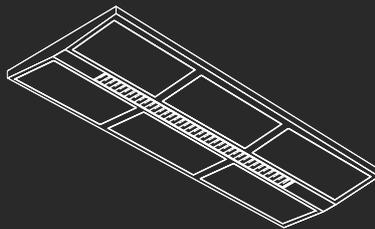


FOR LED OPTIONS PLEASE CONTACT LUMITRON  
FOR A DATA SHEET  
info@lumitron.co.uk  
01923 226222



**Silentium**  
INTEGRATED ACOUSTIC LUMINAIRES



## Architecture & Schools

### Changes In Design

There is increasing pressure from the government to increase sustainability, therefore architects have been finding ways to help decrease the carbon footprint of their buildings.

This can be accomplished in schools by the removal of suspended ceilings. This helps to reduce the cost of heating and cooling the building through the use of thermal mass.

However it creates a problem for acoustic absorption, a job traditionally done by ceiling tiles, with these removed, sound is free to reverberate for longer.

### BB93 Performance Standards

Type of room	T <sub>int</sub> <sup>2</sup> (seconds)
Nursery school playrooms	<0.6
Nursery school quiet rooms	<0.6
Primary school: classrooms	<0.6
Secondary school: classrooms	<0.8
Open-plan	
Teaching areas	<0.8
Resource areas	<1.0
Music	
Music classroom	<1.0
Small practice/group room	<0.8
Ensemble room	0.6 - 1.2
Performance/recital room <sup>2</sup>	1.0 - 1.5
Recording studio	0.6 - 1.2
Control room for recording	<0.5
Lecture rooms <sup>3</sup>	
Small (fewer than 50 people)	<0.8
Large (more than 50 people)	<1.0
Hearing impaired student classrooms	<0.4
Study room	<0.8
Libraries	<1.0
Science laboratories	<0.8
Drama studios	<1.0
Design and Technology Areas	<0.8
Art rooms	<0.8
Assembly halls, multi-purpose halls (drama, PE) <sup>2,3</sup>	0.8 - 1.2
Audio-visual, video conference rooms	<0.8
Atria, circulation spaces used by students	<1.5
Indoor sports hall	<1.5
Gymnasium	<1.5
Dance studio	<1.2
Swimming pool	<2.0
Interviewing/counselling rooms, medical rooms	<0.8
Dining rooms	<1.0
Ancillary spaces	
Kitchens*	<1.5
Offices*, staff rooms*	<1.0
Corridors, stairwells	See Section 1.1.6
Coats and changing areas*	<1.5
Toilets*	<1.5

## The Issues

### Increased Reverberation

*"A classroom with a long reverberation time of several seconds will cause syllables to be prolonged so that they overlap and hence degrade speech intelligibility".*

DFES (2003) Building Bulletin 93, Acoustic Design for Schools 4.3

Therefore when there is an increased reverberation time, words can become muffled and sentences blend together making it much harder to understand.

This causes the following issues:

### Children

Causes words to be missed from sentences and children find it very difficult to fill the gaps.

### Special Needs

High background noise means special needs children are unable to listen as they require a very low level of background noise to understand what is being communicated.

### Teachers

Their job becomes more demanding and increases their stress level.

### In Emergency

Critical instructions may be miss-interpreted.

## Requirements

### Building Bulletin 93

Building Bulletin 93 outlines the required reverberation times for different areas within schools.

*"The objective is to provide suitable reverberation times for (a) clear communication of speech between teacher and student, and between students, in teaching and study spaces and (b) music teaching and performance."*

DFES (2003) Building Bulletin 93, Specification of acoustic performance 1.1.5.

The requirements for acoustic absorption of the mid-frequencies (500Hz, 1kHz and 2KHz) within general teaching areas of a secondary school is <0.8 and in a primary school <0.6.

With the Silentium lighting installation, these values can be met due to the incredibly high quality of the foam used along with good fitting design ensuring maximum absorption by the foam.

## Solution

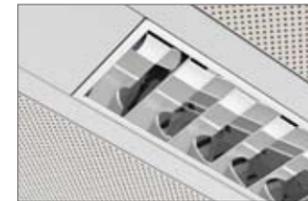
- Industry leading Acoustic absorption.
- Non shedding acoustic material.
- Bespoke solutions.
- High LOR - L2 compliant.
- Flexible design.
- Independently tested product.
- Project management and product testing solutions.
- Project/site modelling for both lighting and acoustic applications.



# Silentium

INTEGRATED ACOUSTIC LUMINAIRES

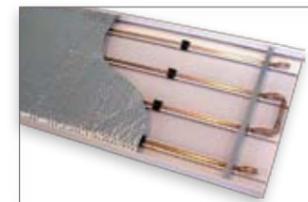
## Introduction Lighting



Full details on Page 6.

The Silentium offers great efficiency and very high LOR. The optical performance of the Silentium is one of the best on the market. With the MIRO SILVER louvre option the Silentium can offer an LOR of up to 78% with great light distribution in compliance with LG7.

## Radiant Heating



Full details on Page 10.

The Silentium offers the ability to be combined with radiant heating, allowing for a true all in one solution. Radiant Heating contained within the Silentium provides an unobstructive, effective and efficient form of radiant heating.

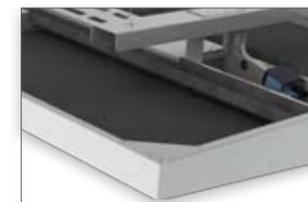
## Integrated Services



Full details on Page 11.

The Silentium allows integrated services to be installed into the infill panels with pre-cut holes during manufacture. Cabling can be neatly managed along the internal wireways.

## Acoustics



Full details on Page 8.

The Silentium has been designed to fulfil the requirements of a highly effective sound absorbing product which helps to reduce reverberation times. Achieved through industry leading sound absorption foam contained within the wings of the luminaire.

## Lighting Controls



Full details on Page 10.

The Silentium allows a wide range of lighting control sensors to be installed into the infill panels of the Silentium system.

## Infill Panels



Full details on Page 11.

The Silentium is designed to be a continuous system allowing for concealed cabling. Custom designed infill sections are available to meet specific requirements or needs including integrated controls/services and angled corners.



### T5 Eco lamps

The Masterline TL5 Eco range is the **latest in efficient lamp technology** from Philips. A unique coating and composition filling gas allows an **energy saving of up to 10%**, with no compromise on light levels.

Service lifetime (90% operating lamps): 24,000 hours. Average lifetime: 30,000 hours.

Equal to normal Masterline T5 range:

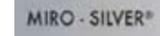
- Mercury content of only 1.4mg.
- Lumen maintenance of 90%.
- Same dimmable behaviour.



### MIRO SILVER® Louvre

MIRO SILVER® has a **total reflectivity of 98%** delivering high efficiency with little transmission loss, but also stays completely white with **no colour spectrum shift**, even after numerous reflections. It is also extremely durable and **will not fade or lose reflectivity**.

Our MIRO-SILVER® louvres ensure **high quality and durability**.



### Lighting Control

Infill panels can incorporate lighting controls enabling daylight linked dimming which is an effective way of reducing energy costs.

### MPK Controller

3mm Polycarbonate CDP Microprism controller also available.

- TPA Rated, UV Stable
- High Light Transmission of 92%
- High Temperature range up to 120°.

### LG3 & LG7

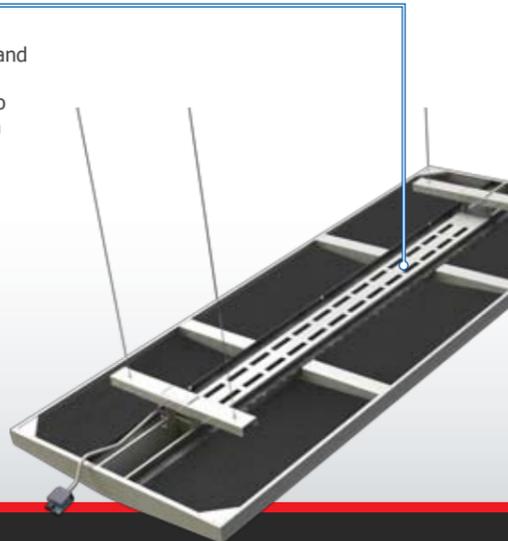
Silentium utilises light in a direct/indirect distribution illuminating the working plane and ceiling in the correct proportions to achieve LG7\*. Silentium emits light at high angles to illuminate walls and faces but benefits from limited glare.

### DLOR & ULOR

On projects the ratio can be altered to change the ULOR and DLOR to suit. The overall efficiency of the fitting is typically unaltered.

The MPK controller option as standard has an open back with clear diffuser. In this form the resulting polar curve has an increased upward light element.

\*This statement is correct when certain parameters are applied.



### Lamp Options & Efficacy

Lamp	LL/cw
1 x 25W T5 Eco	75.1 ll/cw
1 x 32W T5 Eco	75.7 ll/cw
1 x 45W T5 Eco	67.0 ll/cw
1 x 50W T5 Eco	64.3 ll/cw
2 x 25W T5 Eco	75.1 ll/cw
2 x 32W T5 Eco	75.7 ll/cw
2 x 45W T5 Eco	67.0 ll/cw
2 x 50W T5 Eco	64.3 ll/cw

### Lamp Colour

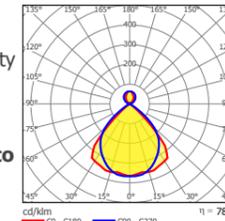
Lamp colour has the ability to effect our mental state and can help to improve alertness and productivity. The lamp colour is a result of the lamp temperature and colour rendering.

T5 Eco lamps are available in colours 830 and 840 which are good colour choices for classrooms. The Silentium solution is based around the T5 Eco due to their industry leading energy efficiency, however other various T5 lamp colour options are available for particular applications. See page 15.

### Controller Options

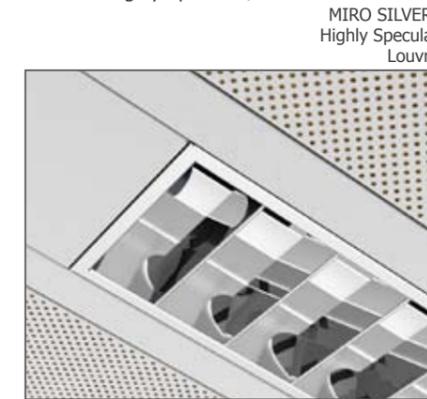
#### MIRO SILVER® Louvre

The louvre options are manufactured from very high quality MIRO SILVER® or MIRO 4® Aluminium which has a **total reflectivity of up to 98%**.



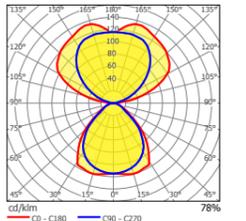
#### Louvre Options:

MIRO SILVER® Highly Specular /W2R  
MIRO 4® Highly Specular /W2



#### Microprism

The fittings are also available with a microprism lens for efficient light transmission and excellent glare control. /MPK



This polar distribution curve is representative of an MPK controller with clear rear diffuser. DLOR and ULOR can be altered to suit.



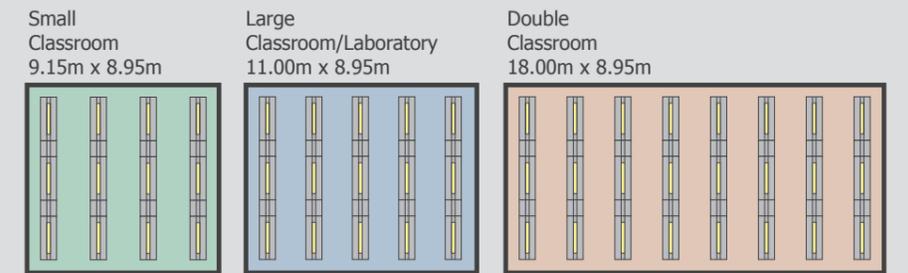
### Raft Numbers

In order to achieve the reverberation time of <0.8 seconds in secondary school classrooms there needs to be a specific amount of acoustic material present. The required number of rows is set out to the right in the example classrooms which achieve this requirement with no additional acoustic wall panels being required.

For rooms fitted with vinyl flooring additional acoustic rows may be required. Additional rows may also be required in primary schools due to the more onerous requirement of a reverberation time of <0.6 seconds.

### Lamp Requirements

This illustration and table has been put together to illustrate the number of rows required to meet the acoustic performance of a secondary school classroom, whilst offering lamp packages that can meet the requirements of 300, 400 or 500 lux on the working plane.



Area	Lamps required to meet 300 lux on workplane	Lamps required to meet 400 lux on workplane	Lamps required to meet 500 lux on workplane	Based on 400 lux, 1 x 45W	
				W/m <sup>2</sup>	u0
Small Carpeted Classroom	1 x 32W	1 x 45W	2 x 32W	7.33	0.835
Large Carpeted Classroom/Laboratory	1 x 32W	1 x 45W	2 x 25W	7.62	0.828
Double Carpeted Classroom	1 x 32W	1 x 45W	2 x 25W	7.45	0.835

The above illustrates the requirements for a secondary school classroom with carpet meeting a reverberation time of <0.8 seconds, primary school classrooms may require additional Silentium rows or wall mounted acoustic panels to reduce the reverberation time to <0.6 seconds.

## "The Silentium meets the requirements of DCSF Building Bulletin 93"

### Classrooms

When exposed soffits are utilised in a building the sound absorption is often very poor, resulting in a room with long reverberation times.

In order to reduce the reverberation time so compliance with DCSF Building Bulletin 93 is met, a highly effective sound absorbing product needs to be obtained.

### Solution

The Silentium luminaire has been designed to fulfil the requirements of a highly effective sound absorbing product.

Contained within the wings of the luminaire is a fire rated foam with an industry leading sound absorption coefficient.

### Acoustic Material - A no compromise solution

Often to save money, other manufacturers will use Mineral Wool acoustic material in their products. The efficiency of this option is not questioned so long as the acoustic properties are retained. To retain these properties **the material cannot be covered and must essentially be a raw fleece** of acoustic absorption. This is **like having attic insulation** in a perforated luminaire. To stop "shedding" the fleece can be covered but this clearly would significantly reduce the acoustic properties.

**We have sourced a product from one of the worlds leading chemical companies which has excellent acoustic and fire properties, also very importantly it does not shed in the classroom. It is truly a no compromise solution.**

### Foam Specification:

- **Class A Acoustic absorption.**
- **Class 0 fire rated.**
- Superior **chemical resistance.**
- Grey finish - Does not show dirt.
- **Environmentally friendly** produced without using halogenated hydrogen.
- **Easily maintained** - can be vacuumed.

### Reverberation Times

The required reverberation time in a **secondary school classroom** is:

**<0.8 Seconds**

The Silentium solution with standard dimension acoustic foam in a carpeted classroom meets this requirement without the need for additional acoustic wall panels.

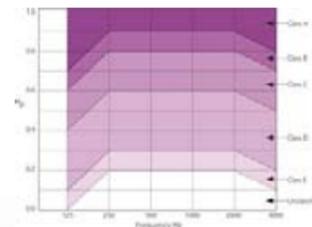
In **primary school classrooms** there is a more onerous requirement with a required reverberation time of:

**<0.6 Seconds**

This requirement can be met using the Silentium by increasing the volume of acoustic foam in the luminaire. Alternatively the secondary school version can be used with the addition of acoustic wall panels.

Given the nature of these requirements we advise that you contact our technical department to discuss project specific details.

### Class A acoustic material:



"The Acoustic foam is the same foam that is often used for sound insulation in aircraft design and rockets and is rated as class A"

## SRL test report no. C/21329/R02 - 12 August 2010

Sound Research Laboratories (SRL) have independently tested the Acoustic luminaire and Acoustic infill panel to determine their acoustic absorption.

**The reverberation time of <0.8<sup>1</sup> seconds is met without the need for additional acoustic baffles in the classroom. This is based on the parameters set out below.**

### Room Parameters

Size: 9m x 9m  
Height: 3.5m  
Luminaire Qty: 12  
Infill Qty: 8  
Temperature: 19.5°C  
Humidity: 49%RH  
Pressure: 1011 mbar  
Flooring: Carpet  
Mounting: 800mm Suspension  
Volume: 300m<sup>3</sup>

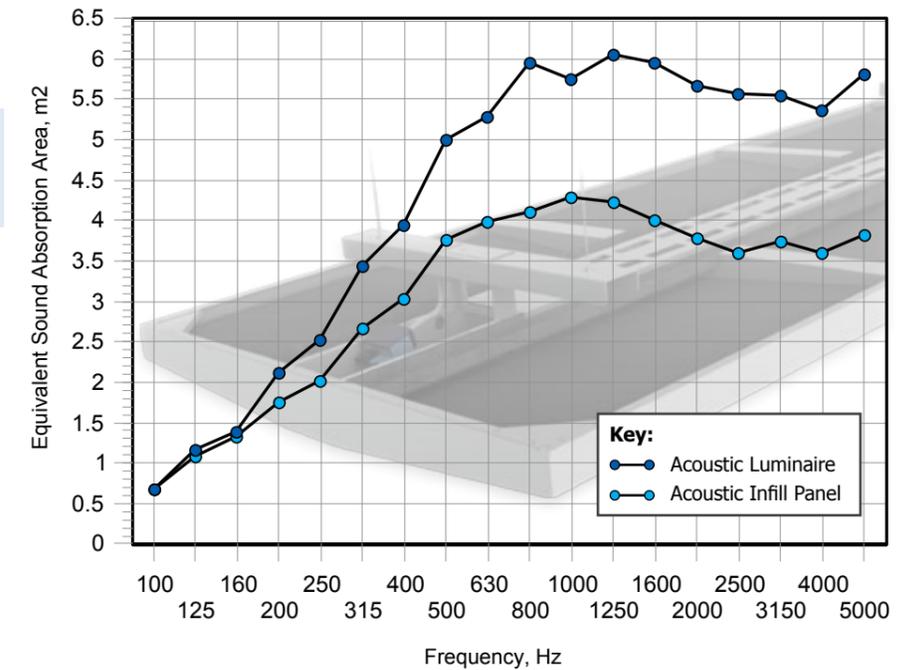
Reported results are for one of two fittings. One fitting is 2.2m long by 0.8m wide.



<http://www.soundresearch.co.uk>

1. Based on the above parameters a room with a carpet has a Tmf (seconds) of 0.74 or with Vinyl flooring a Tmf (seconds) of 0.87. With Vinyl flooring 5 additional acoustic class A absorbers would be required to meet the Tmf (seconds) <0.8.

\*Denotes frequencies outside the range covered by BS EN ISO354:2003.  
T1, empty room reverberation time.  
T2, room reverberation time with sample.



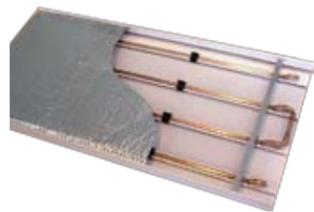
Freq Hz	T1 sec	T2 sec	Equivalent Absorption Area, m <sup>2</sup>
50*	5.19	5.15	0.03
63*	5.67	3.48	2.68
80*	6.68	5.96	0.44
100	7.78	6.39	<b>0.68</b>
125	8.10	5.83	<b>1.16</b>
160	7.17	5.08	<b>1.39</b>
200	7.72	4.61	<b>2.11</b>
250	7.75	4.28	<b>2.53</b>
315	8.04	3.75	<b>3.44</b>
400	7.21	3.31	<b>3.95</b>
500	5.81	2.64	<b>4.99</b>
630	5.36	2.47	<b>5.27</b>
800	5.80	2.39	<b>5.94</b>
1000	6.30	2.52	<b>5.75</b>
1250	6.20	2.43	<b>6.05</b>
1600	5.57	2.35	<b>5.96</b>
2000	5.01	2.31	<b>5.66</b>
2500	4.39	2.19	<b>5.58</b>
3150	3.69	2.01	<b>5.55</b>
4000	2.98	1.81	<b>5.37</b>
5000	2.42	1.55	<b>5.82</b>
6300*	1.68	1.23	5.59
8000*	1.26	0.96	6.48
10000*	0.90	0.74	6.50

Freq Hz	T1 sec	T2 sec	Equivalent Absorption Area, m <sup>2</sup>
50*	5.19	4.93	0.24
63*	5.67	3.76	2.17
80*	6.68	5.99	0.42
100	7.78	6.43	<b>0.65</b>
125	8.10	5.97	<b>1.07</b>
160	7.17	5.16	<b>1.31</b>
200	7.72	4.96	<b>1.74</b>
250	7.75	4.72	<b>2.00</b>
315	8.04	4.27	<b>2.66</b>
400	7.21	3.80	<b>3.01</b>
500	5.81	3.06	<b>3.74</b>
630	5.36	2.85	<b>3.97</b>
800	5.80	2.93	<b>4.08</b>
1000	6.30	2.98	<b>4.27</b>
1250	6.20	2.98	<b>4.21</b>
1600	5.57	2.91	<b>3.98</b>
2000	5.01	2.82	<b>3.77</b>
2500	4.39	2.67	<b>3.59</b>
3150	3.69	2.37	<b>3.73</b>
4000	2.98	2.09	<b>3.58</b>
5000	2.42	1.78	<b>3.80</b>
6300*	1.68	1.37	3.58
8000*	1.26	1.06	4.10
10000*	0.90	0.82	3.31

The Acoustic performance of an installation is determined by site factors such as room height, luminaire suspension height and room finishes. Most marketing data including ours assumes the room is carpeted. Where the classroom has vinyl flooring the acoustic performance is not surprisingly reduced. Specifiers should be aware that if data is produced, the correct site conditions are correctly applied.



## Radiant Heating



The option for Radiant Heating **contained within the Silentium** provides an unobstructive, effective and efficient form of radiant heating, which ensures **even and comfortable warmth** with minimal air temperature difference between floor and ceiling from a relatively hidden source.

The **air quality within the room is cleaner** because dust and other air pollutants such as mould, fungi, bacterium and viruses are not circulated by the constant movement associated with convectional systems.

## Lighting Controls

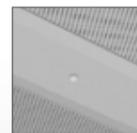


Lighting controls are an essential player in helping to **reduce the energy consumption and carbon footprint** associated with lighting.

We therefore **offer a wide range of lighting control sensors** to be installed into the infill panels of the Silentium system.



Phillips Actilume



Helvar Minisensor



Ex-Or MLS



Tridonic Smart

## Integrated Services



With no false ceiling, building services need to be installed elsewhere.

With the Silentium **these services can be installed into the infill panels with pre-cut holes during manufacture.** Cabling can be neatly managed along the internal wireways.



Smoke Detectors



Speakers



Other  
(please enquire)

## Infill Panels

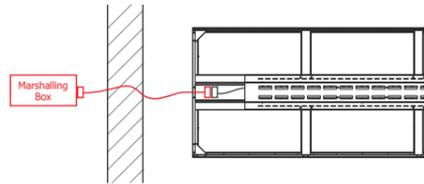


The Silentium is designed to be a **continuous system.** The Infill panels contain a  **cable management system for through wiring** between luminaires and other integrated services/sensors.

Infill panels are also **available as 90° corners and T-sections.** Other types of infill panel are available. For custom designs please contact our technical department.

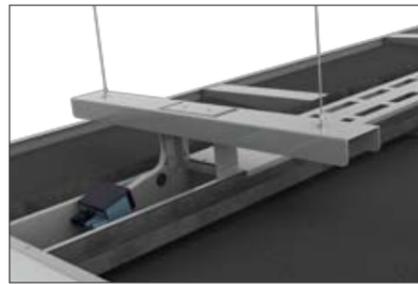
# Installation

## Standard Wiring Procedure



Other than connection from the marshalling box to the luminaire, there is no wiring required. All connections are plug and play. Marshalling Box & starter cable from marshalling box by others.

## Suspension Bracket



Suspension brackets are designed to be quickly installed on site using a click to fit mechanism further secured by nut and bolt.

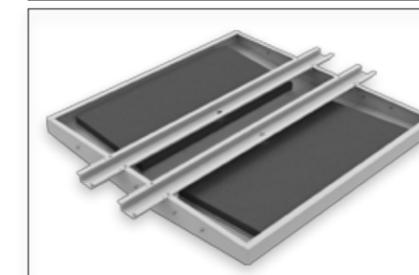
## Ceiling Suspension Kit



The ceiling brackets contain a clutch mechanism which allows the fitting to be lifted and secured into place at the required height.

Due to the innovative wiring of the Silentium luminaire the ceiling mounting kit is used only for suspension purposes.

## Wiring Channels



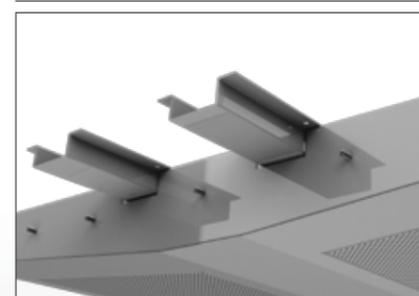
Silentium has been designed with internal wireways to assist in cable management.

## Through Wiring

The fittings are through wired and are connected using plugs and sockets laid over the infill panels.

This allows for quick and easy installation of continuous rows of fittings.

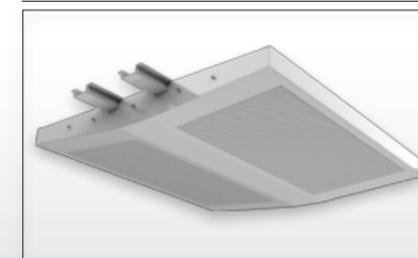
## Installation



Panels are easily joined together on site through the use of nuts and bolts that run along the connecting faces.

There are dedicated start and end of run luminaires.

## Integrated Sensors/Downlights

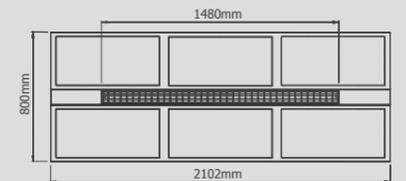


Infill panels allow the integration of other services to be conveniently installed.

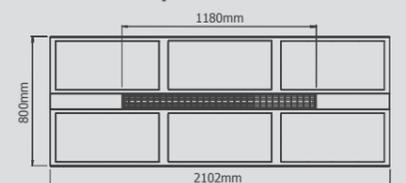
These include items such as presence detectors, smoke detectors, fire alarms and speakers.

## Luminaire Dimensions

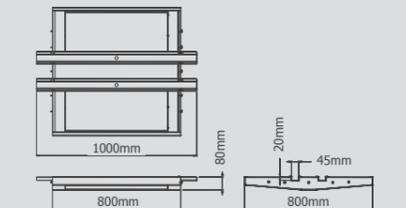
### 1500mm Lamp Version



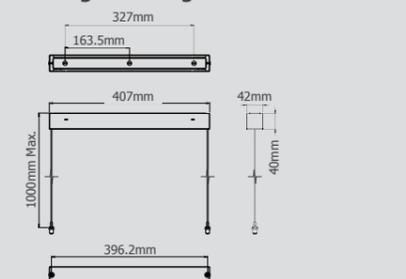
### 1200mm Lamp Version



### Infill Panel



### Ceiling Mounting Kit



# Additional Details



With over 47 years of experience in the lighting industry we have successfully completed a diverse and challenging range of projects incorporating office lighting, commercial lighting, industrial lighting, retail lighting, health care and education.

We are passionate about producing cost effective luminaires that meet the requirements of the customer in an ever demanding market with tougher legislation.

Our value engineering services enable us to provide the highest level of energy efficiency in a cost effective manner, providing the best value for money.

Our expertise ranges from short lead time projects to full design and build encompassing bespoke or custom design luminaires.

We can guarantee you the best products along with great support throughout the design stage through to aftercare with our professionalism, quality and reliable approach.

Should you need any further information on anything contained within this catalogue please feel free to contact us and we will be more than happy to assist.



## Colour Options



## Lamp Colour

Area of application	SKYWHITE® 880 8,000 K	Cool Daylight 865 6,500 K	965 6,500 K	Daylight 954 5,400 K	Cool White 840 4,000 K	940 4,000 K	White 835 3,500 K	Warm White 830 3,000 K	930 3,000 K	INTERNA® 827 2,700 K	NATURA® 76 3,500 K
Schools and lecture rooms											
Auditoriums, classrooms, Kindergartens	•		○		○		•	○		•	
Libraries, reading rooms					○		•	•		•	

○ Denotes colour options for T5 Eco lamps.

## Controller Options



## Emergency Options

Emergency converted luminaires have 3 hour integral inverter with batteries and green LED. /3M

Self test systems have 3 hour integral inverter with batteries and bi-colour LED. /3MST

LED's are also available as Non-maintained emergency fittings and can be installed into the infill panels.



## Standards

Designed/manufactured to EN60598  
Emergency to EN605982.22

## Specification Information

The specification options for the Silentium acoustic luminaire are listed below

Lamp	Dimensions (L) x (W) x (H)	Reference
T5 Eco		
- 1 x 25W	2102 x 800 x 110	ACC/125
- 1 x 50W	2102 x 800 x 110	ACC/150
- 2 x 25W	2102 x 800 x 110	ACC/225
- 2 x 50W	2102 x 800 x 110	ACC/250
- 1 x 32W	2102 x 800 x 110	ACC/132
- 1 x 45W	2102 x 800 x 110	ACC/145
- 2 x 32W	2102 x 800 x 110	ACC/232
- 2 x 45W	2102 x 800 x 110	ACC/245

Ballast	Reference
- High Frequency Fixed	/HF
- DALI dimming	/HFDAL
- Digital dimming	/HFDIG
- 1-10V dimming	/HFDIM

Controller	Reference
- MIRO SILVER® Specular Louvre	/W2R
- MIRO 4® Specular Louvre	/W2
- Microprism Lens	/MPK

Direct/Indirect	Reference
- Direct/Indirect	/IND
- Direct Only	/DW

Mounting	Reference
- Suspended	/SUS

RAL Colour	Reference
- 9016 (White) 20% Gloss	/9016
- 9010 (Pure White) 20% Gloss	/9016
- 9007 (Grey Aluminium) 20% Gloss	/9007
- 7043 (Traffic Grey B) 20% Gloss	/7043

\*To specify alternative colours please contact us.

Emergency	Reference
- 3hr Non-maintained	/3M
- 3hr Self Test	/3MST

Reference Example:  
ACC/145/HFDAL/W2R/IND/SUS/9016

Would denote Silentium with 1x45W T5 Eco lamp, HF DALI dimming ballast, MIRO SILVER® Specular Louvre, Indirect, Suspended in colour RAL9016.

Unit 31  
The Metro Centre  
Tolpits Lane  
Watford  
WD18 9UD

Tel: 01923 226222  
Fax: 01923 211300  
E-Mail: [sales@lumitron.co.uk](mailto:sales@lumitron.co.uk)  
Web: [www.lumitron.co.uk](http://www.lumitron.co.uk)

