



# Lighting for schools

Investment in the future

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## Good lighting makes learning easier

Day to day life in schools has changed basically in recent years. In addition to the usual teacher-centred instruction there are all kinds of new learning situations such as group instruction or the integration of new media such as computers, beamers and whiteboards. In view of how varied the learning land-

scape has become, the requirements placed on lighting have become equally diverse. An adequate visual perception of the instruction media and materials is only possible with optimal lighting, so that the information can be taken in and assimilated.





It is not disputed that an adequate level of lighting with the right light colour makes it easier for students to concentrate and hence directly affects the success of learning. Last but not least, light also contributes to well-being. Artificial light has thus become hugely important as a supplement for natural

daylight - for learning, but also for teaching. The focus should always be on the user of the light, followed by economic or design aspects. Competent and professional lighting planning is absolutely necessary, whereby the special requirements of the various types of rooms must also be covered.

# Energy efficiency

Energy efficiency is important in these times of rising energy prices, firstly to reduce costs, but also to save resources and protect the climate . Several components determine how economical a lighting system is. Over the past few years, LEDs have established themselves in the market as the most economic form of lighting with what is currently the highest light output. As a lighting manufacturer with a strong sense of responsibility, Regiolux operates LEDs with high-quality drivers and well-thought-out temperature management so that the LEDs can be put to optimum use. The luminaires are characterised by highly efficient and carefully calculated lighting technology.

Depending on the amount of natural daylight in the rooms to be illuminated, further savings can be achieved with a daylight-linked control system . In view of the longer operating time, this is especially the case in all-day schools. The light is switched off automatically during breaks by an additional presence -based control

system. Last but not least, the maintenance costs also play a role in a complex analysis. LEDs are better here too, the extra costs of changing the lamps are avoided due to their long service life.

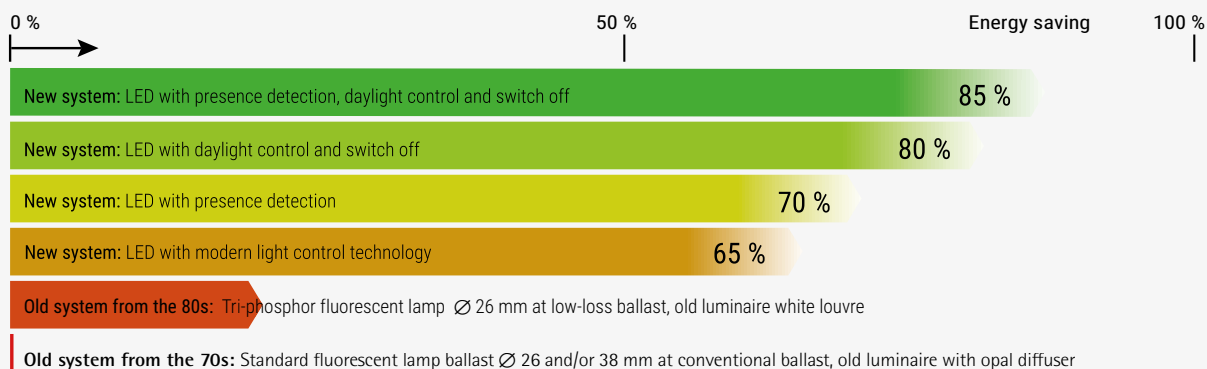


## More information

in the brochure  
„Light - energy -  
the environment“



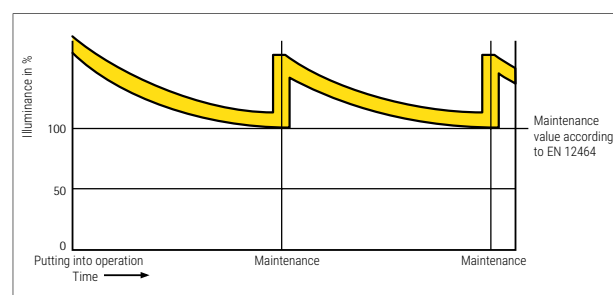
## Energy saving indoor lighting





## Standards and light quality

The basis for the planning of lighting in schools is EN 12464-1 „Light and lighting - Lighting of work places - Part 1: Indoor work places“. The horizontal illuminances quoted in the standard are 300 Lux for general classrooms and 500 Lux for special subject classes such as handicraft rooms, training workshops or laboratories. Special rooms such as those for drawing in art schools need even brighter illumination. The vertical light components are also important in addition to the horizontal illumination level. This primarily concerns board illumination, which should always be set at 500 Lux regardless of the type of room. In addition, vertical light is a prerequisite for good communication between teacher and students and between the students themselves. Further parameters that are defined in the standard specify the uniformity, glare suppression and colour rendering properties of the lighting. However, sufficiently high light quality goes



beyond merely the correct implementation of what has been stipulated in the standard. Teachers and students should experience their environment as pleasant and identify with their school. In addition, a corresponding room climate is a precondition in the rooms, something that is ultimately determined by the interaction of, among things, colours, materials, acoustics as well as the architectural and lighting concept.



# Lighting complex school



## Classrooms Auditoria

DIN-EN: 300-750 lux

General classrooms 300 lux,  
Auditoria 500 lux,  
Special subject classes  
500-750 lux.



## Blackboard area

DIN-EN: 500 lux

Optimal glare-free lighting of vertical wall and blackboard surfaces for low-fatigue learning and high-level perception. 500 lux.



## Offices Administration areas

DIN-EN: 500 lux

Glare-free working with all-round glare-free general and individual workstation lighting according to DIN EN 12464-1. 500 lux overall.



## Computer rooms Teaching rooms

DIN-EN: 300 lux

All-round-glare limitation for VDU workstations according to DIN EN 12464-1. 300 lux overall.



## Garage areas Cellars

DIN-EN: 100 lux

Robust luminaire systems with a higher protection rating, impervious towards dust and splashwater. 100 lux overall.



## Corridors Staircases

DIN-EN: 100-200 lux

Cost efficiency and safety with good general lighting. Corridors 100 lux, Staircases 150 lux, entrance areas 200 lux.





#### Changing rooms Ancillary rooms

DIN-EN: 200 lux

Robust luminaire systems with a high protection rating, impervious to dust and dirt. 200 lux overall.



#### Work rooms Handicraft rooms

DIN-EN: 500 lux

Neutral, glare-free general lighting for safe and error-free activities. 500 lux overall.



#### Laboratories Specialist rooms

DIN-EN: 500 lux

Glare-free lighting with good distinction of forms and colours and safe working. 500 lux overall.



#### Libraries Break rooms

DIN-EN: 200/500 lux

200 lux for bookshelf areas. Glare-free general lighting for optimisation of visual tasks in reading areas. 500 lux.



#### School kitchens Canteens

DIN-EN: 500 lux

Easy to clean luminaire systems with higher protection rating, impervious to dust and humidity. 500 lux overall.



#### Sports halls Multi-purpose halls

DIN-EN: 300 lux

Glare-free lighting installations with ball impact resistance for good visibility and avoidance of accident and injury. 300 lux overall.





# Human Centric Lighting

-the right light at the right time



A high quality of light is characterised today not only by satisfying the classic quality properties of good light. Much more important is the new approach, whereby light has a biologically important component in addition to visual and emotional functions. Biological processes in the body can be controlled by changes in the lighting level, the colour temperature and the direction of the light. Energising daylight-white light results in alert students who are more motivated

and can follow the instruction more closely. On the other hand, warm white light provides a relaxed learning atmosphere in the recovery phases and reduces the amount of restless movement. It is therefore obvious that the best possible light has to be provided, especially for schoolchildren and younger students, so as to encourage their ability to concentrate, to pay attention, their performance, and last but not least, to promote a sense of well-being.





## Intelligent control

In addition to the possibility of reducing energy costs with light controllers, intelligent systems make a significant contribution to more comfortable lighting. For example, lighting scenes designed to meet individual requirements can be called up at the press of a button. This allows various kinds of instruction to be addressed specifically. For example, these could be dimmed lighting scenes for screen presentations or various scenarios in the sense of Human Centric Lighting.

LC-RX direct:LC-Controller

EnOcean Dali controller, DT8 protocol for Tunable White, up to max. 15 Dali devices, 230 V 50 Hz, 868 MHz, freely configurable, incl. surface-mount box.



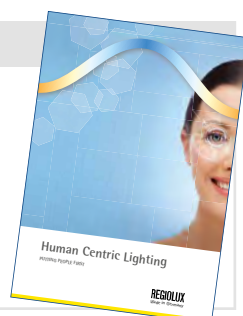
### More Information

in the application manual „Tunable White“



### More Information

in the theme catalogue „Human Centric Lighting“



# Jean-Paul secondary school

## Actual project

### Project data

Building owner:  
Architects:

Wunsiedel municipal authorities  
Dömges Architekten AG Architektur und  
Stadtplanung, Regensburg  
Kuchenreuther Architekten/Stadtplaner,  
Marktredwitz

Planning:  
Execution:  
Project location:

WUN Elektro GmbH, Wunsiedel  
WUN Elektro GmbH, Wunsiedel  
Wunsiedel



Named after Wunsiedel's famous author of German novels, Jean Paul, this secondary school has been completely renovated in several construction phases. Since it is an open and linked all-day school, this naturally also places high demands on the lighting system. This problem was solved in the second construction phase not only in lighting terms but also in a very aesthetic way by the use of visula pendant luminaires.

The direct-indirect lighting of the visula offers a very homogeneous appearance with its edge lighting, as well as glare limitation that is suitable for VDU work thanks to high-quality micro-prisms. planara recessed luminaires were used in the kitchen and the handicraft rooms on account of the higher level of protection required in these rooms. They stand out above all through their elegance, since they appear to consist of nothing but light.





# Heinrich-Heine school

## Actual project

### Project data

Building owner:  
Architects:

Planning:  
Execution:

Project location:

Büdelsdorf municipal authorities  
Dohle+Lohse Architekten GmbH,  
Brunswick  
Goldbeck Treuen  
Schuster Elektrotechnik Nebelschütz  
GmbH, Kamenz  
Büdelsdorf

The new building of the community school with a higher-level school upper class did not get off to an easy start, but the school looks all the better for it. As an acclaimed „model school for digital learning“, many lighting-related challenges had to be tackled. The planar recessed luminaires with their iced opal diffusers provide an especially homogeneous soft light as well as an anti-glare model high-quality micro-prisms for VDU workplaces. Downlights from the doma series were used

in the ancillary rooms and in the auditorium, which was designed as a meeting area; these could be used in a wide variety of areas due to their high LED efficiency together with very good glare limitation. As a round recessed luminaire, it does not depend on any direction and blends in very well with the round columns that support the meeting area, without thrusting itself into the creative limelight, this allowing the modern architecture to take its full effect.









# Planning example classroom

## Planning of a classroom

An adequate level of horizontal lighting on the work tables and vertical light on the board form the basis for standard conforming lighting.

Vertical light components are also important on the walls, especially when these are used as presentation areas. The use of computers, beamers and whiteboards also has to be taken into account, as does the fact that the various types of rooms in the entire school complex have to be considered and planned in different ways.

Lighting control - the ideal solution for classrooms.

The LC-BEG PD4-M-TRIO sensors each have a light sensor that can be aligned individually and an associated DALI and switching output for the window zone and the inner zone of a classroom. In addition, the sensors have an independent third output, e.g. to control board lighting.

The controllable lighting circuits provide an optimal illuminance with maximum energy savings.



## Object examples

Primary school, Oberhaid



Rudolf-Tarnow primary school, Wismar



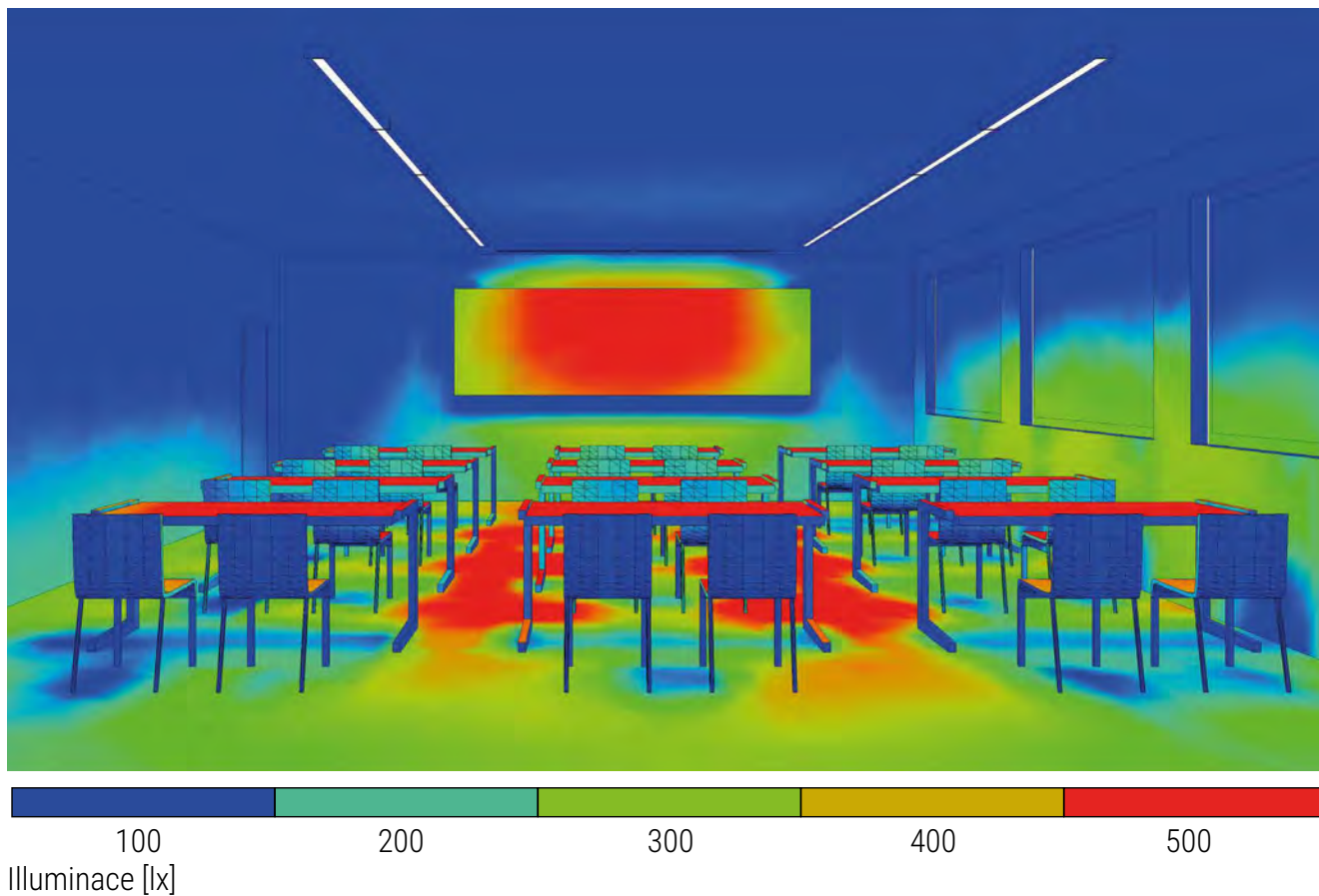
Secondary school, Ebern



Richard-Keller school, Berlin







### Calculation basis



Reflection values:

Ceiling: 0,7

Walls: 0,5

Floor: 0,2

Average illuminance:

Utilization plane: 545 Lux

Blackboard: 532 Lux

UGR: 19

Performance (with ED): 499 W



Space dimension: 9,60m x 7,20 m

Mounting height: 2,80 m

Utilization plane: 0,75 m

Types:

10x procube-CUAX/1500-1 LED 4000 840

2x procube-CAWF/1500-1 LED 3700 840






















# Regiolux range of luminaires









 **Recessed luminaires**







Room types:           


					
planara	panella	protection	hokal	RE	UE












 **Surface mounted luminaires**

Room types:           

							
visula	protection	peanut	stail	hokal	procube	cubus	UA

					
rebus	wotek	lens line	KL	WL	WQL




 **Suspended luminaires**

Room types:           

							
visula	alvia	heip	peanut	stail	hokal	procube	cubus

 **Furniture luminaires/light strips**

Room types:    

		
ilia	vakant	MLF

# Regiolux range of luminaires



## Wall-mounted and standing luminaires

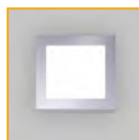
### Room types



alvia



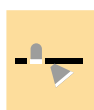
visula



visula



smile



## Downlights and spotlights

### Room types



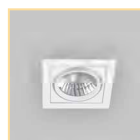
doma



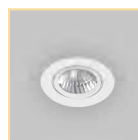
relo



loda



rotara



rotara



rotara



spotty



emphara



## Damp-proof luminaires

### Room types



WL

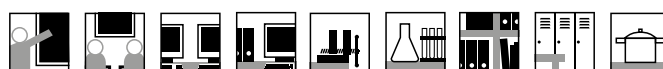


parsia



## Quick fit mounting system

### Room types



LED IP20



LED IP40

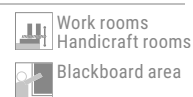
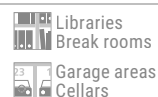
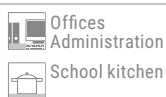
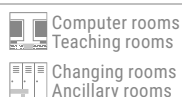
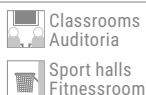


LED IP54



LED SDGE

### Room types





# Regiolux sport hall luminaires



Sport hall luminaires

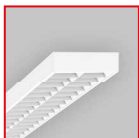
Room types



sportler



quanta



THL





# Sport- and multi-purpose hall

What sports facility lighting must achieve is widely known.

Good visibility demands balanced, harmonised lighting and this is especially true for sports centres. In such applications light must satisfy standards relating to illuminance, uniformity, glare limitation and the colour properties of the light sources as specified in the European DIN EN 12193 standard „Sports Lighting“, a directive that specifies lighting requirements for the most popular types of sports. Such requirements are to be understood as minimum values, a fact that makes lighting tasks even more demanding.

Multi-purpose halls, as well as having to satisfy the conditions specified by DIN EN 12193, must also meet further demands and in addition must be equipped with temporary lighting such as spots for a stage for example.

In order to meet the various requirements of individual uses, DIN EN 12193 assigns photometric criteria to three different lighting classes, and in addition, the lighting demands created by specific visual requirements for the various types of sport are also defined.



## Lighting class I

- Top performance competitions such as on national and international levels, generally with large numbers of spectators and large visual distances between spectators and athletes.
- High level training

### More Information

in the application manuals  
„Sports halls“







## Lighting class II

- Competitions on mid-level such as regional or local competitions, generally with a mid-range quantity of spectators and mid-range visual distances between spectators and athletes
- Performance training

## Lighting class III

- Basic competitions such as on a local or club-level, generally without spectators
- General training
- School sports
- Leisure sports

# Planning example sports-/multi-purpose hall

## Three-bay sports hall and multi-purpose hall

### The planning of a sports hall

The specific light for each type of sport practiced within a hall must be made available according to the conditions defined for that sport. That demands a carefully planned installation, as shown by the table on the right, featuring sports hall luminaires from Regiolux.

### Supplementary lighting for a multi-purpose hall

Reasons of economy may well determine whether it makes sense to plan a new sports hall construction as a multi-purpose hall or to refurbish an existing sports hall. Thus space is made available for further activities: lectures, exhibitions, stage productions, club meetings and as a location for festivities. In fact, the possibilities are limitless.

To meet the requirements of multifunctional locations, the demands made upon the lighting systems exceed those of purely sporting purposes.

### Object examples

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Werner-Wicker-Hospital, Bad Wildungen



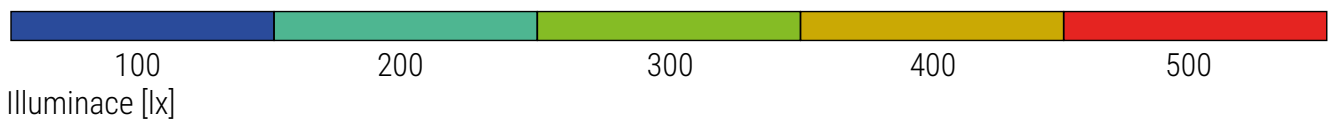
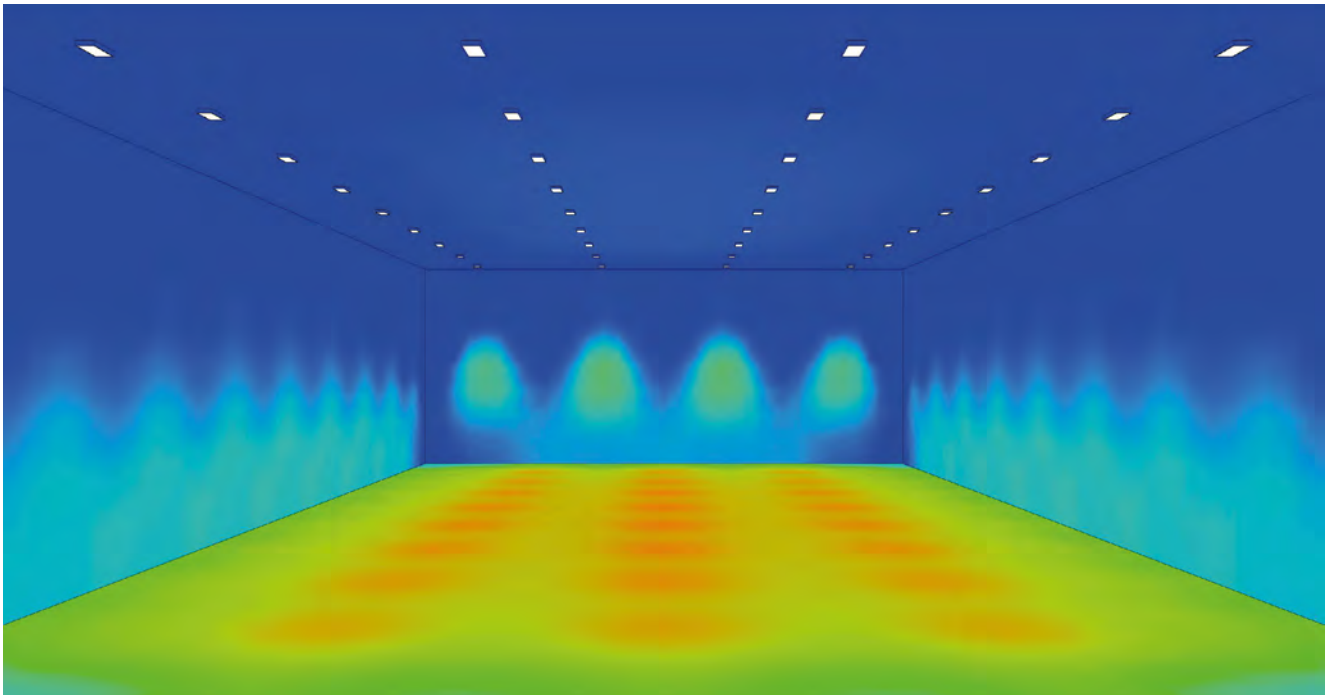
Wilhelmsgymnasium, Kassel



Frederica Indraetscenter, Frederica (DK)







## Calculation basis

Reflection values:

Ceiling: 0,7

Walls: 0,5

Floor: 0,3

Average illuminance::

Utilization plane: 382 Lux

UGR: 19

Performance (with ED):

4,039 kW



Space dimension:

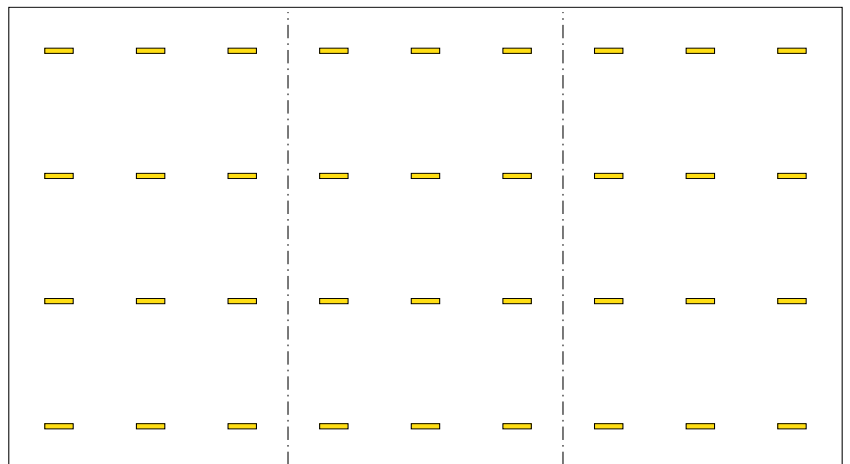
45,0 m x 27,0 m

Mounting height: 7 m

Utilization plane: 0,0 m

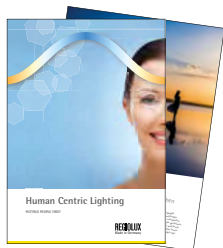
Types:

36x SOHTB/700 14800 840



# Other special applications

Our brochures and information on the subject:



Human Centric Lighting

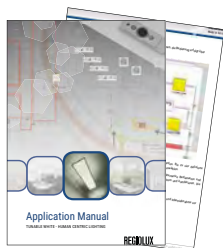


Tunable white  
Luminaires for Human  
Centric Lighting

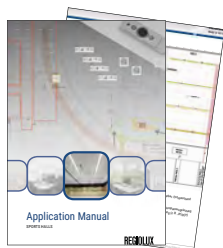


Light solutions for  
beverage and food  
industry

Our application manuals on the topic:



Tunable white



Sports halls

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