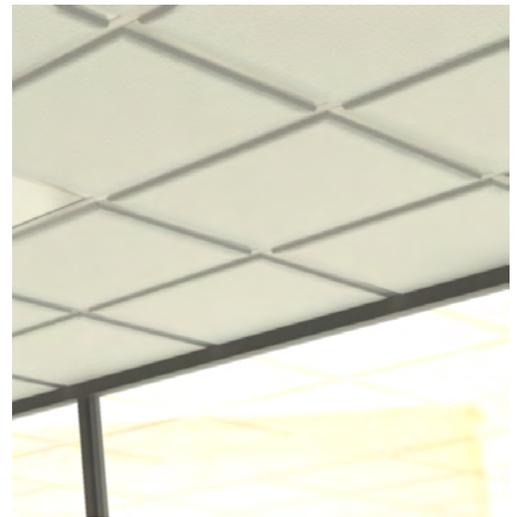
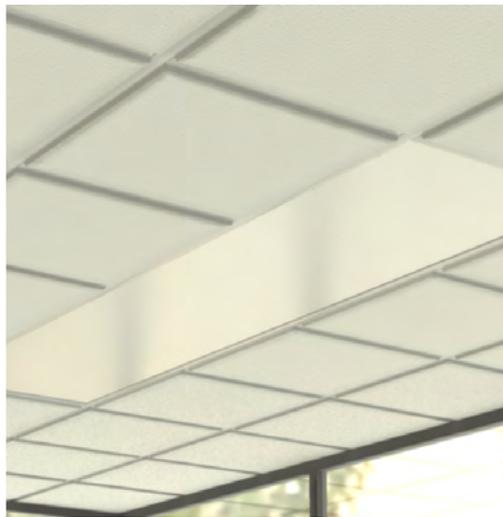


the future of space conditioning

# Modula High Performance radiant heating panel



#### **Application**

Commercial, hospitals, hotels, schools, shops, sports halls, offices, laboratories, food industry etc.

#### **Installation**

Ceiling integrated  
Free hanging

#### **Capacity**

187 BTU/hr/ft<sup>2</sup> @ 99 dTF

#### **Features**

Smooth finish  
Technology proven of 50 years  
Low construction depth  
High capacity  
Cost effective  
Simple to install

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## Contents

<b>Introduction</b>	3
<b>Function</b>	4
<b>Installation</b>	5
<b>Heating Effect</b>	6
<b>Manifold, Coupling &amp; Connection Arrangement</b>	7
<b>Testing Protocols</b>	8

# Introduction

## How does ceiling heating work?

If hot air rises, why and how can a 'Radiator' on the ceiling be effective? - This is most people's reaction to the idea of utilizing a Radiant Ceiling heating panel system.

The basic way to explain on how such a system works is to compare the principle of our own 'Sun' - when you stand in direct sunlight you feel an almost immediate increase in temperature, this is due to the radiant energy that is transferred direct from the 'Suns' rays warming your skin.

A radiant ceiling heating panel system works on the same principle - it transfers a large proportion of its heating energy via radiation (typically up to 60% of panels overall heat output) direct to all and any of an areas surface it 'sees', traveling in much the same way as light is distributed and reflected in an area.

It is due to this 'reflection' and the constant radiation exchange between all room surfaces continuously striving to level out that ensures a very even temperature spread throughout an area.

Additionally this same radiant effect ensures that all room surfaces are heated to a higher temperature when compared to a conventional heating system. This means that a comfortable indoor climate temperature can be achieved with lower air temperatures than realized with a convective heating system - potentially up to 5-6°F lower. The net result of this is a reduction in the heat loads and energy consumption in any area that utilizes a radiant ceiling heating panel system.

## Modula HP Heating Panel



### Description

Modula is an unobtrusive modular heating cassette. The cassettes are manufactured from 20 gauge smooth-faced steel panels and are designed to be integrated within a standard  $\frac{5}{8}$ " exposed grid ceiling system. Copper pipes are expanded under pressure into extruded aluminum pipe seats to give high metal-to-metal contact and the pipe seats are then securely fixed to the rear of the steel panels. Consequently, the arrangement delivers excellent heat transfer characteristics. Panels are insulated with 1" thick class 'O' foil wrapped mineral wool insulation 16 lb/ft<sup>3</sup> density. The technology employed in the construction of the cassette results in very high heating capacity at low water mass flow rates.

Modula has been specifically developed for use in schools and healthcare environments where a smooth faced simple-to-install panel width with high heating capacity is the preferred solution.

### Standard Features

- Modular system to fit into 2ft exposed grid ceiling.
- Modular nominal lengths; 2ft, 4ft, 6ft, 8ft, 10ft.
- Panel depth 1'  $\frac{3}{4}$ ".
- Smooth faced, unobtrusive design.
- 187 BTU/hr/ft<sup>2</sup> @ 99 dtK room (mwt - room temp).
- Standard polyester finish White RAL 9010 (25% gloss).

*water connections:*  $\frac{5}{16}$ " (15mm) OD Copper, to EN12449/EN127352

*weight:* less than 4.3 lb/ft<sup>2</sup> per section.

### Connection Possibilities

water; vertical, same end for flow and return.  
Alternative options available upon request.

### Maintenance

The unit has no moving parts, and therefore maintenance requirement is limited to periodic cleaning of the surface of the panel with a soapy sponge and drying with a cotton towel.

### Installation

Standard fixing arrangement from the structural soffit using rigid or flexible wire hangers (supplied by others), suspended via pre punched keyhole slots.

For simplicity and flexibility we recommend that flexible stainless steel braided EPDM hoses (supplied by others) are

# Function

With an output of 187 BTU/hr/ft<sup>2</sup> at 99 dTF. Modula is one of the most efficient smooth - faced radiant heating panels currently available.

The secret to Modula's outstanding performance lies in its unique method of expanding the water-carrying copper pipes within the heat radiating aluminum extrusions. The extrusions are then mechanically bonded to the aluminum panel face using a heat transfer adhesive. Due to the high metal-to-metal contact between the copper waterways and extrusions and the fact that the aluminum pipe seats are fully bonded to the panel face, the energy transport between the pipe and panel face is extremely efficient.

The manufacture of Modula is semi-automated in our purpose-built facility; consequently panels can be produced to very high tolerances. Furthermore, the processes employed and the standardized design means that the cost of Modula remains highly competitive.

Modula is so simple to install that it is most often fitted by the ceiling installer.

## Design

*Dimensions:* Modula is available in two widths, as standard - 2ft and 1ft. The dimensions are reduced (minus 3/8" on length and width) so that panels can be integrated within a traditional suspended ceiling using exposed T-bars (2ft wide) on a 2ft x 2ft grid module. The depth of the Modula panel is just 1' 3/8".

*Lengths:* Modula is produced in module lengths of 2ft, 4ft, 6ft, 8ft and 10ft as standard; non-standard lengths are available upon request.

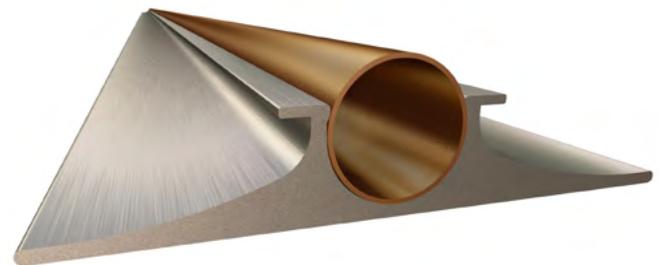
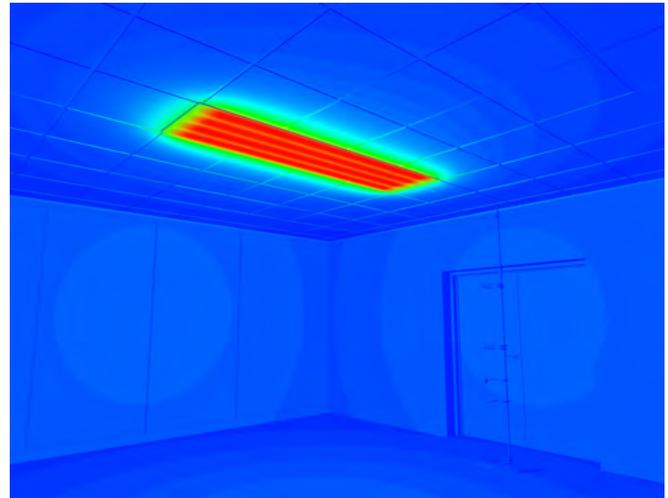
*Water connection:* Modula is available with two different connection configurations (C and D) please see page 7 for further details.

*Surface finish:* Modula is polyester coated as standard in white RAL 9010, gloss value 25%, emissivity 0.94.

*Insulation:* Modula is supplied with integrated 1" thick 16 lb/ft<sup>3</sup> class 'O' foil wrapped mineral wool insulation within the panels returned flanges.

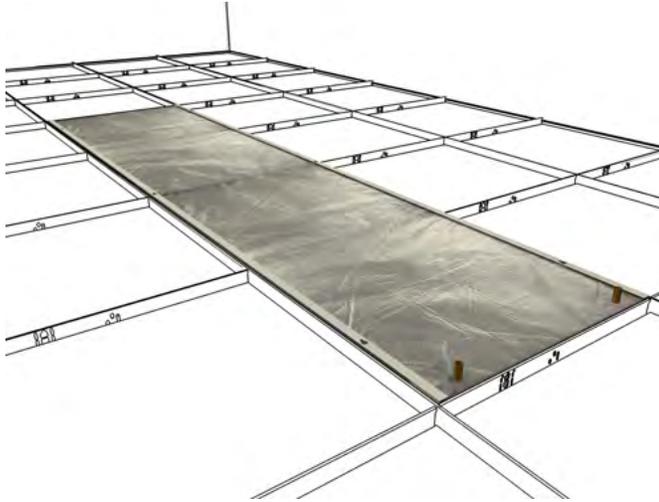
## Application

Modula is particularly suited for use in hospitals, schools, shops and offices; in fact wherever there is a need for a high-output radiant heating panel which is simple to install, easy to keep clean and comes at a very competitive price. Modula is the perfect solution for integration with an exposed grid ceiling system, but is equally suited to free hanging applications. The panel can also be adapted to suit surface mounted applications.



# Installation

The Modula panels are designed to be fixed directly back to the structural soffit. Panels are supplied with pre-punched keyhole slots which are suitable for suspension using rigid or flexible wire hanging systems (by others). Four holes are required for each heating panel up to 6ft long, each positioned no more than 7 1/8" in from each end. Panels 6ft long or over require 6 No. fixings.



It should be remembered that the ceiling system "main runners" must be designed to run either side of the Modula panel and parallel to its long sides. Ceiling system "cross noggin" bayonets must be capable of being bent back so as not to clash with the Modula panel.

For simplicity and flexibility we recommend that flexible stainless steel braided EPDM hoses (supplied by others) are used to connect the Modula panel.

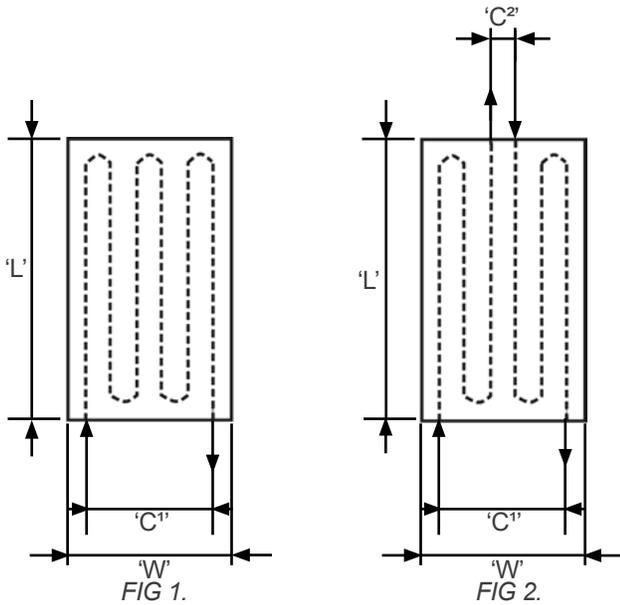


# Heating Effect

Panel Dimensions		$\Delta tK$ (Mean water Temperature less room temperature ( $^{\circ}F$ ))								
		87	90	94	98	99	101	105	108	112
Width (ft)	Length (ft)	$Q'$ (BTU/hr)	$Q'$ (BTU/hr)	$Q'$ (BTU/hr)	$Q'$ (BTU/hr)	$Q'$ (BTU/hr)	$Q'$ (BTU/hr)	$Q'$ (BTU/hr)	$Q'$ (BTU/hr)	$Q'$ (BTU/hr)
2	2	614	645	676	706	723	737	771	802	833
2	4	1228	1290	1351	1413	1443	1477	1539	1604	1669
2	6	1843	1935	2027	2119	2167	2214	2310	2406	2501
2	8	2457	2580	2702	2829	2890	2952	3078	3207	3334
2	10	3071	3224	3378	3535	3613	3692	3849	4009	4170
3	2	921	966	1013	1061	1085	1109	1153	1201	1249
3	4	1843	1935	2027	2119	2167	2214	2310	2406	2501
3	6	2764	2900	3040	3180	3252	3323	3463	3607	3750
3	8	3685	3869	4054	4241	4333	4429	4620	4811	5002
3	10	4606	4835	5067	5302	5418	5538	5773	6012	6251

Above stated radiant outputs based on 180°F Flow and 160°F return with a room temperature of 71°F.

# Manifold, Coupling & Connection Arrangement



Coupling Type	C6	D6
Pipe Configuration	FIG 1.	FIG 2.
Length 'L'	M - $\frac{5}{16}$ "	M - $\frac{5}{16}$ "
Width 'W'	2ft	2ft
Con. Centre 1 'C1'	19' $\frac{1}{16}$ "	19' $\frac{1}{16}$ "
Con. Centre 2 'C2'	N/A	3' $\frac{1}{16}$ "
Water Content (per tube)	0.01 US Gal/ft	0.01 US Gal/ft
Panel Weight (Dry)	7.7 lb/ft	7.7 lb/ft
Minimum Flow Rate*	0.19 gpm	0.19 gpm
Maximum Flow Rate**	1.664 gpm	1.664 gpm
Thermal Expansion***	0.0192 in/ft	

**Note:** All flow and return connections manifolds are  $\frac{1}{2}$ " OD vertical.

\* @ 168.8°F MWT

\*\* (3.3 ft/s) with  $\Delta P = 3.2$  ft H<sub>2</sub>O (10ft long panel)

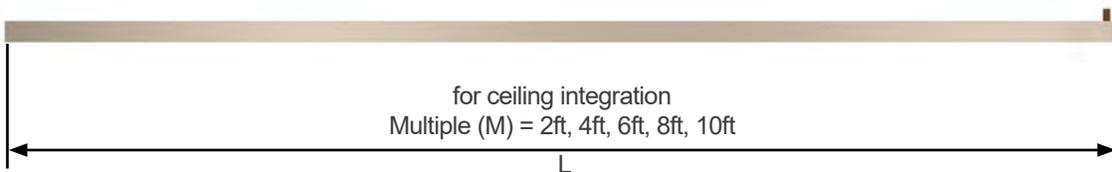
\*\*\* @ 131°F Above Ambient

## Width & Depth ft/inches



Modula is manufactured in standard module lengths (L) from 2ft, up to 10ft. Actual dimensions are less  $\frac{5}{16}$ " to fit into standard T-bars. All panels are manufactured to a dimensional tolerance of  $\frac{1}{16}$ ".

## Length ft/inches



Modula is manufactured in standard module lengths (L) from 2ft, up to 10ft. Actual dimensions are less  $\frac{5}{16}$ " to fit into standard T-bars. All panels are manufactured to a dimensional tolerance of  $\frac{1}{16}$ ".

# Testing Protocols

Maximum working pressure	126 PSI
Maximum test pressure	188 PSI
Classification category	SEP
Pressure equipment directive 97/23/EC	

## Extrusion Specification

Section tolerances	BS 1474
Chemical properties	BS 1472
Heat treatment	BS 1490

## Thermal Insulation

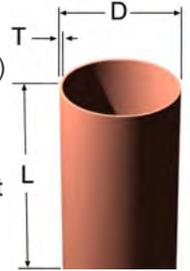
Modula panels are supplied with integrated 1" thick 16 lb/ft<sup>3</sup> class 'O' foil wrapped mineral wool insulation within the panels returned flanges.



## Copper Pipe Specification

The copper pipe used in the manufacture of the Modula heating panel is compatible with the European Standard for Copper Tubes EN12449/EN12735-2. The dimensional specification are as follows;

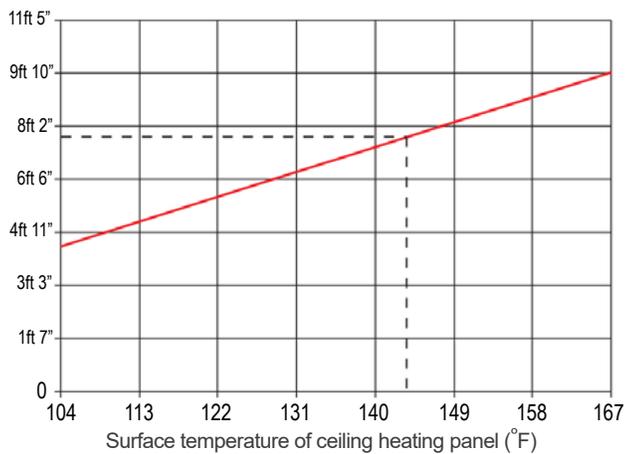
Outside Diameter (D):  $\frac{9}{16}$ " (15mm  $\pm$  0,04mm)  
 Wall Thickness (T):  $\frac{1}{64}$ " (0.38mm)



**Note: Modula radiant panels come supplied with brass compression straight couplers (supplied loose for fitment on site by others) for use between the  $\frac{9}{16}$ " OD copper tails on the Modula radiant panel product and  $\frac{1}{2}$ " (nominal) site copper pipework – outside diameter of site copper pipe assumed to be 0.625 (i.e Type K, Type L or Type M  $\frac{1}{2}$ " nominal copper tube) (Subject to availability).**

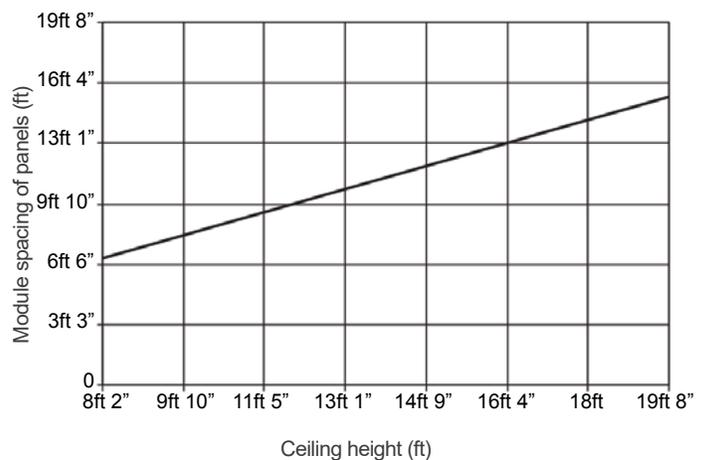
## Modula Dimension Guidelines

Installation heights and temperature



Guide to lowest installation height for the ceiling heater with radiant temperature asymmetry of 41°F. Assumes panel installation adjacent to cold wall/window.

Panel Spacing



Recommended spacings between heating panels (centre-to-centre).





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