



# Modernisation of school facilities

Good practices

# Proper illumination of educational areas

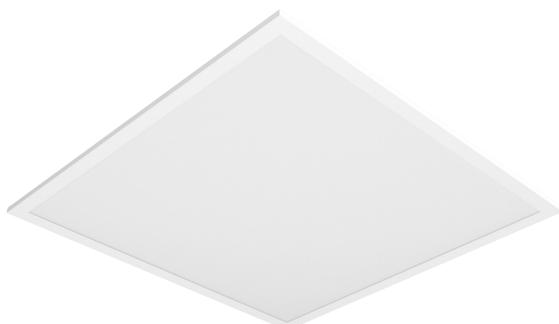
According to PN-EN-12464-1



RAYLUX



RAYLUX LB



LUGCLASSIC SLIM  
LB LED HE



LUGSTAR 3.0



MEDICA 2.0 HE



CRUISER

# Lighting

- 1 Classrooms
  - Em – 300lx
  - UGR <19
  - Ra $\geq$  80
  - U0 $\geq$  0,6
- 2 Corridors
  - Em – 100lx
  - UGR <25
  - Ra  $\geq$  80
  - U0 $\geq$  0,40
- 3 Toilets
  - Em – 200lx
  - UGR<25
  - Ra $\geq$  80
  - U0 $\geq$  0,40
- 4 Teachers' room
  - Em – 300lx
  - UGR <19
  - Ra $\geq$  80
  - U0  $\geq$  0,6
- 5 Classroom boards lighting
  - Em – 500lx
  - U0 $\geq$  0,7
- 6 Sport halls
  - Em – 300lx
  - UGR <22
  - U0 $\geq$  0,6
  - Ra $\geq$  80
- 7 School canteen
  - Em – 300lx
  - UGR <19
  - Ra $\geq$  80
  - U0 $\geq$  0,6
- 8 IT Classrooms
  - Em – 300lx
  - UGR <19
  - U0 $\geq$  0,60
  - Ra  $\geq$  80
- 9 Practical classes and laboratories
  - Em – 500-750lx
  - UGR < 19
  - U0 $\geq$  0,6-0,70
  - Ra  $\geq$  80,90



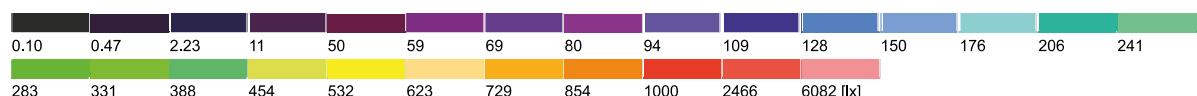


# Classrooms

Partial daylighting of the classroom



Full classroom illumination with artificial light





# Classrooms

Case study



RAYLUX

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#### Assumptions

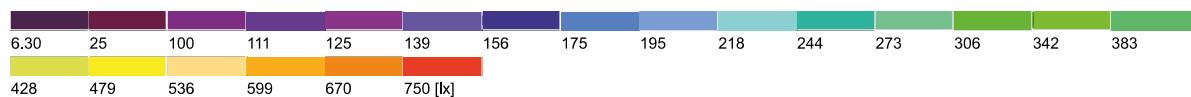
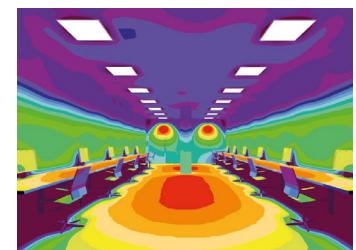
Room [m <sup>2</sup> ]	54
Energy costs [EUR/kWh]	0,27 EUR
Working time [h/day]	12
Working time [days/year]	200

	LUG luminaire	Luminaire fluorescent lamp
Power [W]	35	86
Luminaires [pcs.]	8	8
Energy costs [EUR/kWh]	0,27 EUR	0,27 EUR
Working time [h/day]	12	12
Number of days per year	200	200
Energy consumption [kWh/1pcs.]	0,035	0,086
Energy consumption [kWh/year]	672	1 652
Energy costs [EUR/year]	182,00 EUR	447,00 EUR
<b>Cost savings [EUR/year]</b>	<b>265,00 EUR</b>	



# IT classrooms

Partial daylight illumination of the room



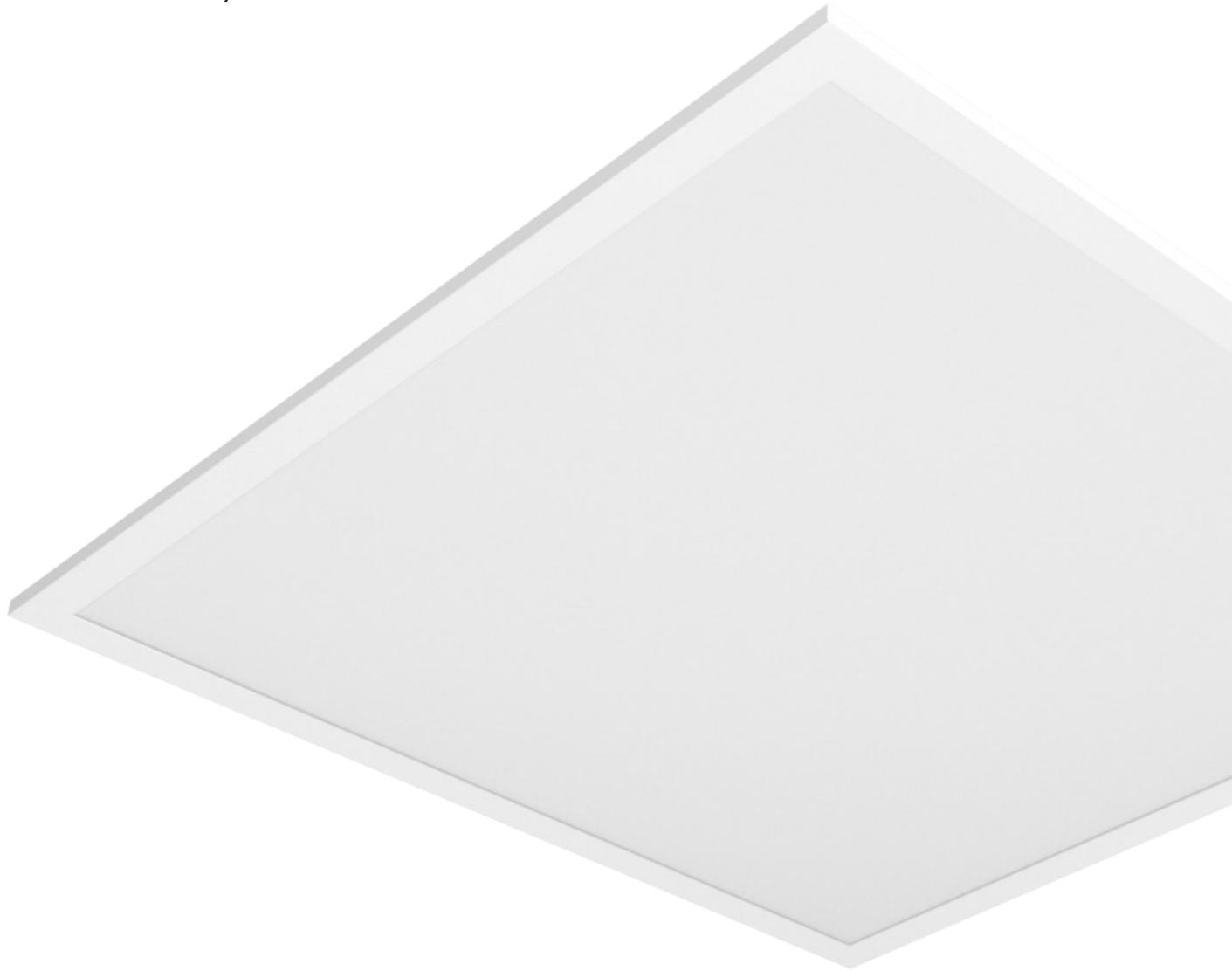
School facilities are no longer just traditional classrooms. New technologies have become an inseparable part of modern schools, so the need for professional lighting is increasing.

The light panel is the optimal solution for IT classrooms, where lighting should be adapted to continuous use of the PC's, the UGR indicator should be as low as possible.



# IT classrooms

Case study



LUGCLASSIC SLIM  
LB LED HE

### Assumptions

Room [m <sup>2</sup> ]	65
Energy costs [EUR/kWh]	0,27 EUR
Working time [h/day]	12
Working time [days/year]	200

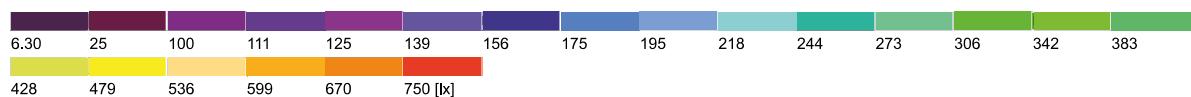
LUG luminaires	Luminaire fluorescent lamp
----------------	----------------------------

Power [W]	34	86
Luminaires [pcs.]	14	14
Energy costs [EUR/kWh]	0,27 EUR	0,27 EUR
Working time [h/day]	12	12
Number of days per year	200	200
Energy consumption [kWh/1pcs.]	0,034	0,086
Energy consumption [kWh/year]	1 143	2 890
Energy costs [EUR/year]	309,00 EUR	781,00 EUR
<b>Cost savings [EUR/year]</b>	<b>472,00 EUR</b>	



# Vocational classrooms

## Full room illumination with artificial light



The correct lighting of vocational subject rooms classrooms is a major challenge, as it often has to meet a number of stringent standards.

During practical sessions, steam, humidity and dust are generated, and these rise in the room and damage electrical equipment, including luminaires. It is therefore essential to install professional lighting that is suitably protected from the elements.



# Vocational classrooms

Case study



MEDICA 2.0

### Assumptions

Room [m <sup>2</sup> ]	102
Energy costs [EUR/kWh]	0,27 EUR
Working time [h/day]	12
Working time [days/year]	200

LUG luminaires	Luminaire fluorescent lamp
----------------	----------------------------

Power [W]	47	86
Luminaires [pcs.]	12	12
Energy costs [EUR/kWh]	0,27 EUR	0,27 EUR
Working time [h/day]	12	12
Number of days per year	200	200
Energy consumption [kWh/1pcs.]	0,047	0,086
Energy consumption [kWh/year]	1 354	2 477
Energy costs [EUR/year]	366,00 EUR	669,00 EUR
<b>Cost savings [EUR/year]</b>	<b>303,00 EUR</b>	



# Teachers' rooms

## Partial daylighting of the room



Linear luminaires are used to create lines of light in office areas and communication routes.

They are also perfect for illuminating teachers' rooms as they provide a good quality of vision, uniformity of lighting, anti-fatigue and generate a high output from a relatively low power.



# Toilets and bathrooms

## Partial daylighting of the room



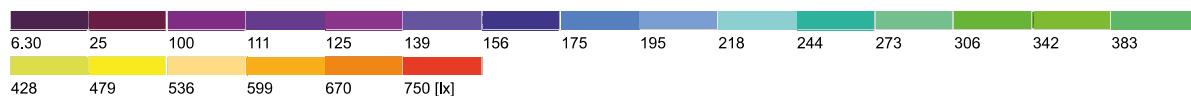
Toilets and bathrooms are characterised by special requirements - high efficiency and demanding conditions due to the possible humidity.

Humidity is dangerous for at least two reasons: fungi and moulds grow easily in damp rooms. On the other hand, large amounts of water and inadequately chosen lighting can lead to electrocution. It is therefore very important to select dedicated lighting for such areas.



# Corridors

Partial daylighting of the room

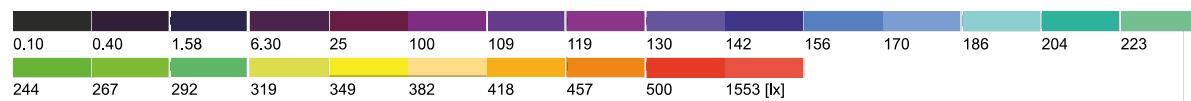


School corridors are not only communication routes that must comply with all health and safety standards, they are also places of rest during short breaks between classes. Therefore, lighting plays an equally important role as much as their ergonomics.



# Practical classes and laboratories

Partial daylight illumination of the room



Many extra-curricular activities take place in the school building. These rooms should be suitable for a wide range of activities, therefore require versatile lighting. Downlight luminaires meet these requirements perfectly.

The LED technology used in this particular luminaire enables significant savings. The calculation carried out on an example of room of this type, illuminated with 20 luminaires, allows us to estimate that the replacement of conventional luminaires to a suitable LED luminaire, savings of up to 65% can be achieved.

# Practical classes and laboratories

Case study



## LUGSTAR 3.0



### Assumptions

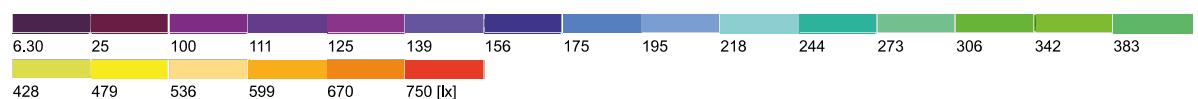
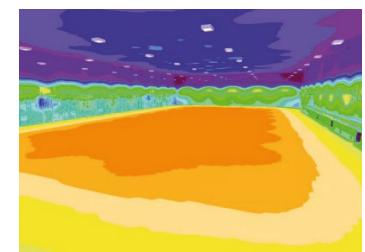
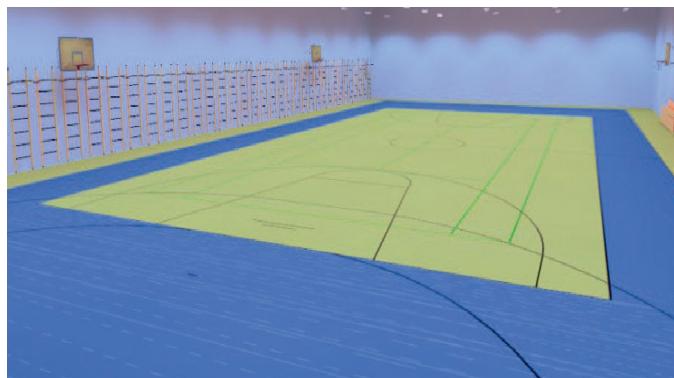
Room [m <sup>2</sup> ]	72
Energy costs [EUR/kWh]	0,27 EUR
Working time [h/day]	12
Working time [days/year]	200

	LUG luminaires	Luminaire fluorescent lamp
Power [W]	18	54
Luminaires [pcs.]	20	20
Energy costs [EUR/kWh]	0,27 EUR	0,27 EUR
Working time [h/day]	12	12
Number of days per year	200	200
Energy consumption [kWh/1pcs.]	0,018	0,054
Energy consumption [kWh/year]	864	2 592
Energy costs [EUR/year]	234,00 EUR	700,00 EUR
<b>Cost savings [EUR/year]</b>	<b>466,00 EUR</b>	



# Sport Halls

## Partial daylighting of the room



Sport halls due to their size, require a large number of luminaires with high luminous flux which results in relatively high electricity consumption.

Energy efficiency is becoming a key lighting design issue for this type of room. The use of High -Bay luminaire with LED technology will provide savings of technology of over 65% compared to conventional technology.



# Sport Halls

Case study



CRUISER

### Assumptions

Room [m <sup>2</sup> ]	1056
Energy costs [EUR/kWh]	0,27 EUR
Working time [h/day]	12
Working time [days/year]	200

LUG luminaires	Luminaire fluorescent lamp
----------------	----------------------------

Power [W]	145	400
Luminaires [pcs.]	50	50
Energy costs [EUR/kWh]	0,27 EUR	0,27 EUR
Working time [h/day]	12	12
Number of days per year	200	200
Energy consumption [kWh/1pcs.]	0,145	0,4
Energy consumption [kWh/year]	17 400	48 000
Energy costs [EUR/year]	4 698,00 EUR	12 960,00 EUR
<b>Cost savings [EUR/year]</b>	<b>8 262,00 EUR</b>	

# Summary of savings

Rooms	Pcs.	Costs to date	Cost after modernisation	Savings annual
Classroom	24	10 728,00 EUR	4 368,00 EUR	6 360,00 EUR
Laboratories	2	1 338,00 EUR	732,00 EUR	606,00 EUR
IT Classrooms	2	1 562,00 EUR	618,00 EUR	944,00 EUR
Sport Halls	2	25 920,00 EUR	9 396,00 EUR	16 524,00 EUR
Teachers' room	1	447,00 EUR	182,00 EUR	265,00 EUR
Corridors	6	2 682,00 EUR	1 092,00 EUR	1 590,00 EUR
Toilets and bathrooms	8	5 600,00 EUR	1 456,00 EUR	4 144,00 EUR
<b>Annual saving</b>				<b>30 433,00 EUR</b>

# Proper lighting of school rooms

## Summary



Classrooms  
**300 lx**



IT classrooms  
**300 lx**



Practical classes  
and laboratories  
**500 lx**



Laboratories,  
presentation tables  
**500 lx**

### Note the following:

- Flickering
- Durability
- Glare
- Colour rendering
- Colour temperature
- Electrical and photobiological safety

### Important technology:

- UV-C
- Human Centric Lighting
- Smart lighting



Spain, Zaragoza, Colegio de Cuarte





# It is happening!

Prepare yourself for  
the EU's fluorescent  
lights ban.



CFL



T8



T5



We got  
**you covered!**



EU laws restrict the use of certain hazardous substances in electrical and electronic equipment through the RoHS Directive. During the use, collection, treatment and disposal of such waste, products may release harmful (hazardous) substances such as lead, mercury and cadmium, which can cause major environmental and health problems.

**All products with an electrical and electronic component, unless specifically excluded, have to comply with these restrictions.**

### **From 24 February 2023, the following light sources will be phased out:**

- CFL, compact fluorescent tube, lifetime < 20.000 h
- Circline lamps >10 - <15 mg mercury

### **From 24 August 2023, the following light sources will be phased out:**

- CFL, compact fluorescent tube, lifetime > 20.000 h
- T5 fluorescent tubes
- T8 fluorescent tubes

### **From 23 February 2027, the following light sources will be phased out:**

- HPS High pressure sodium lamps
- MH Metal halide lamps



[www.luglightfactory.com/en](http://www.luglightfactory.com/en)