



**THORN**  
LIGHTING

# ARENA SYMPHONY LED

Innovative LED luminaire with sound absorbing  
features to minimise reverberation echoes

# Education and office lighting

Creating the perfect learning environment is key to maximising learning potential of students. Controlling and optimising the lighting and acoustic properties of our learning environment can help stimulate their learning.



## Maximise student learning with optimum lighting and acoustics

Research\* shows that controlling and optimising lighting, acoustics and the environment can help stimulate learning. Creating the perfect classroom environment is therefore essential for helping to maximise student's learning potential.

Good quality lighting increases student communication and participation, and makes it easier to see the whiteboard. At the same time, effective acoustic control makes it easier to listen and understand while removing the need for shouting.

As well as facilitating learning, both lighting and acoustics are important for ensuring the comfort and wellbeing of students.

## The importance of reverberation time in classrooms

Reverberation time is the time it takes for sound to decay 60 decibels from its initial level.

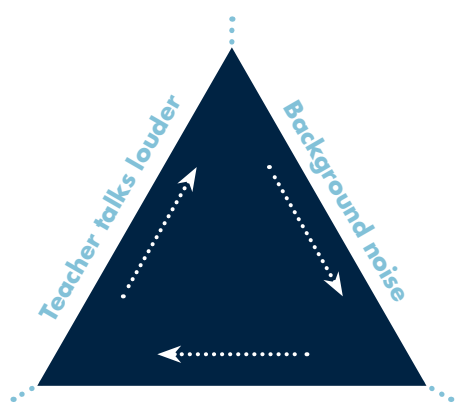
In a more reflective room, such as a concert hall, it will take longer for the sound to die away and the room is said to be live. In a very absorbent room, such as a carefully designed lecture theatre, the sound will die away quickly and the room is described as acoustically dead.

Large rooms and those with hard surfaces and décor of poor absorption qualities will naturally have longer reverberation times. However, it is important to maintain the maximum reverberation time to <0.5 seconds for primary school or small classrooms and <0.8 seconds for secondary/larger school classrooms. Exact targets vary slightly by country.

Echoes blur the teacher's voice and make it harder for students to hear. Students react by talking louder, which creates a vicious circle of noise. What may appear to be an unruly class may in fact be poor acoustic design. Either way the learning outcomes are impacted.



**Teacher talks to the class**



**Students hear less**

**Increased noise levels**

**Standards require:**

As specified by the UK's Building Bulletin 93 (BB93), Germany's IN 1804 and the international EN ISO 3382-3, the maximum reverberation time for primary and secondary school classrooms is <0.6 and <0.8 seconds respectively.

Country	Standard/Guideline	Year	Required T (s)	Occupancy
Denmark	BR2010	2010	$\leq 0.6$	Furnished unoccupied
France	Arrete du 25 avril 2003	2003	$V < 250\text{m}^3: 0.4 \leq T \leq 0.8$ $V < 250\text{m}^3: 0.6 \leq T \leq 1.2$	Furnished unoccupied
Germany	DIN 18041:2004	2004	$T_{\text{ref}} = 0.32 \log V - 0.17$ $(V = 100^3 \rightarrow T_{\text{ref}} = 0.47\text{s})$ $V = 250^3 \rightarrow T_{\text{ref}} = 0.60\text{s})$	Fully occupied
Norway	NS8175:2012	2012	$\leq 0.5$ (Class C)	Furnished unoccupied
Spain	CTE DB-HR	2009	$V < 350\text{m}^3: \leq 0.5$	Fully occupied
UK	BB93	2003	Nursery & Primary: $\leq 0.6$ Secondary: $\leq 0.8$	Unfurnished unoccupied

# Classroom architecture trends

Exposed concrete ceilings, hard floors  
and more natural daylight.

## Modern trends are creating poor sound absorption

The modern classroom has moved away from conventional suspended ceilings in favour of exposed concrete. As well as saving on purchasing and installation costs, exposed concrete ceilings have a high thermal mass to keep the classroom temperature stable and reduce the need for active heating and cooling, offer higher ceilings for daylight ingress improving learning rates and reducing the need for electric light.

However, exposed concrete ceilings coupled with solid floors and increased glazed areas leave classrooms with poor sound absorption and multiple echoes.

## Meeting key requirements

To ensure compliance with the strict reverberation guidelines of BB93, IN 1804 and EN ISO 3382-3, one of the following two actions can be taken:

- Add extra acoustic absorption to walls
- Incorporate acoustic absorbing material into the luminaire

Incorporating acoustic absorbing material into the luminaire is desirable because it is quicker and easier to install, creates just one supplier for both acoustics and lighting, improves bass frequency sound absorption and reduces overall the required surface area for acoustic material within the room.

## The importance of classroom daylight

Research of 21 000 pupils over three countries has found high levels of daylight resulted in:

- High improvements in learning rates
- Increased attendance
- 20% higher results in reading and maths

This was the result of:

- Higher levels of illuminance
- Improved visibility
- Improved melatonin production
- Better colour rendering

How to achieve more daylight :

- Increase window size
- Remove false ceilings

Higher ceilings for  
daylight ingress

Suspended, so false  
ceiling not required

Daylight through  
large windows

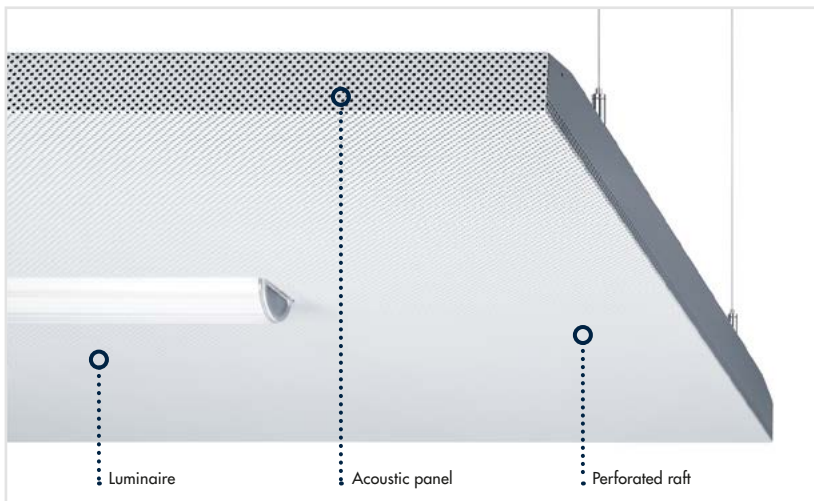
Solid walls

Solid floors



# New Arena Symphony LED

Sound absorbing panels minimise classroom reverberation.



Fully compliant with the European acoustic regulations and lighting requirements EN 12464 Arena Symphony LED is a complete, single solution for absorbing sound.

Using sound absorbing panels and high performance LEDs, Arena Symphony LED creates quieter, brighter and more comfortable environments to improve communication and maximise learning.

Arena Symphony LED is specifically designed for primary and secondary school classrooms with poor sound absorption.

These include classrooms with:

- Concrete ceilings
- Plasterboard or highly glazed walls
- Solid wood or vinyl flooring

## Optimum acoustic performance using less surface area

Arena Symphony LED is suspended to ensure optimum acoustic performance with both sides of the luminaire benefiting from acoustic material for maximum sound absorption efficiency.

Arena Symphony LED requires approximately half the area of a wall panel to achieve the same acoustic performance.

As a suspended continuous row luminaire Arena Symphony LED also hides unsightly concrete ceilings and can accommodate other mechanical and electrical services, including sprinklers and smoke alarms.

## Higher compliance, less fittings

For a 56m<sup>2</sup> secondary school classroom Arena Symphony LED achieves acoustic and lighting standards with just six fittings. This not only makes the luminaire easier, faster and cheaper to install, but also reduces overall costs by using less luminaires.

## Arena Symphony LED is fully compliant with European acoustic regulations

Arena Symphony LED is designed to comply with European acoustic regulations (measured for an empty classroom) in the worst case scenario, where:

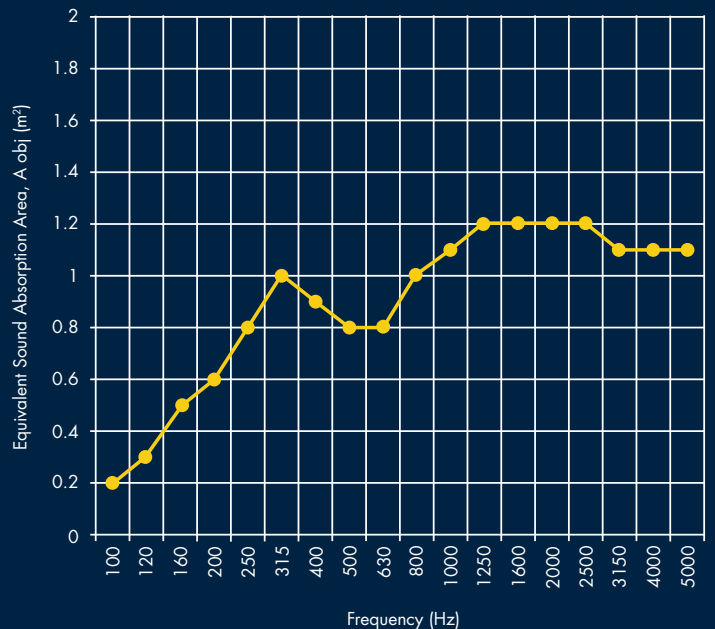
- Walls are finished with plasterboard
- There is an exposed concrete soffit
- Entry to the classroom is via a single timber doorway of area 2m<sup>2</sup>
- Windows of areas 24m<sup>2</sup> cover approximately one half of the exterior wall
- Floors have a hard covering such as linoleum or parquet over concrete
- Luminaires are suspended a minimum of 300mm below the ceiling



### Acoustic performance of Arena Symphony in relation to sound frequency

The sound absorption material in Arena Symphony has been selected to absorb the sound frequencies common in educational spaces. The table and graph show how our acoustic material performs as measured in the laboratory and can be used by an acoustic designer to evaluate the performance of the product in designed spaces

Frequency (Hz)	A obj One Third octave (m <sup>2</sup> )	A obj Octave (m <sup>2</sup> )
50		
<b>63</b>		
80		
100	0.2	
<b>125</b>	0.3	0.3
160	0.5	
200	0.6	
<b>250</b>	0.8	0.8
315	1	
400	0.9	
<b>500</b>	0.8	0.8
630	0.8	
800	1	
<b>1000</b>	1.1	1.1
1250	1.2	
1600	1.2	
<b>2000</b>	1.2	1.2
2500	1.2	
3150	1.1	
<b>4000</b>	1.1	1.1
5000	1.1	
6300		
<b>8000</b>		
10000		



# Installation

Arena Symphony LED is easy to order and install for speed and convenience.

## Complete out of the box product

For quick and simple ordering and installation, Arena Symphony LED is supplied as a complete out of the box product including the raft, luminaire, four suspension wires and two joining bars and screws. Depending on the project requirements, simply order the required infill separately (300, 700, 1200 or 1800mm).

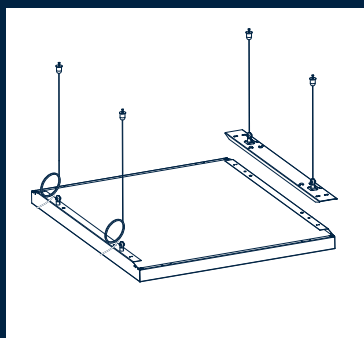
No additional accessories are necessary, although a wall bracket can be ordered to directly fix the luminaire to the wall to accommodate smaller classrooms or projects where the power supply and/or DALI signal are coming directly from the wall.

## New packaging design

Arena Symphony LED benefits from separate packing for the raft, luminaire and joining bar, with all components provided on one pallet. The advantages of this new packaging design includes reduced risk of product damage, reduced packaging waste with more products per pallet, and reduced overall packaging size to reduce space requirements.

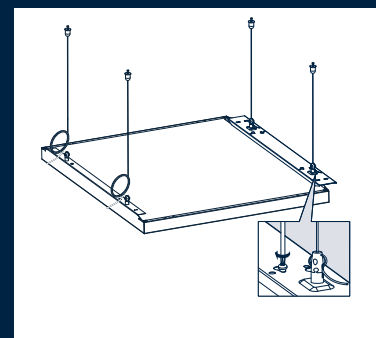
Installation is easier because the luminaire is not attached to the raft. Without the luminaire it is less heavy. 2 teams: 1 - guy who is doing the ceiling and one installer.

## Install in just four simple steps



### Step 1

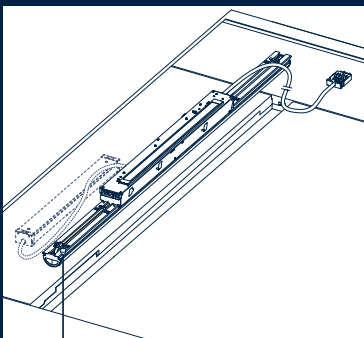
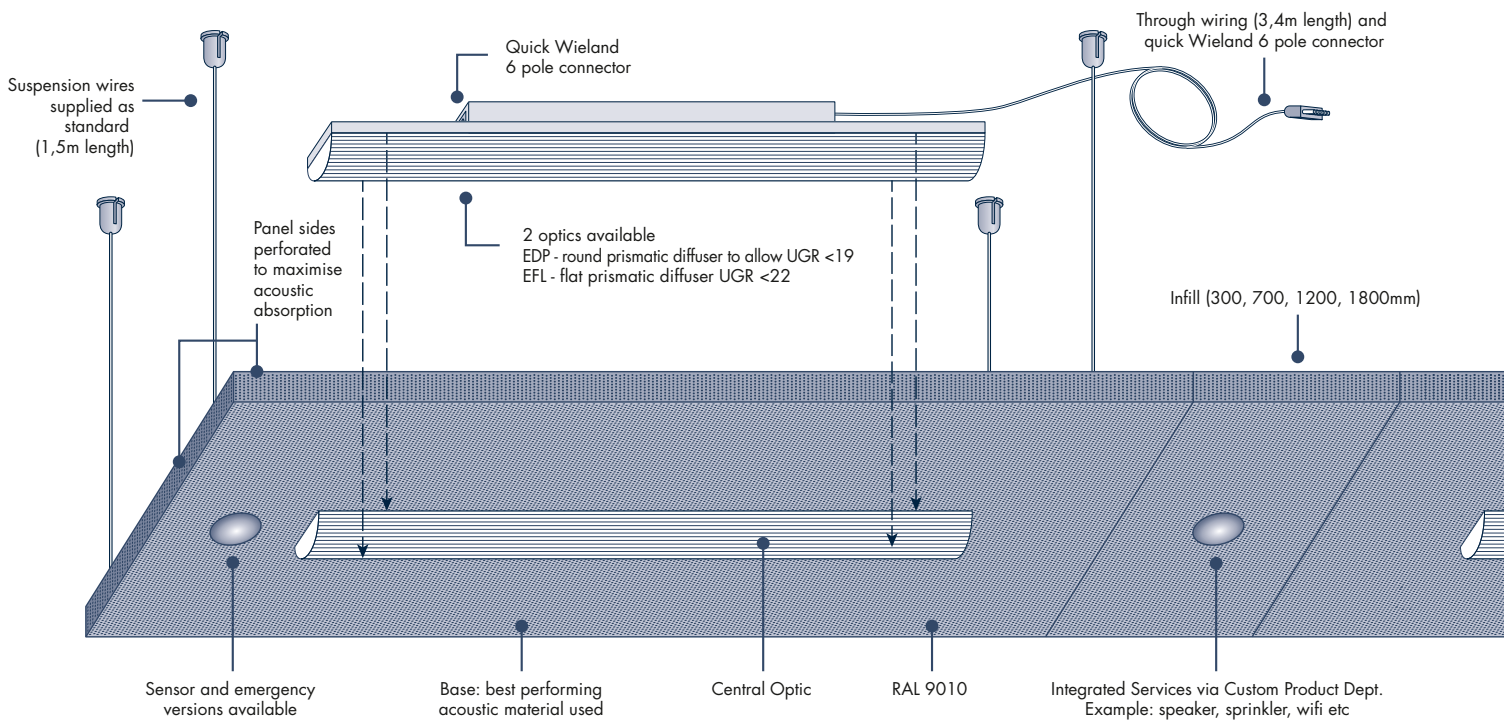
Pre-attach the suspension wire on the ceiling and to the joining bar, roughly adjusting the height as necessary



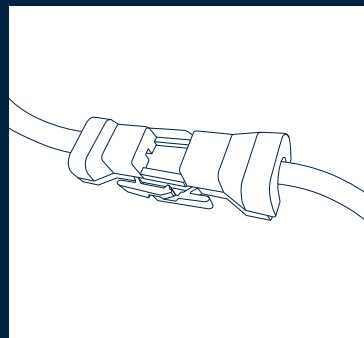
### Step 2

Pre-install the screws on the raft, lift it up and fix it to the joining bar





**Step 3**  
Insert the luminaire into the raft



**Step 4**  
Connect all luminaires electrically with the pre fixed connector

# Product specification

Innovative LED luminaire with sound absorbing features to minimise sound reverberation in classrooms.



## Designed to meet classroom standards

Arena Symphony LED meets standards local sound regulations and EN 12464 as well as the usual benefits associated with Thorn luminaires, including low energy consumption, sustainability and ease of maintenance. Arena symphony LED uses a specific prismatic round optic technology with transparent endcaps to light the raft in order to reach an UGR < 19, in a typical application. Thanks to a direct/indirect light Arena Symphony LED avoids the cave effect in the classroom and improves the uniformity on the ceiling and task area.

## Sound performance

Incorporates sound absorbing material combined with micro perforated raft, creating quiet and comfortable learning environments.

## Flexible design options

Arena Symphony LED's flexible panel system offers infills of 300, 700, 1200 and 1800mm to meet each classroom's specific acoustic requirements.

## Complete control

The range offers DALI dimming, sensor (with master and slave control) and emergency versions (E3 and E3TX). Arena Symphony LED can also be supplied with ready2mains driver, based on the ready2mains™ technology from Tridonic. This provides an easy refurbishment solution with quick installation because there is no need to rewire and no commissioning necessary.

## Quick and simple installation

Complete out of the box solution. Product supplied with suspension wires, through wiring with on one side with a quick Wieland connectors 6 poles and on the other side 3.4m of wires with a quick Wieland connectors 6 poles.

## Standards

Compliant with EN60598  
Classification of reaction to fire: A2-s1,d0 in relation to EN 13 694:2004 + A1:2006  
Emergency version compliant with EN 60598-2-22

IP20 IK03 650°C T<sub>a</sub> 0 +25  

## Optics

Choose from two optics:  
EDP: round prismatic diffuser in acrylic to allow UGR <19  
EFL: flat prismatic diffuser in acrylic UGR <22

## Application

- Classroom
- Offices

## Light source information

Lifetime 50000 hours L80  
5000lm and 6500lm (37.5W to 54W)  
Up to 128lm/W  
Colour temperature 4000K  
CRI 80  
MacAdams 3 shift over life 3  
Photobiological risk group 0

## Materials/Finish

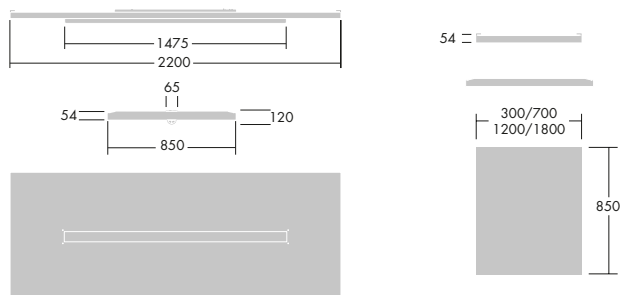
Raft: aluminium  
Luminaire frame: aluminium powder coated white as standard (RAL9010)  
Acoustic material: rocksilk mineral wool fibre  
Optic: acrylic

## Installation/Mounting

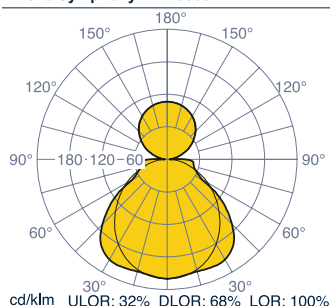
Suitable for suspension mounting with four suspension wires of 1.5 metres (supplied). Suspension wires are adjustable in height due to the support on the luminaire with millimetre movements. This product can be used in a system with added infill panels to fulfil the acoustic requirement. Through wiring and quick connector are also provided to aid a fast installation.

## Specification

To specify state: Innovative acoustic LED luminaire to comply with the local sound regulations norms and EN 12464 inside an empty classroom. Wide variety of infills and accessories to maximise the flexibility. As Thorn Arena Symphony.



Arena Symphony LED 6500



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## Ordering guide

Description	Wt (Kg)	SAP Code
<b>Arena Symphony LED</b>		
ARENA LED5000-840 HF TW WL6 EFL	21.2	96645146
ARENA LED5000-840 HF TW WL6 EDP	22.3	96645147
ARENA LED6500-840 HF TW WL6 EFL	21.2	96645148
ARENA LED6500-840 HF TW WL6 EDP	21.2	96645149
<b>Arena Symphony LED, emergency</b>		
ARENA LED5000-840 HF E3 TW WL6 EDP	22.2	96645131
ARENA LED5000-840 HF E3 TW WL6 EFL	22.2	96645130
ARENA LED5000-840 HF E3TX TW WL6 EDP	22.2	96645119
ARENA LED5000-840 HF E3TX TW WL6 EFL	22.2	96645118
ARENA LED6500-840 HF E3 TW WL6 EDP	22.2	96645133
ARENA LED6500-840 HF E3 TW WL6 EFL	22.2	96645132
ARENA LED6500-840 HF E3TX TW WL6 EDP	22.2	96645121
ARENA LED6500-840 HF E3TX TW WL6 EFL	22.2	96645120
<b>Arena Symphony LED, dimmable</b>		
ARENA LED5000-840 HFIX TW WL6 EDP	21.2	96645159
ARENA LED5000-840 HFIX TW WL6 EFL	21.2	96645158
ARENA LED5000-840 R2M TW WL6 EDP	21.2	96645151
ARENA LED5000-840 R2M TW WL6 EFL	21.2	96645150
ARENA LED6500-840 HFIX TW WL6 EDP	21.2	96645161
ARENA LED6500-840 HFIX TW WL6 EFL	21.2	96645160
ARENA LED6500-840 R2M TW WL6 EDP	21.2	96645153
ARENA LED6500-840 R2M TW WL6 EFL	21.2	96645152
<b>Arena Symphony LED, dimmable, emergency</b>		
ARENA LED5000-840 HFIX E3 TW WL6 EDP	22.2	96645143
ARENA LED5000-840 HFIX E3 TW WL6 EFL	22.2	96645142
ARENA LED5000-840 HFIX E3TX TW WL6 EDP	22.2	96645127
ARENA LED5000-840 HFIX E3TX TW WL6 EFL	22.2	96645126
ARENA LED5000-840 R2M E3 TW WL6 EDP	22.2	96645135
ARENA LED5000-840 R2M E3 TW WL6 EFL	22.2	96645134
ARENA LED6500-840 HFIX E3 TW WL6 EDP	22.2	96645145
ARENA LED6500-840 HFIX E3 TW WL6 EFL	22.2	96645144
ARENA LED6500-840 HFIX E3TX TW WL6 EDP	22.2	96645129
ARENA LED6500-840 HFIX E3TX TW WL6 EFL	22.2	96645128
ARENA LED6500-840 R2M E3 TW WL6 EDP	22.2	96645137
ARENA LED6500-840 R2M E3 TW WL6 EFL	22.2	96645136
<b>Arena Symphony LED, sensor</b>		
ARENA LED5000-840 HFSX TW WL6 EDP	21.2	96645155
ARENA LED5000-840 HFSX TW WL6 EFL	21.2	96645154
ARENA LED6500-840 HFSX TW WL6 EDP	21.2	96645157
ARENA LED6500-840 HFSX TW WL6 EFL	21.2	96645156
<b>Arena Symphony LED, sensor, emergency</b>		
ARENA LED5000-840 HFSX E3 TW WL6 EDP	22.2	96645139
ARENA LED5000-840 HFSX E3 TW WL6 EFL	22.2	96645138
ARENA LED5000-840 HFSX E3TX TW WL6 EDP	22.2	96645123
ARENA LED5000-840 HFSX E3TX TW WL6 EFL	22.2	96645122
ARENA LED6500-840 HFSX E3 TW WL6 EDP	22.2	96645141
ARENA LED6500-840 HFSX E3 TW WL6 EFL	22.2	96645140
ARENA LED6500-840 HFSX E3TX TW WL6 EDP	22.2	96645125
ARENA LED6500-840 HFSX E3TX TW WL6 EFL	22.2	96645124
<b>Arena Symphony LED Infills</b>		
ARENA LED INFILL 300MM	2.50	96628180
ARENA LED INFILL 700MM	5.80	96628181
ARENA LED INFILL 1200MM	10.0	96628182
ARENA LED INFILL 1800MM	15.0	96628183
<b>Arena Symphony LED Control</b>		
SENSA SDP		96241223

EDP - round prismatic diffuser  
EFL - flat prismatic diffuser

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02/2020 (INT)

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