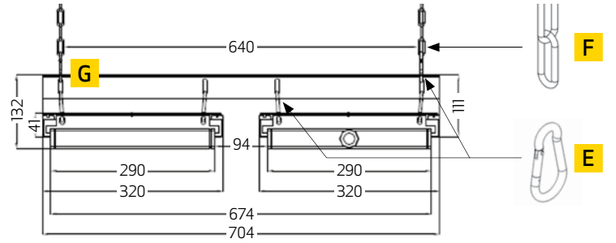
Mounting Kits Per Bearer		
Type	Quantity	Distance Between Fixing Points
1 EmmetiString radiant panel	2	250mm
2 EmmetiString radiant panels side by side	2	640mm
3 EmmetiString radiant panels side by side	2	512mm
4 EmmetiString radiant panels side by side	2	768mm

1m of hanging chain allowed per fixing point.

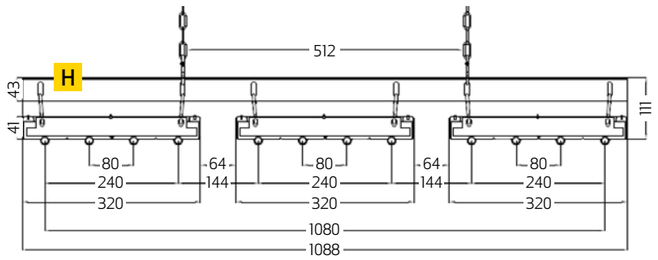
EmmetiString1



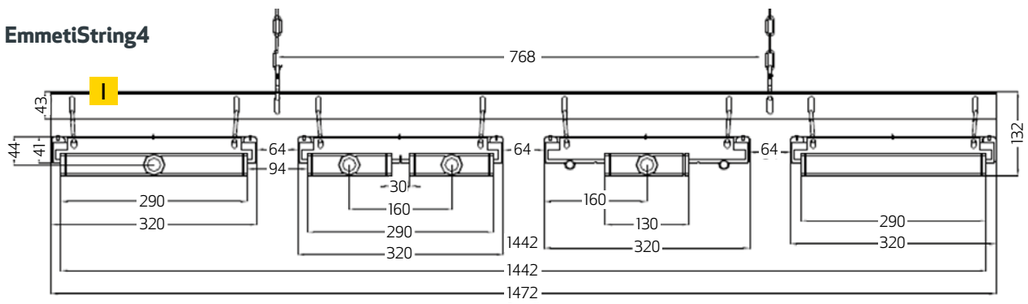
EmmetiString2



EmmetiString3



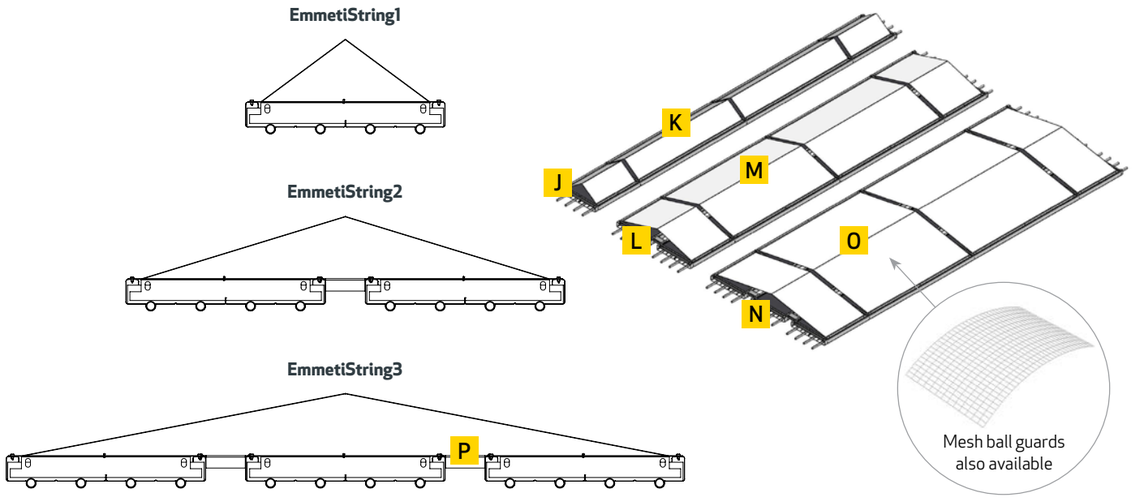
EmmetiString4

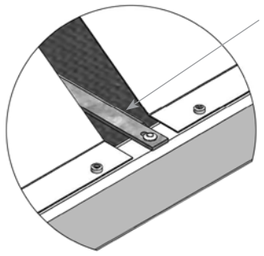


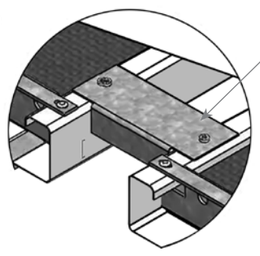
For accessories * see page 17 for details.

Ball Guard

The ball guards can be used for installations of EmmetiString1, EmmetiString2 and EmmetiString3 in sports halls and activity centres to prevent balls being trapped on the radiant panel.







Metric Weights	Unit	EmmetiString1	EmmetiString2	EmmetiString3
Operating weight	kg/m	4.7	9.6	14.5
Extra weight for ball guard	kg/m	2	3.9	5.9
Total weight	kg/m	6.7	13.5	20.4

NOTE: The panel weight of EmmetiString1/2 (2-pipe panel) is 0.8kg/m less compared to the EmmetiString1.

Accessories

The cover plates are used to cover the manifolds and are installed to cover the joints between the modules.

The dust protective shields ease the removal of the dust accumulated on the panels.

The mounting kits: the 3mm steel chains F and 5 x 50mm carabiner hooks E are used to suspend the panels.

The suspension bar is for side by side coupling.

For accessories * see page 17 for details.

Accessories

Ref.	Product	Product Code
A	**EmmetiString Manifold 4 Pipes 1"M**	ES-100040
B	**EmmetiString Manifold 4 Pipes**	ES-100041
C	**EmmetiString Manifold 2 Pipes 1"M**	ES-100020
D	**EmmetiString Crimp Fitting, 15mm**	ES-0487459
E	**Carabiner 5x50mm (100 pcs in a bag)**	ES-100012
F	**EmmetiString Chain 3mm, 50m**	ES-100014
G	**EmmetiString2 Suspension Bar**	ES-100704
H	**EmmetiString3 Suspension Bar**	ES-101088
I	**EmmetiString4 Suspension Bar**	ES-101472
J	**EmmetiString1 Ball Guard, 370mm, RR20**	ES-BG1-370
K	**EmmetiString1 Ball Guard, 972mm RR20**	ES-BG1-972
L	**EmmetiString2 Ball Guard, 370mm, RR20**	ES-BG2-370

Ref.	Product	Product Code
M	**EmmetiString2 Ball Guard, 972mm, RR20**	ES-BG2-972
N	**EmmetiString3 Ball Guard, 370mm, RR20**	ES-BG3-370
O	**EmmetiString3 Ball Guard, 972mm, RR20**	ES-BG3-972
P	**EmmetiString Ball Guard Support**	ES-100004
	EmmetiString Cover Plate, RR20	ES-100001
	End Cover for Manifold 4 Pipe 1"	ES-100002
	End Cover for 2x Manifold 2 Pipe 1"	ES-100002-2
	End Cover Manifold - No Cut Out	ES-100002-NO
	EmmetiString Glass Wool Insulation for Cover Plate	ES-100003
	EmmetiString Polyester Insulation for Cover Plate	ES-100003-E
	EmmetiString Dust Protective Shield, 310x420mm	ES-100008
	EmmetiString Dust Protective Shield, 310x1000mm	ES-100009

General Information

Handling

Due to their large size, the panels should always be handled with great care and attention. When removing the packages, carry the panels sideways to prevent bending. Avoid applying torque while carrying.

Insulation Options

Felt-covered mineral wool λ=0.033W/mK, thickness 30mm, fire resistance rating A1 (Standard)

Polyester fibre insulation λ=0.039W/mK, thickness 30mm, fire resistance rating B-s1-d0

Maintenance and Cleaning

The system requires very little maintenance. If there are signs of external damage, the pipes need to be inspected for leaks. Dust accumulated on top of the panels can be removed with an industrial vacuum. If this does not help, wipe the panels with a damp cleaning cloth. Avoid abrasive agents when cleaning the radiant surface. To avoid streaks and other marks, change the cleaning water regularly. If there are signs of external damage, the pipes need to be inspected for leaks.

Warranty

Emmeti grants its products a 5 year warranty period from the delivery date.

Tender Specification

The EmmetiString radiant ceiling panel is a modular system and consists of a both sides galvanised steel plate with a thickness of 0.5mm.

> The steel plate of the 320mm wide base module is rolled-formed into four omega-shaped grooves in which an externally galvanised precision steel tube Ø15 x 1.2mm according to EN 10305 is embedded.

> The profile is attached to stiffening crossbars with a stiff spring. This ensures that despite any torsional stress on the module during installation, the pipes remain securely in place in the profile. The sheet steel is factory-painted in Winter White RR 20, and there is a protective varnish on the inside of the profile on the galvanising. The sheet steel is factory-painted in Winter White RR 20, and there is a protective varnish on the inside of the profile on the galvanised surface.

> The radiant panel gains rigidity thanks to the side edging, the profile design and additional stiffening bars. The lateral edgings also serve as anchorage for the stiffening crossbars and to keep the thermal insulation in place. The sturdy crossbars are mounted in a longitudinal grid of one metre in the modules and can also be used as suspension bars: this offers optimal flexibility in mounting. The radiant panel with a single module line can be suspended from the crossbars directly to the ceiling with chain sets or cable wires at intervals of 3 metres. If the panel consists of several modules mounted in parallel, they are first hung together by a multi-suspension bearer so that the number of required ceiling anchor points is optimised and reduced to a minimum: only 2 pieces every 3m are needed.

> The water flow within the panel is defined by the headers and collectors selected from Emmeti's range. These manifolds are connected to the main pipework of the network on the supply and return side of the panel with a 1" external thread connection. The manifolds are in turn connected to the panel by means of 15mm slip coupling crimp fittings. The venting of the system should be through installation of venting bottles mounted on the main pipe flow and return side. Filling and emptying should also be carried out by the installer with suitable valves.

> The panel elements are 3000, 4000, 5000 or 6000mm long and 320mm wide, longer panels can be made by connecting modules with 15mm slip coupling crimp fittings. If necessary, the joints and manifolds connections can be covered with cover plates and end covers.

> EmmetiString radiant ceiling panels are protected against corrosion according to EN 10169. The protection method is tested in a state chamber according to EN 442-2.

> Protection against scratches and slight impacts is classified in the highest class "0" according to EN ISO 2409. Thus the EmmetiString radiant ceiling panels are resistant to high humidity and aggressive atmosphere.

> The thermal insulation consists of mineral wool reinforced on the top with a glass fibre fleece mat according to EN 14303, λ = 0.040W/mK, thickness 30mm, fire class A1.

> The acoustic performance is tested according to EN 354 and evaluation of sound absorption determined according to EN 11654 with test report EUFI29-21004456-T3-DE and with an αw=0.55.

> The ball impact resistance of EmmetiString was tested with a handball (16.5m/s) according to DIN 18032-3. Ball guard hoods or grilles for sports halls are available on request.

> The EmmetiString 320mm module and has an operating weight of 4.7kg per metre.

> Required water quality of the closed heating circuit according to VDI 2035.

> Maximum standard operating conditions: 95°C and 8 bar (higher operating conditions on request).

> Heating capacity according to EN 14037-3 and Δt= 55K: 200W/m for EmmetiString standard with 4 pipes.

> Heating capacity according to EN 14037-3 and Δt = 55K: 119W/m for EmmetiString with 2 pipes in the middle.

> Cooling capacity according to EN 14037-4 and Δt = 8K: 25W/m for EmmetiString standard with 4 pipes.