EDUCATION LIGHTING

APPLICATION GUIDE

MADE IN THE UK

Thorlux Lighting

EDUCATION LIGHTING SOLUTIONS

Good lighting in schools allows pupils and staff to perform necessary tasks and importantly can improve their happiness and well-being.

Lighting is the single largest consumer of energy within a school building and its reduction should be one the designer's key objectives.

The use of LED luminaires combined with intelligent, Smart, lighting controls offers substantial savings (often in excess of 70% when compared with more conventional solutions), particularly in educational establishments where rooms typically have infrequent occupancy rates.

CONTENTS

INTRODUCTION

Thorlux, for over 80 years, has manufactured increasingly sophisticated luminaires in the Birmingham area.

During the last 20 years, the company has focused on high technology products, including the development of its first electronic energy-saving lighting control system in the mid-1990s. Huge investment in design and testing facilities in Worcestershire has now put Thorlux at the forefront of its market sector.

Thorlux luminaires are subject to stringent quality control, as demonstrated by the company's BS EN ISO 9001:2015 (Quality management systems) accreditation. Additionally, accreditation of Thorlux to BS EN ISO 14001:2015 (Environmental management systems) gives the customer assurance that the company manufactures its products in the most environmentally responsible manner.

LATEST LED TECHNOLOGY

Thorlux is able to exploit recent advances in LED technology to help meet customer demand for energy-efficient solutions. The company's considerable technical expertise and its ability to invest position it to maximise the opportunities offered by LED technology.

Backed by the group's modern facilities, Thorlux designers and developers have worked over recent years to create LED luminaires to meet customers' operational and aesthetic requirements. Thorlux has made a huge investment in LED technology, including in-house circuit board design, software development, thermal modelling and optical lens design.

To increase the range and performance of its LED luminaires, Thorlux both designs dedicated LED luminaires from scratch, to optimise optical and thermal performance, and adapts existing conventional products to offer an LED option.

Unlike a traditional light source, a bare LED is a very intense point-source of light which has high glare and emits light in one direction only; therefore optical design is very important. Thorlux takes different approaches to optical design, according to the desired outcome.

Almost all LED products benefit from bespoke LED printed circuit boards (PCBs) designed by the Thorlux electronics team. These PCBs ensure that Thorlux luminaires deliver maximum performance.

LEDs, as with lamps, can sit behind a controller or diffuser which will help to spread the light over a wider area, providing a uniform light

Having multiple LEDs on a luminaire provides the option of having individual optics for each LED

LED SYSTEM PROTECTION

LEDs are a very efficient light source and are resilient to many conditions that can be detrimental to the lifetime of traditional lamps.

For example, LEDs are largely unaffected by frequent switching, shock or vibration. However, LEDs or their solder joints can infrequently fail. In such circumstances it would be inconvenient if the failure caused significant loss of light, or if the luminaire extinguished completely.

In many luminaires LEDs are linked in series whereby a current flows through each LED in turn. Should an LED or solder joint fail, a whole row of LEDs, or in fact all LEDs, may extinguish. Thorlux has designed specific protective measures to prevent such a condition.

There are two methods of LED system protection used by Thorlux

1 LED PROTECT
For high power LEDs

2 LUX GUARD
For medium power LEDs

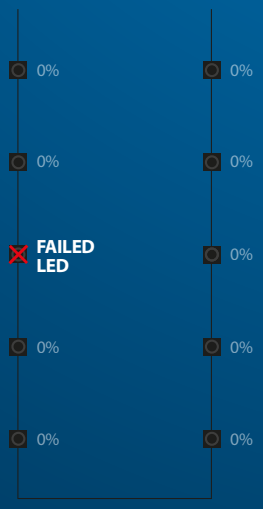
LED PROTECT

Certain high lumen output Thorlux luminaires use high power LEDs, for example the Starbeam floodlight.

In this type of luminaire LEDs are connected in a series string and failure of an LED or its solder joint can cause an open circuit and all LEDs in the string to extinguish. Thorlux adds PLED protectors to the majority of these luminaire types (see LED Characteristics data on each product page).

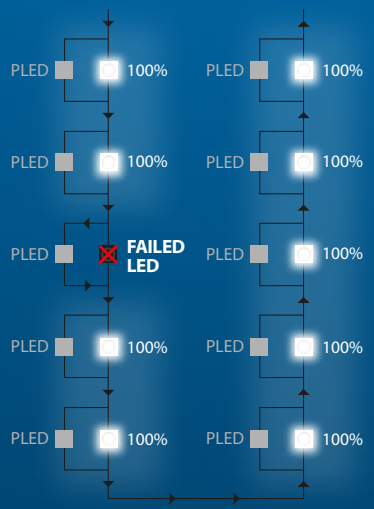
PLED protectors provide an electronic alternative path for the current to flow in the case of LED or solder joint failure ensuring all remaining LEDs stay illuminated at the correct power. This is an invaluable feature guaranteeing that a luminaire continues to provide light, even in the case of nuisance LED failures, and reduces the maintenance costs of a project.

CONVENTIONAL CIRCUIT



0% OUTPUT

LED PROTECT CIRCUIT



90% OUTPUT

★ PATENTED ★

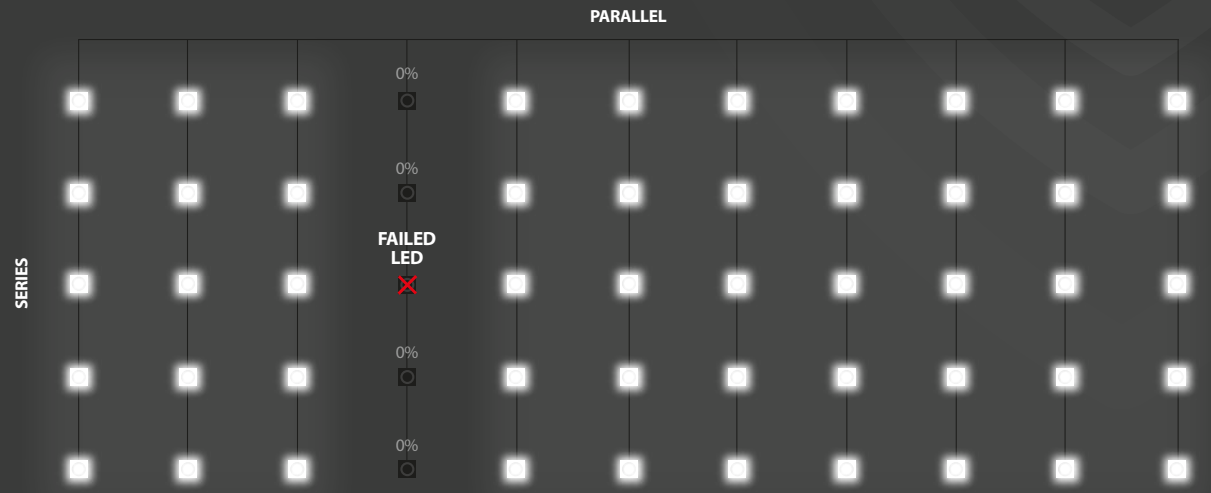
LUX GUARD

LUX GUARD by Thorlux, is a patented current sharing PCB and circuit design philosophy. If an LED fails then its current is shared via neighbouring circuits, with each LED's brightness increasing slightly to compensate. LUX GUARD ensures that a luminaire continues to provide its designed lumen performance, even in the case of nuisance LED failures, and reduces the maintenance costs of a project.

CONVENTIONAL CIRCUIT

5 IN SERIES **11** IN PARALLEL

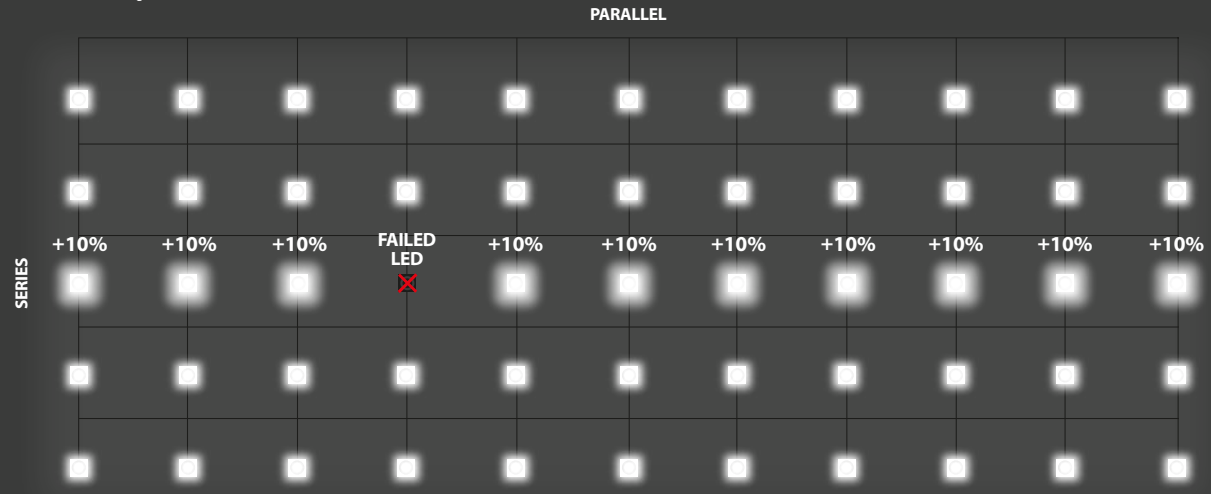
91% OUTPUT



LUX GUARD CIRCUIT

5 IN SERIES **11** IN PARALLEL

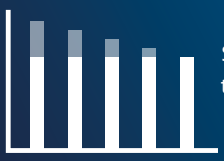
100% OUTPUT



SmartScan

SMART ENERGY SAVING CONTROLS

The Thorlux Smart System exploits the latest 'Digital Technology' to provide a simple, effective method of lighting control which minimises energy consumption whilst retaining high levels of user comfort.



MAINTAINED ILLUMINANCE

Smart luminaires maintain the desired lighting level throughout the maintenance cycle by automatically increasing LED output as the light source ages, avoiding over lighting new installations.

DAYLIGHT DIMMING

When daylight enters an area the sensors will take this light into account and gradually dim the LEDs, saving energy whilst maintaining the required light level.

MOVEMENT DETECTION

Presence sensors in all luminaires ensure excellent detection coverage, so that Smart luminaires switch on when movement is detected and stay on whilst the space is being used.

A discrete sensor integral to the luminaire monitors ambient light and presence, controlling output to the correct level, and ensuring that the area is only illuminated when occupied.

Individual Thorlux Smart luminaires may be linked using a 'Motionline' two wire low voltage bus allowing luminaires to communicate within a group. Upgrading to SmartScan provides the option of full wireless Motionline control between Smart luminaires eliminating the need for additional cabling.

Savings by the installation of automatic lighting control systems often exceed 70%.

FULL STATUS MONITORING OF YOUR LUMINAIRES FROM THE GROUND

The functional status and energy performance of SmartScan luminaires can be monitored from anywhere via the SmartScan website (SmartScan Gateway required), or from the ground using the SmartScan Programmer.

The website provides an easy to read visual reference highlighting the following:

- Control gear status monitoring
- Light source functionality
- Thermal performance (the luminaire is operating within correct temperature limits)
- Average energy used by the luminaire
- Total hours powered
- Full energy performance monitoring

www.thorlux.com/smartscan

EMERGENCY

Platform 1

SmartScan emergency luminaires are stand-alone. Each luminaire will self-test to the schedule specified in BS EN 50172:2004. The operational status of each luminaire is displayed by the status LED and operational status information can be retrieved using the SmartScan Programmer. Manual tests can also be initiated at each luminaire using the SmartScan Programmer. The user, legally, will need to inspect each luminaire at prescribed intervals to monitor test status and manually log the results.

Platform 2

The emergency luminaires wirelessly communicate with each other and the Gateway through the mesh network. The Gateway transmits emergency lighting status reports to the SmartScan web server and the user can then employ their chosen device to access the status reports.

REDUCED INSTALLATION COSTS

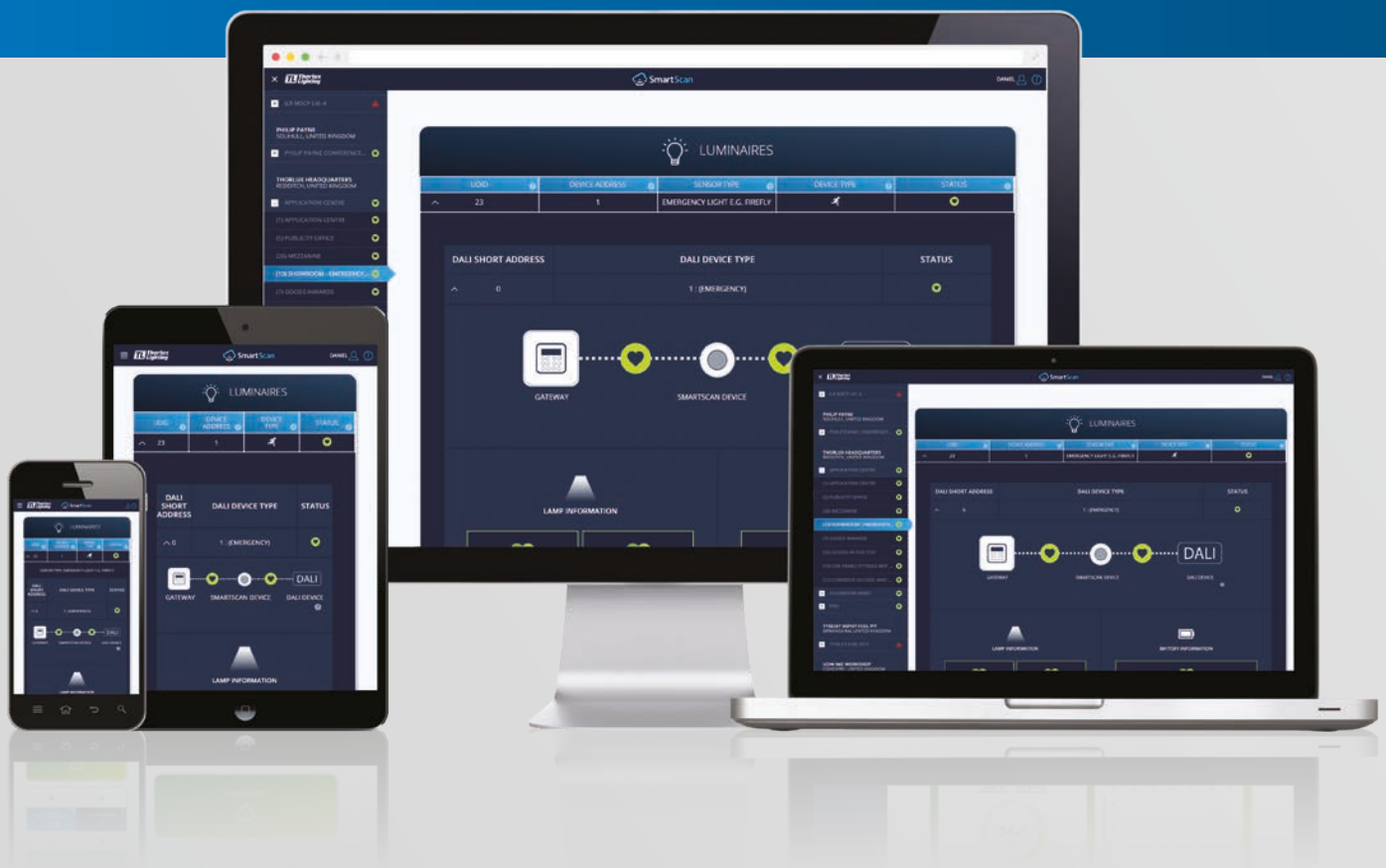
The SmartScan Gateway and compatible Smart, Smart External and emergency luminaires simply require a mains connection.
All communication cables are replaced by the mesh network so there is no need for data cables, additional power supplies, control modules.

SIMPLE AND FAST COMMISSIONING

Using a single robust hand held infra-red programmer all luminaire types can be very quickly and easily commissioned, and all operational settings can be fine tuned in the future if desired.

AUTOMATED EMERGENCY TEST RECORDS

SmartScan emergency saves the significant costs associated with the monthly and annual testing of emergency luminaires, and stores accurate records on secure off site servers which can be accessed when required. This, therefore, avoids possible prosecution and conviction which may occur if manual testing and records are not maintained correctly.



COLOURACTIVE LIGHTING *Light as nature intended*™

In educational environments, optimised lighting can have positive effects on performance and social behaviour, as well as on physical health and well-being. ColourActive, from Thorlux, can be used not only to sustain the circadian rhythm of pupils and staff, but also to improve alertness during tests and tasks that require concentration. Put simply, to imitate natural lighting conditions inside the classroom.

COLOUR TEMPERATURE CONTROL

Thorlux ColourActive high performance LED luminaires incorporate dual populated PCBs where LEDs with two different colour temperatures (3000K and 6500K) are combined.

The Thorlux designed and manufactured technology utilises twin lighting circuits within each luminaire to vary the output to produce colour temperatures of either 3000K (warm), 6500K (cool) or any value in between.

High quality medium power LEDs, placed on a circuit board with integral heat sinking, provide a high efficiency solution.

ADVANCED CONTROLS

SmartScan wireless mesh network technology provides signals to control the ColourActive luminaires to provide both manual and automatic control of colour temperature.

The ColourActive Gateway communicates with the luminaires throughout the day, providing automatic, seamless transitions between colour temperatures. Manual control is provided by a range of wall mounted touch sensitive plates and smart phone apps.

3000°K 6500°K

For more information about ColourActive lighting visit: **www.thorlux.co.uk/control-systems/colouractive**

CARBON OFFSETTING

Thorlux operates a carbon offsetting scheme which involves planting trees on 215 acres of Monmouthshire, Wales. This accredited scheme carbon offsets all manufacturing and distribution processes undertaken by the group companies. Thorlux has to date planted 149,849 trees *(Spring 2018)*.

Woodland Carbon CO_2de

FUNDING FOR ENERGY EFFICIENT EDUCATION LIGHTING

Thorlux have partnered with Hitachi Capital (UK) PLC, a well-established provider of finance for businesses to provide a cost effective solution to enable wider adoption of energy efficient lighting in education establishments, by eliminating the need for an upfront capital investment. Costs can be spread over an agreed term allowing for savings in energy to match or exceed payments.

Key Benefits:

- No upfront capital payment and fixed payments
- Contract term to suit your needs and flexible payment profile
- 5 year Thorlux warranty
- Simple approval process

HITACHI
Inspire the Next

Please contact your local Thorlux representative for more information

MADE IN THE UK

MADE IN THE UK

Thorlux Lighting, the largest company in the FW Thorpe Plc group, is proud that around **97%** of its products are manufactured in the UK.

The FW Thorpe Plc group employs over 700 people.

Thorlux Warranty

A genuine warranty with genuine value

The Thorlux range of luminaires is designed, manufactured and distributed by Thorlux Lighting, a division of the FW Thorpe Plc group. FW Thorpe is listed on the London Stock Exchange. See the corporate website at www.fwthorpe.co.uk

Thorlux luminaires have been manufactured continuously in the UK since 1936, the year Frederick William Thorpe founded the company.

In 2016-17, the revenue of FW Thorpe Plc was £105m, of which £69m was generated by Thorlux Lighting luminaires and control systems.

The Thorlux product warranty offered to customers covers a period of 5 years, with no get-out clauses concerning the number of burning hours or maintenance requirements, and no convoluted registration process.

This warranty is enhanced by the following key factors:

- FW Thorpe has a robust balance sheet, with net assets in excess of £100m (2017)
- More than £40m in cash reserves provide the ability for Thorlux to support any future warranty liabilities
- FW Thorpe has a stable ownership structure, with over 60% of the business owned by founding family members and management
- Investment in product research and development is continual - £1.7m invested per annum
- Thorlux product failure rates are consistently below 0.1%, with over 2,000 luminaires individually tested and shipped every day
- Critical components are supplied by market- leading global suppliers
- A dedicated team of our own employed local service engineers respond to any customer issues quickly and effectively, not only in the UK but overseas too
- Products are manufactured in the UK therefore spares are readily available

As Thorlux is a listed company, stringent conditions require it to be fully audited by a third party. In recent years this has been PricewaterhouseCoopers LLP (PwC), one of the top four audit and advisory firms globally. Auditors of listed companies follow rigorous international guidelines, ensuring that the financial details such companies publish (such as those on page 10) are accurate and can be relied upon.

Thorlux must prove that it will be able to pay any claims made according to its warranty conditions during the warranty period. Provision is made in each year's accounts, effectively putting aside profit from current orders for use in the future if required.

This is a key aspect of being a listed company that other smaller businesses are not required, and maybe not capable of doing. Thorlux customers should be reassured that a Thorlux warranty means something: at Thorlux, we are capable of meeting our obligations.

Some other companies offer long warranties but do not have the financial assets to withstand a sizeable warranty claim. Thorlux encourages customers to consider this scenario when purchasing other companies' products with extended warranty offers.

Michael Allcock
Managing Director

A genuine warranty with genuine value

Please refer to **www.thorlux.co.uk/terms** for full details of our terms and conditions of sale.

CLASSROOMS

Students require the correct learning environment and studies have shown that good lighting aids the subconscious processes that energise learning. Modern teaching spaces are often used for a variety of different activities and teaching methods. Through the use of intelligent lighting controls the appropriate lighting level for the specific teaching requirement can be achieved, whilst realising significant energy savings through absence/presence detection and daylight dimming.

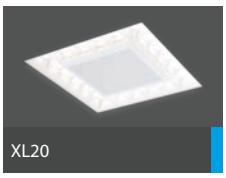
Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)	Specific requirements
Classrooms, tutorial rooms	300	19	0,60	80	Lighting should be controllable.
Classroom for evening classes and adult education	500	19	0,60	80	Lighting should be controllable.

EXAMPLES OF LUMINAIRES:

RECESSED


HI-STYLE LED


RADIANCE


XL20

SURFACE


KANBY PRO


JUBILEE


KANBY EVO

SUSPENDED


THORLUX LIGHTLINE


ZIPLINE


RADIANCE


KANBY ZIP

WHITEBOARDS

The vast majority of educational spaces now use whiteboards and/or projection equipment. These technologies have surface finishes prone to veiling reflection and, in the latter case, projected images that may struggle to compete with high luminance.

Lower levels of illumination are required when using modern projection equipment. This is best achieved through the use of intelligent lighting controls to avoid the necessity for supplementary lighting.

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

EXAMPLE TEACHING SPACE SOLUTION

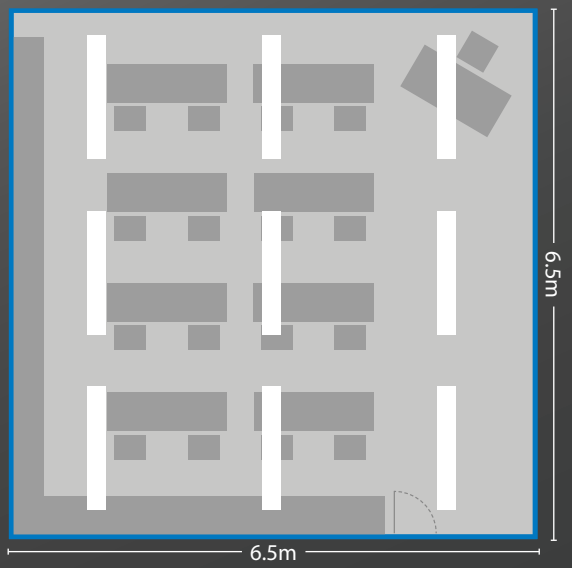
Jubilee LED - 21W

Height of room: 2.800m, Mounting height: 2.799m, Maintenance factor: 0.80

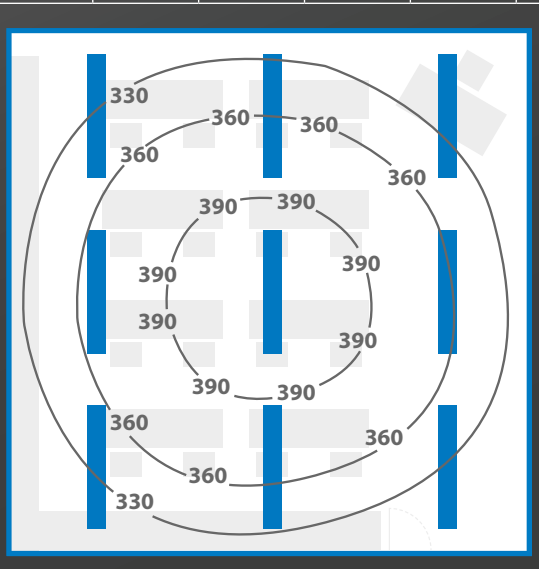
Surface	p [%]	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	363	303	412	0.835
Floor	20	292	195	356	0.667
Ceiling	70	114	88	182	0.768
Walls (4)	50	224	136	370	/

Light Distribution Calculation

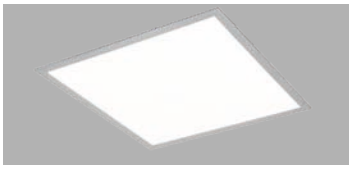
This solution uses Jubilee LED throughout the teaching space. This provides a uniform and comfortable light level over the whole area.



Ceiling height 2.8m



HIGHER EDUCATION EXAMPLE TEACHING SPACE SOLUTION



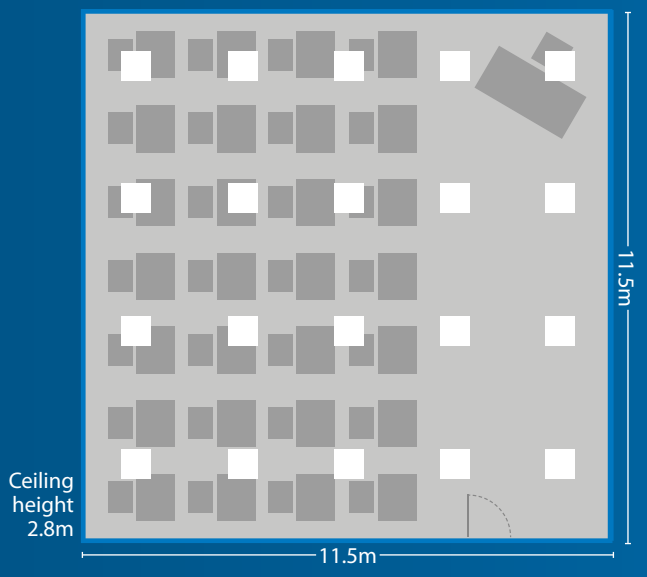
Radiance - 38W

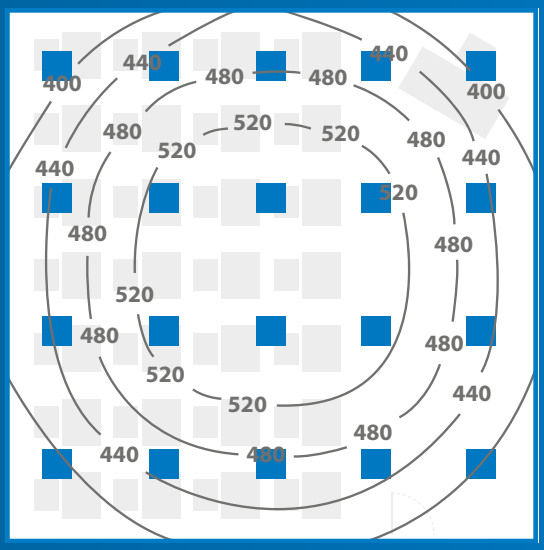
Height of room: 2.800m, Mounting height: 2.910m, Maintenance factor: 0.80

Surface	p [%]	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	555	440	657	0.793
Floor	20	484	333	568	0.688
Ceiling	70	143	125	218	0.871
Walls (4)	50	357	177	652	/

Light Distribution Calculation

This solution uses Radiance throughout the teaching space. This provides a uniform and comfortable light level over the whole area.





SPORTS HALL

Sports halls are often multi-functional spaces that need to be flexible enough to cope with a wide variety of uses. Appropriate lighting is vital to allow activities to take place that often demand difficult visual tasks, for instance tracking a fast moving shuttlecock against a similar colour background. Intelligent lighting controls that adapt lighting levels to the sport is the key to efficient use.

Luminaires should have wire guards or other impact-resistant protection and compliance with the ball test in DIN 57710 part 13 is recommended.

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)	Specific requirements
Sports halls, gymnasiums, swimming pools	300	22	0,60	80	See EN 12193 for training conditions.

EXAMPLES OF LUMINAIRES:

HIGH & LOW BAY

SOLOW LED

SOLOW XLED

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

EXAMPLE SPORTS HALL SPACE SOLUTION

Solow LED - 189W

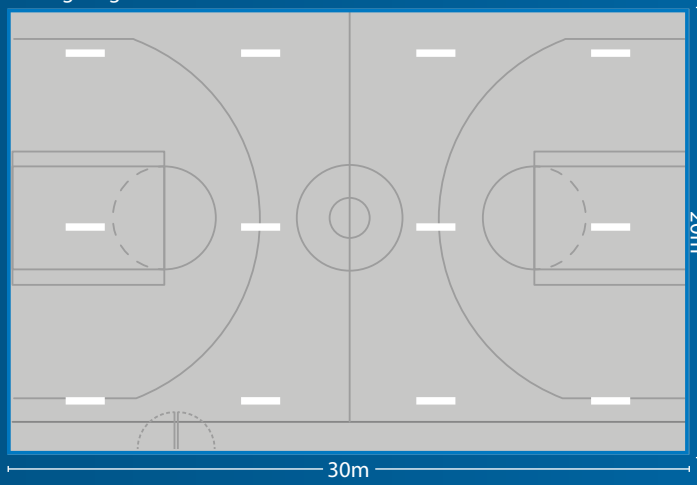
Height of room: 8.000m, Mounting height: 7.500m, Maintenance factor: 0.80

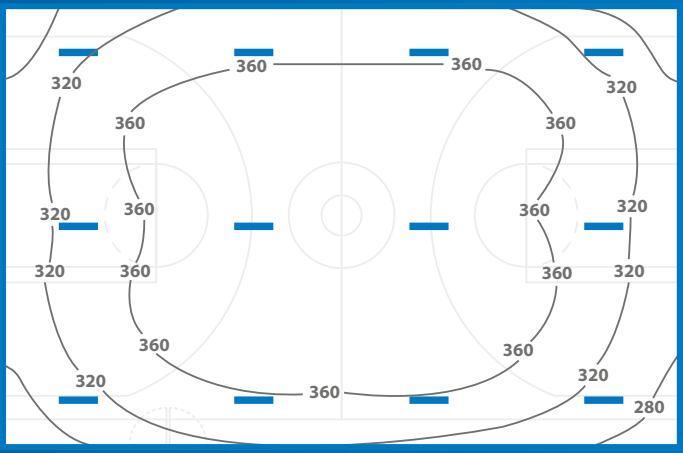
Surface	p [%]	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	349	248	404	0.712
Floor	20	342	199	409	0.583
Ceiling	70	77	55	112	0.713
Walls (4)	50	169	65	345	/

Light Distribution Calculation

This solution uses Solow LED throughout the sports hall. This provides a uniform and comfortable light level over the whole area.

Ceiling height 8m





STUDENT ACCOMMODATION

The lighting of student accommodation poses numerous challenges, it should provide enough illumination to ensure a safe and secure environment whilst creating a visual environment that is interesting rather than "institutional".

Reducing the energy load has to be a key goal in any project, the use of LED luminaires combined with lighting controls can offer substantial savings, particularly in communal areas where the occupancy levels are low.

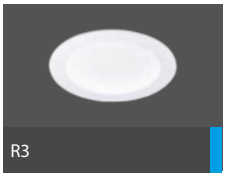
Higher Education providers also have to adhere to very strict emergency regulations which not only require emergency lighting to be functional at all times, but also necessitate monthly and yearly functional and duration tests on all emergency luminaires.
Under the Regulatory Reform (Fire Safety) Order failure to provide a compliant system and failure to regularly test and maintain it can result in prosecution for the employer or building owner who may face fines and imprisonment if convicted.

Study Bedrooms - The main lighting within the study bedroom should provide at least 100 lux at desk height. Local task lighting on the desk and dimming control also enable flexibility within the space.

Communal Kitchens – These areas are often left unoccupied for large periods of the day so occupancy controls are advised to avoid wasted energy. Luminaires within the kitchen area should also have good colour rendering (CRI>80) and be rated IP44.

EXAMPLES OF LUMINAIRES:

RECESSED

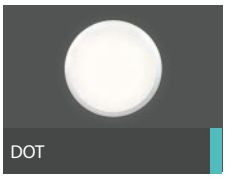

R3


R4


G2


G4

SURFACE


DOT


GLODOME


ARCADIAN


G4 SURFACE

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

EXAMPLE STUDENT ACCOMMODATION SPACE SOLUTION

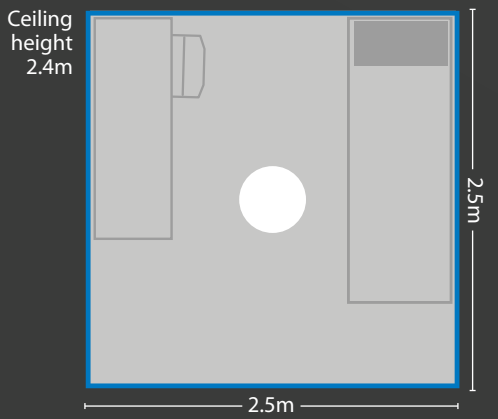
Dot - 17W

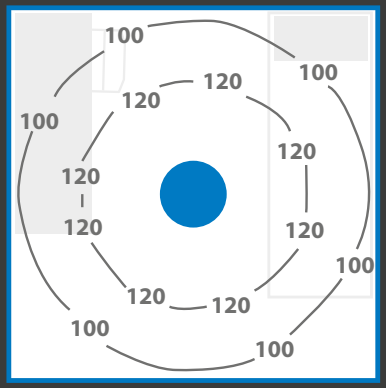
Light Distribution Calculation

This solution uses Dot throughout the student accommodation. This provides a uniform and comfortable light level over the whole area.

Height of room: 2.4m, Mounting height: 2.4m, Maintenance factor: 0.80

Surface	p [%]	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	114	96	134	0.836
Floor	20	106	78	132	0.730
Ceiling	70	39	27	61	0.697
Walls (4)	50	81	38	135	/





LECTURE THEATRES

The lighting in a lecture theatre must reveal the lecturer to the audience and the audience to the lecturer, and also provide for the other visual tasks involved such as observing demonstrations, reading the screen or whiteboard, and the taking of notes. The luminaires must be positioned so as not to create glare problems either for the audience or the speaker.

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)	Specific requirements
Auditorium, lecture hall	500	19	0,60	80	Lighting should be controllable to accommodate various A/V needs.

EXAMPLES OF LUMINAIRES:

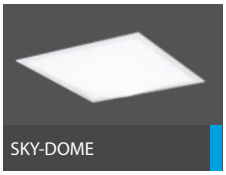
SUSPENDED


HI-BAR


KANBY ZIP

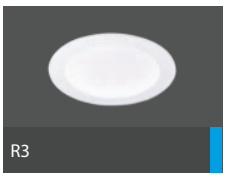

THORLUX LIGHTLINE

RECESSED


SKY-DOME


HI-STYLE OPAL

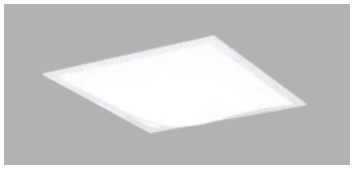

RADIANCE


R3


R4

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

EXAMPLE LECTURE THEATRES SPACE SOLUTION



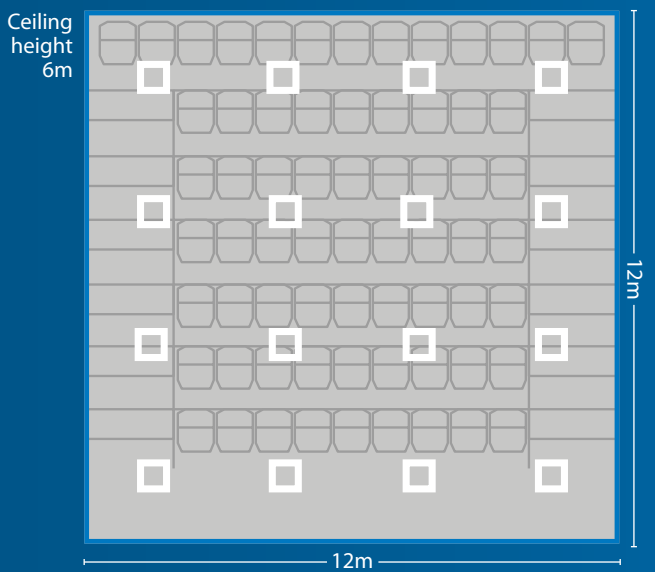
Radiance - 51W

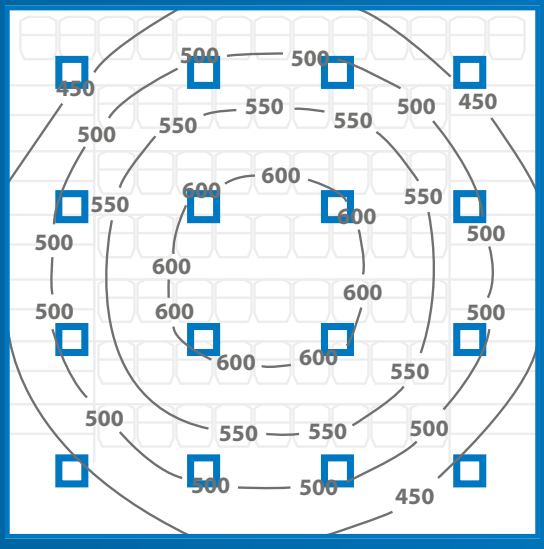
Height of room: 6.000m, Mounting height: 6.112m, Maintenance factor: 0.80

Surface	p [%]	E_{av} [lx]	E_{min} [lx]	E_{max} [lx]	u0
Workplane	/	488	373	561	0.765
Floor	20	432	285	519	0.660
Ceiling	70	122	109	165	0.899
Walls (4)	50	293	131	471	/

Light Distribution Calculation

This solution uses Radiances throughout the lecture theatre. This provides a uniform and comfortable light level over the whole area.





RECEPTIONS

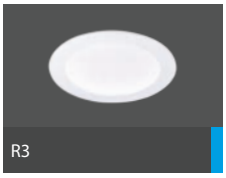
The first impression of a building should give the user a feeling of safety and security. Sharp contrasts are to be avoided adjacent to the reception desk and the use of indirect lighting, to avoid facial shadowing, is recommended. The illuminance at floor level should be increased close to the entrance to ensure a safe transition between the exterior and interior.

EXAMPLES OF LUMINAIRES:

DISPLAY & FEATURE

SUSPENDED

RECESSED



For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

CORRIDORS AND STAIRWELLS

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)
Circulation areas, corridors	100	25	0,40	80
Stairs	150	25	0,40	80

Circulation areas should enable people to find their way easily and safely through the building, even when they are unfamiliar with it. Corridors are used as social areas, for the display of student works and transport. Illuminance level requirements are 100 lux, but higher illumination values should be adapted to the activity type and level. They will also, in most cases, need to provide means of escape and this will require emergency lighting.

EXAMPLES OF LUMINAIRES:

RECESSED SURFACE DISPLAY & FEATURE


G4


CLARA 360


CLARA 180

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

LABORATORIES

Rooms used for practical work, i.e. laboratories, workshops, art rooms, food technology/catering, electronics, craft rooms and similar applied learning spaces, involve visual needs and tasks that are the same as those often found in industry. The main task of the lighting is to make objects easily recognisable so good colour rendition and uniformity are essential. According to the type of visual task and material being used, the luminaire may also need to meet a specific IP rating.

EXAMPLES OF LUMINAIRES:

RECESSED


CLEANLINE


TAU


RADIANCE

SURFACE


A-LINE


THOROPROOF

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

LIBRARIES

In libraries the designer needs to allow for a variety of tasks including finding the correct book, reading and studying. In addition, there are a number of other considerations such as lighting for computer use and accent lighting for display purposes. Lighting in each case calls for a different approach. Physically finding a book requires vertical illuminance on the spine of the book therefore 200 lux on a vertical plane at just above floor level is required. For computer and reading based tasks 300 lux is suitable for most users and in some libraries that are open to the wider adult community this may be raised to 500 lux for reading tasks.

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)
Library: bookshelves	200	19	0,60	80
Library: reading areas	500	19	0,60	80

EXAMPLES OF LUMINAIRES:

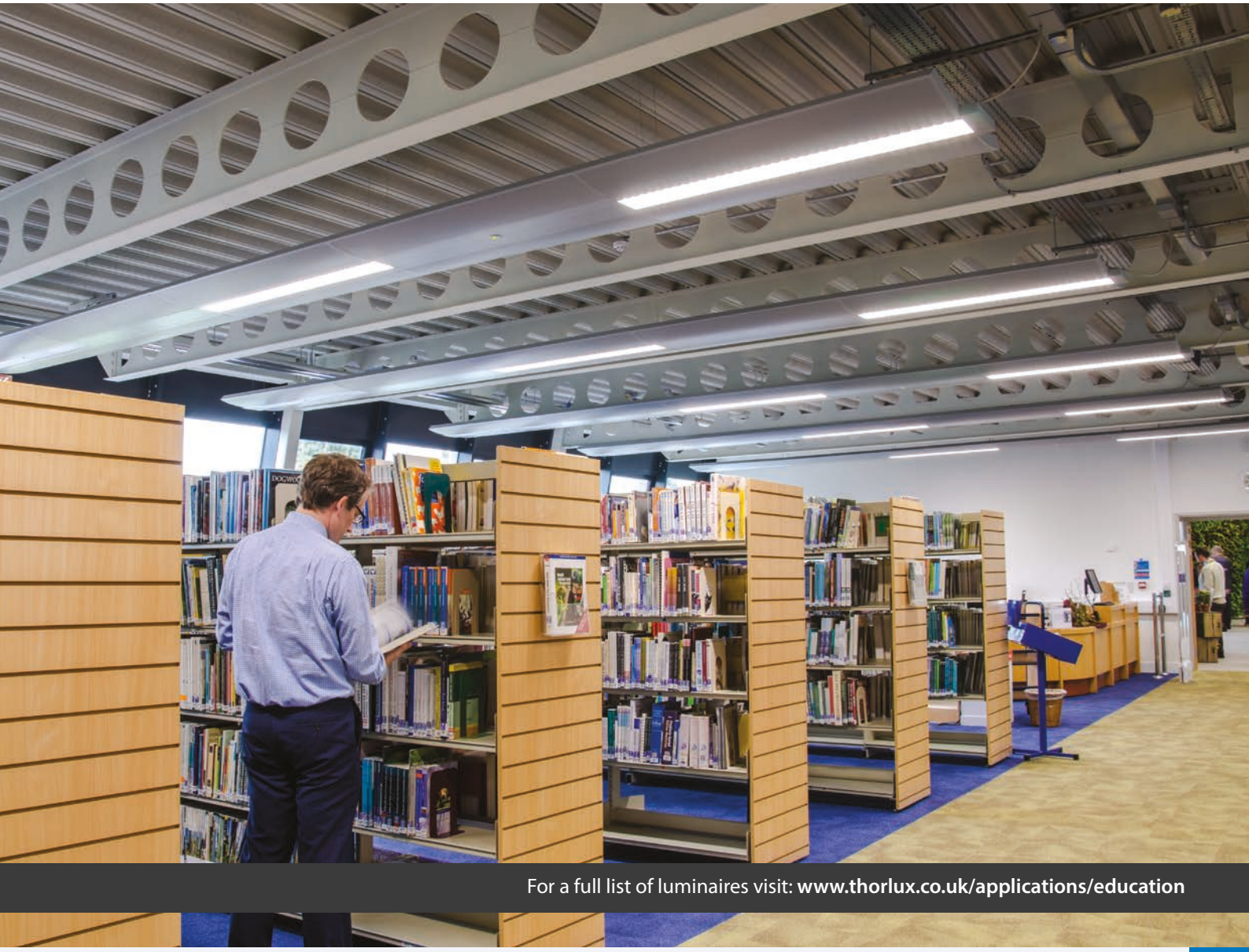
SUSPENDED

THORLUX LIGHTLINE

HI-BAR

RECESSED

HI-STYLE LED



For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

KITCHENS

The kitchen areas require high illuminance levels and uniformity. The luminaires must be of the correct IP rating required for food preparation areas.

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)
Kitchen	500	22	0,60	80

EXAMPLES OF LUMINAIRES:

RECESSED


CLEANLINE


TAU

SURFACE


A-LINE


THOROPROOF

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

CANTEENS AND DINING ROOMS

The lighting in the canteen areas should be inviting and comfortable yet at the same time provide the required illuminance for the high level of activity.

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)
School canteens	200	22	0,40	80

EXAMPLES OF LUMINAIRES:

RECESSED


SKY-DOME


G3

SUSPENDED


CLARA 720


HI-BAR

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

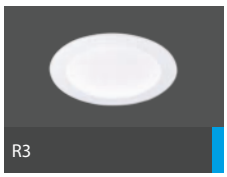
CHANGING ROOMS AND TOILETS

Changing rooms require bright and uniform lighting and have high energy savings potential due to their specific and time-limited use. The toilet and shower areas require luminaires with the correct IP rating.

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)
Cloakrooms, washrooms, bathrooms, toilets	200	25	0,40	80

EXAMPLES OF LUMINAIRES:

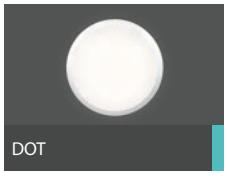
RECESSED


R3


R4

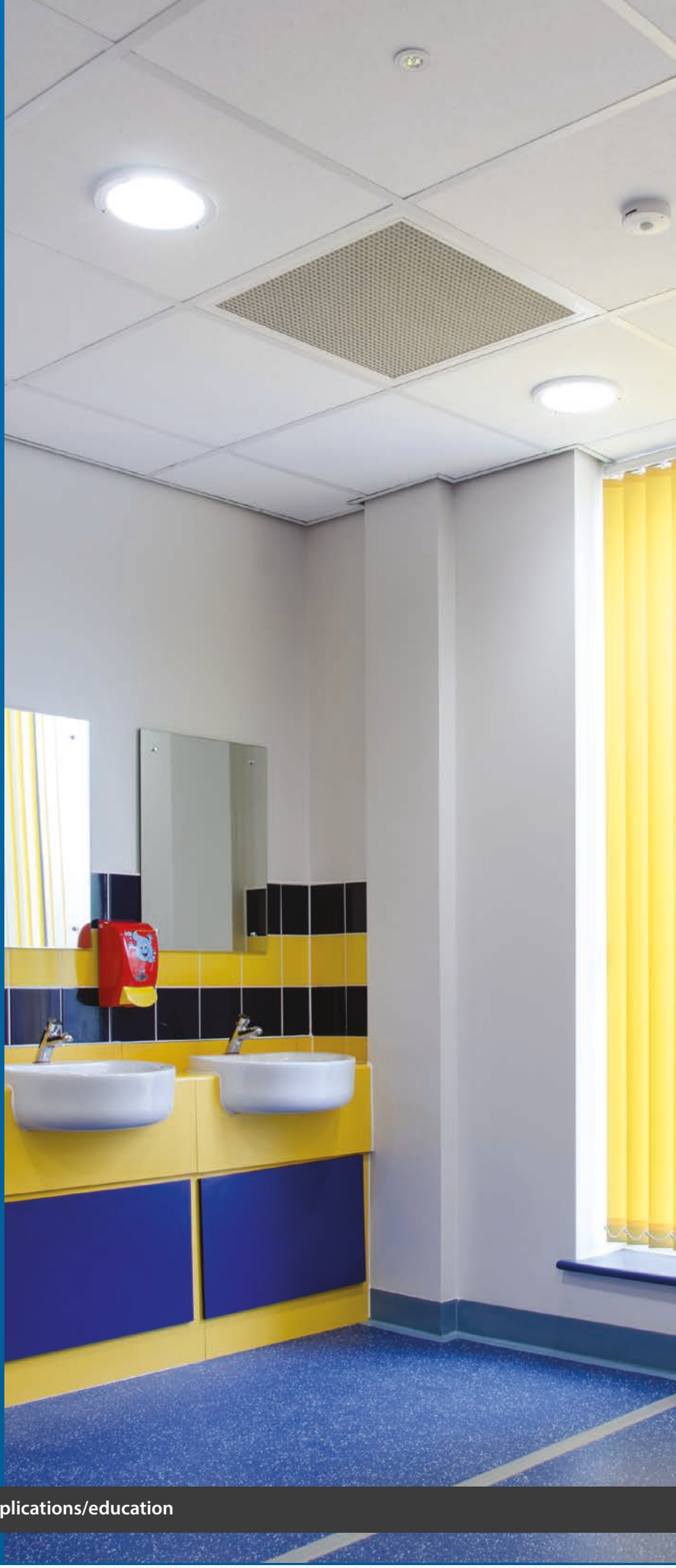

G3

SURFACE


DOT


GLODOME


ARCADIAN



For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

DESIGN TECHNOLOGY CLASSROOMS

A large range of activities are to be found in design and technology departments. Where dust or moisture risk exists the lighting should be a minimum of IP44.

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)
Workshops and other practical learning spaces	500	19	0,60	80

EXAMPLES OF LUMINAIRES:

SURFACE

RECESSED

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

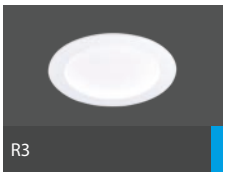
STUDENT LOUNGES

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)
Student common rooms and assembly halls	200	22	0,40	80

EXAMPLES OF LUMINAIRES:

RECESSED


G4


R3


VIVA

SURFACE


JUBILEE


KANBY EVO


G4 SURFACE

For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

STAFF ROOMS

Type of area, task or activity	Lux-level (Em)	Glare rating (UGRL)	Uniformity (U0)	Colour rendition (Ra)
Staff room and offices	300	19	0,60	80

EXAMPLES OF LUMINAIRES:

SUSPENDED


HI-BAR


THORLUX LIGHTLINE


KANBY ZIP

RECESSED


VIVA

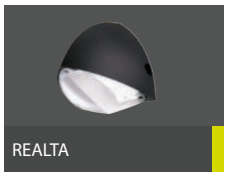
For a full list of luminaires visit: **www.thorlux.co.uk/applications/education**

EXTERNAL

External lighting should provide a welcoming appearance to entrances, access routes and car parks but also give a sense of safety for both pedestrians and vehicular users. The lighting designer should also take into consideration colour rendering, installation efficacies and maintenance issues relative to CCTV use and minimal light nuisance.

EXAMPLES OF LUMINAIRES:

EXTERIOR



REALTA

STARBEAM

STARFLOOD

FOLIO

JUNO RANGE

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