

LIGHTING TECHNOLOGY

An Overview



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Lumitech Ltd



About Lumitech



We design, supply and manufacture exclusive interior and exterior light fittings and lighting control systems.

We are dedicated to innovation and global cutting edge design and work alongside architects, interior designers and building and electrical contractors.

While remaining true to our innovative stylish signature we design unique lighting schemes which are both functional and decorative

Natural Light

How we perceive it and its
importance in lighting
design



Natural Light



- Ambient Lighting
- Zone Lighting
- Mood Lighting

Ambient Light

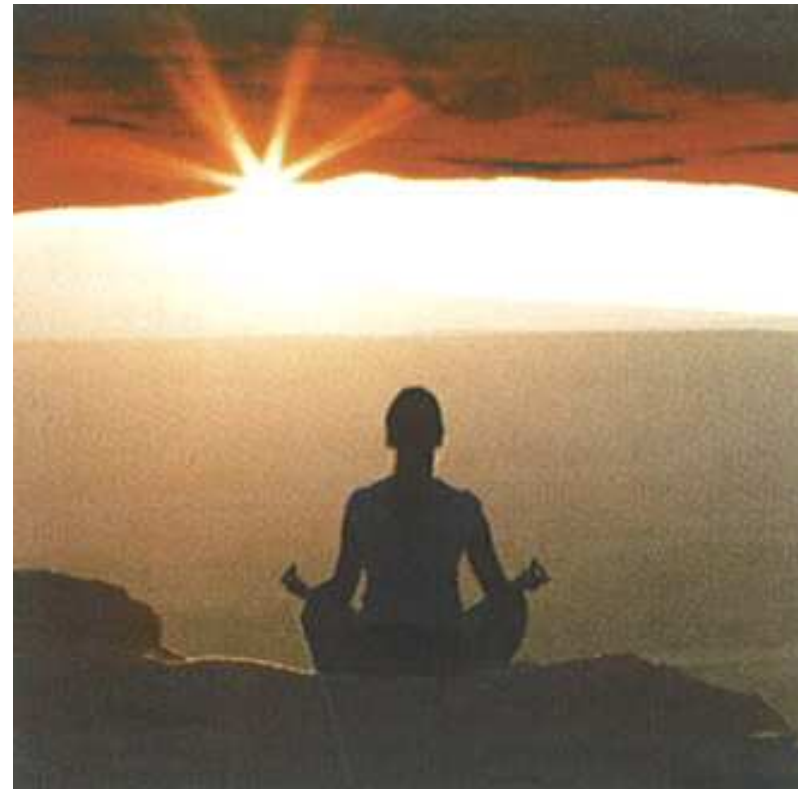


- Spreads evenly illuminating an entire room
- Provides the fundamental brightness needed
- Evens out sharp differences in brightness - easier for the eye to adapt
- Balanced ambient lighting creates a comfortable atmosphere

Zone Lighting



- Delivers a lot of light where it is needed – reading, working, discussions
- High light focal points
- Generally produced by luminaires that direct the light down or against a wall
- Fitting if possible should be flexible in orientation



Mood Lighting



- Creates exceptional atmosphere
- Shines but seldom illuminates
- Never too bright and produces no glare
- Best effect in the evening when surrounding areas are dark

Energy Saving

Energy Conservation in
lighting – fact or fiction?



Energy Saving



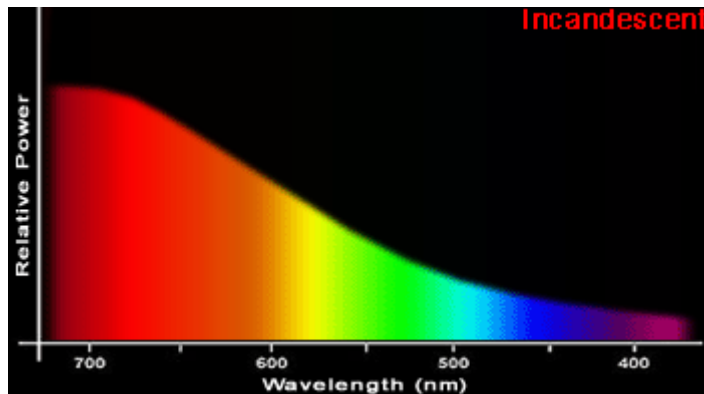
- Are energy-saving bulbs an efficient substitute for filament bulbs?
- Can atmospheric light be energy-saving?
- When to use energy saving bulbs
- Can LEDs save energy without compromising on ambience?

Bulbs explained

CFL, incandescent,
halogen, Metal Halide, LED

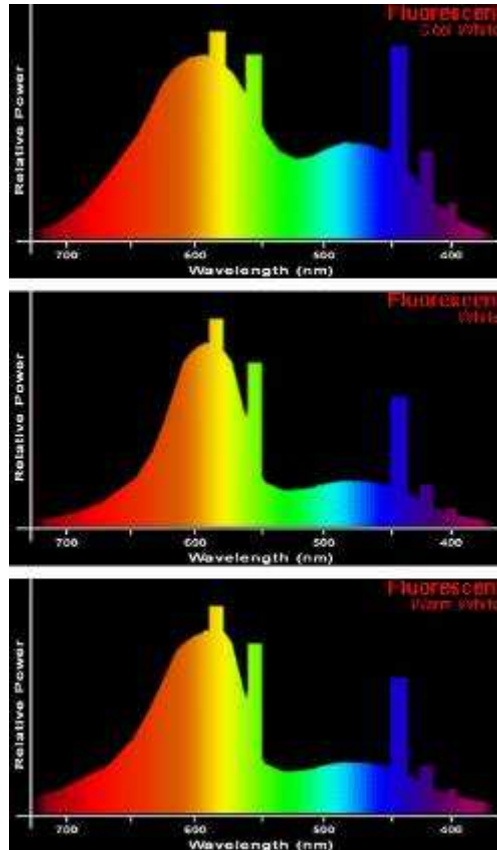


Incandescent



- Cheap to install
- Expensive to run
- Dimming: Good
- High current through Tungsten filament
- Inert gas
Argon/Nitrogen

Fluorescent



- Requires 3 components:
 - Electrodes – hot cathode
 - Gases – Argon/Neon/Mercury
 - Phosphor – Inside of tube
- Dimming
 - 100-30%
- Efficient lamp source
- Inexpensive

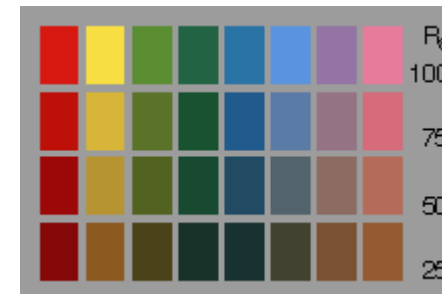
Colour Rendering

Daylight CCT is >5,000k – Black body



The CIE colour rendering groups

Group	R_a	Importance	Typical application
1A	90...100	accurate colour matching	Galleries, medical examinations, colour mixing
1B	80...90	accurate colour judgement	Home, hotels, offices, schools
2	60...80	moderate colour rendering	Industry, offices, schools
3	40...60	accurate colour rendering is of little importance	Industry, sports halls
4	20...40	accurate colour rendering is of no importance	Traffic lighting



Colour rendering index for different light sources

Light source	Colour rendering group
Incandescent	1A
Metal halide	1A ... 2
Fluorescent	1A ... 3
High pressure sodium	1B ... 4
Low pressure sodium	4
LED White	1B... 2

Dimming Control Systems

Pros and Cons



Dimming Control Systems



- Are they really needed?
- Their impact on energy conservation
- Integration into audiovisual automation

Dimming vs. Switching



- Advantages
 - Fine adjustment – more precise control
 - Less Distraction
- Disadvantages
 - Higher cost
- Blended solutions

Benefits of Lighting Control



- Visual Comfort
 - Optimise Productivity
 - Appropriate levels
 - Ambient vs. task
 - Minimize glare

- Aesthetics
 - Enhance Appearance
 - Set mood/ambience via lighting schemes
 - Remove wall clutter

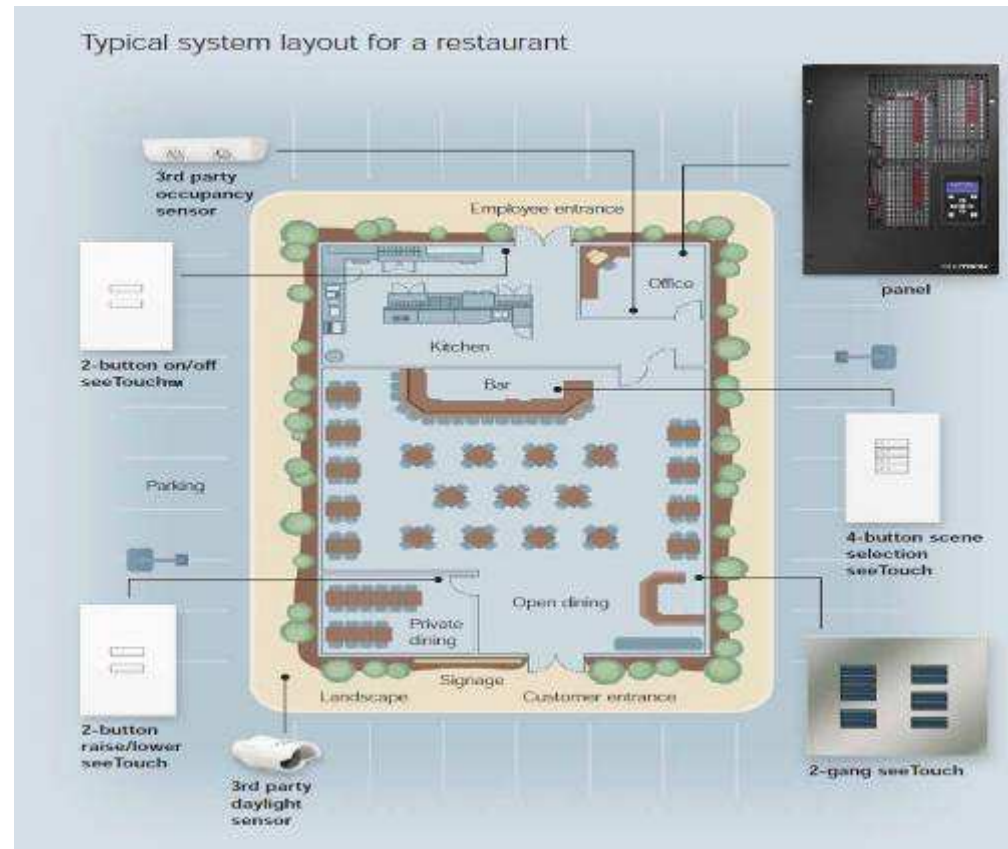
Areas to Control

- Single Room
 - Non-integrated conventional wiring
- Dual Rooms
 - Simple system/AV compatible
- Complete Building
 - AV/Blind control
- Complete Building integrated control
 - Lighting, heating, air conditioning, security – fire, audio visual

Application example



- 07:00 Chef and staff start culinary preparation**
Kitchen lights on.
- 10:00 Waiting staff arrives**
Manager arrives.
Open dining area lights full on for setup.
Office lights on.
- 11:00 Restaurant opens**
Signage on.
Lunch scene on for open dining area.
- 16:00 Dinner, cocktail hour, and private birthday party**
Lights fade to dinner scene for open dining area.
Bartender adjusts bar lighting in bar area.
Adjust lighting for mood in private dining room for birthday party.
- 17:00 Sunset**
Exterior lights on.
- 00:00 Last orders**
Lights ramp to full on.
- 01:00 Closing**
All dining lights full on for clean-up.
Signage off.
Exterior lights off.
- 02:00 Last employee leaves**
All interior lights off.



Emergency Lighting

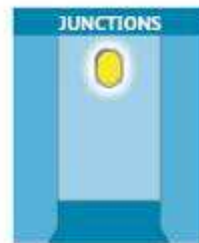
Basic guide



Non-Maintained



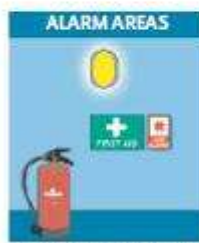
To provide illumination of escape routes.



Install within 2 metres route junctions.



Install externally within 2 metres horizontal distance of any final exits. Please note that sufficient light will be needed to muster a roll call.



Fire alarms, first aid points and fire-fighting equipment, install within 2 metres horizontal distance.



To provide emergency illuminations in all lifts.



Motor generator, control and plant rooms for essential and safety services.

- The Lighting only operates when the normal mains supply fails (emergency lighting only)

Maintained



- The Lighting operates normally and continues to operate when the normal mains supply fails (mains lighting and emergency lighting)



CORRIDORS
Install within 2 metres horizontal distance of a change of direction in an escape route.



STAIRWAYS
Install within 2 metres horizontal distance of change in floor level or stairs (each tread to receive direct light).



ESCALATORS
Should not be used as an escape route, but requires the same illumination to protect users on it when the supply fails.



TOILETS
Install in all toilets exceeding 8m² area or where natural light is not present.



OPEN AREAS
Open rooms either with a particular hazard, an escape route passing through or larger than 60m².



HAZARDOUS AREAS
Areas of high risk should be illuminated to 10% of normal lighting or 15 lux, whichever is greater.

Colour Changing

Explanation and Methods



Colour Changing – Why?



- Can achieve spectacular effects



Colour Changing – Why?



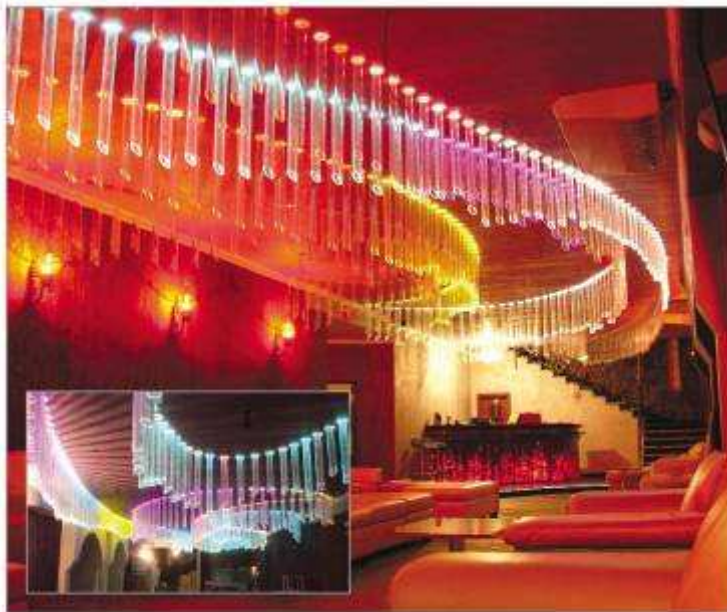
- Change in visual presentation at the touch of a button

Colour Changing



- Should be used sparingly and wisely

What achieves colour effects?



- Fibre Optics
 - Rapid response to DMX protocol
 - Good range of colour
 - Good for inaccessible areas
 - Fibres require no maintenance
 - Design-friendly for unique features
 - Similar cost to LED in overall project
 - No heat or UV

Fibre Optics



Fibre Optics



Fibre Optics



Installation of Lighting

A practical guide

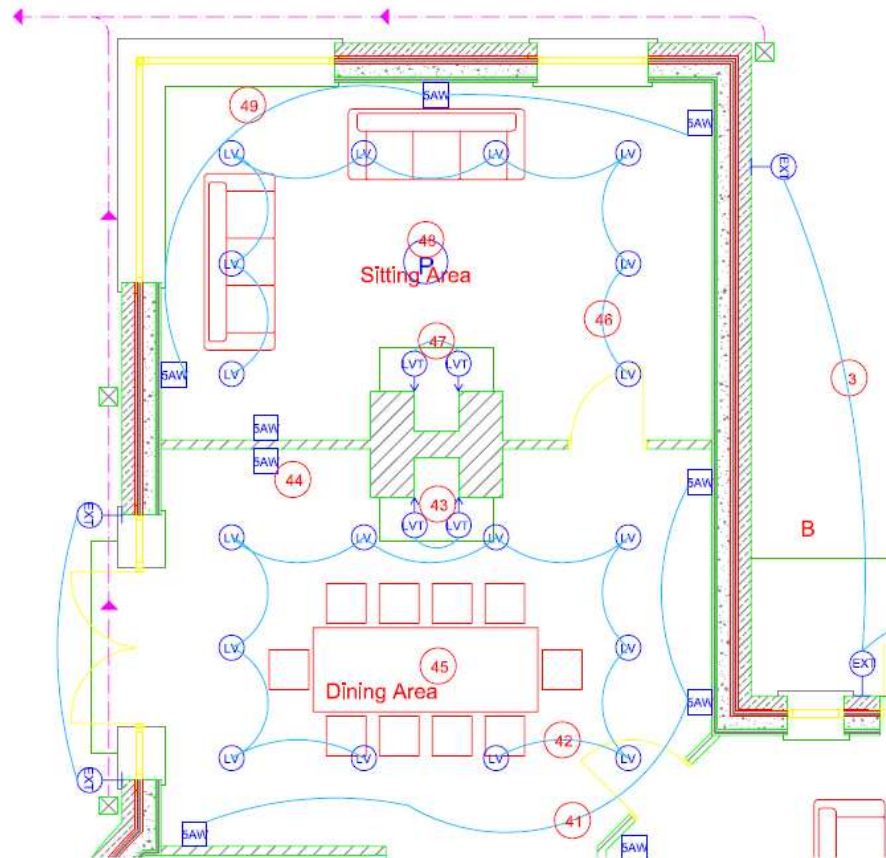


Installation of Lighting

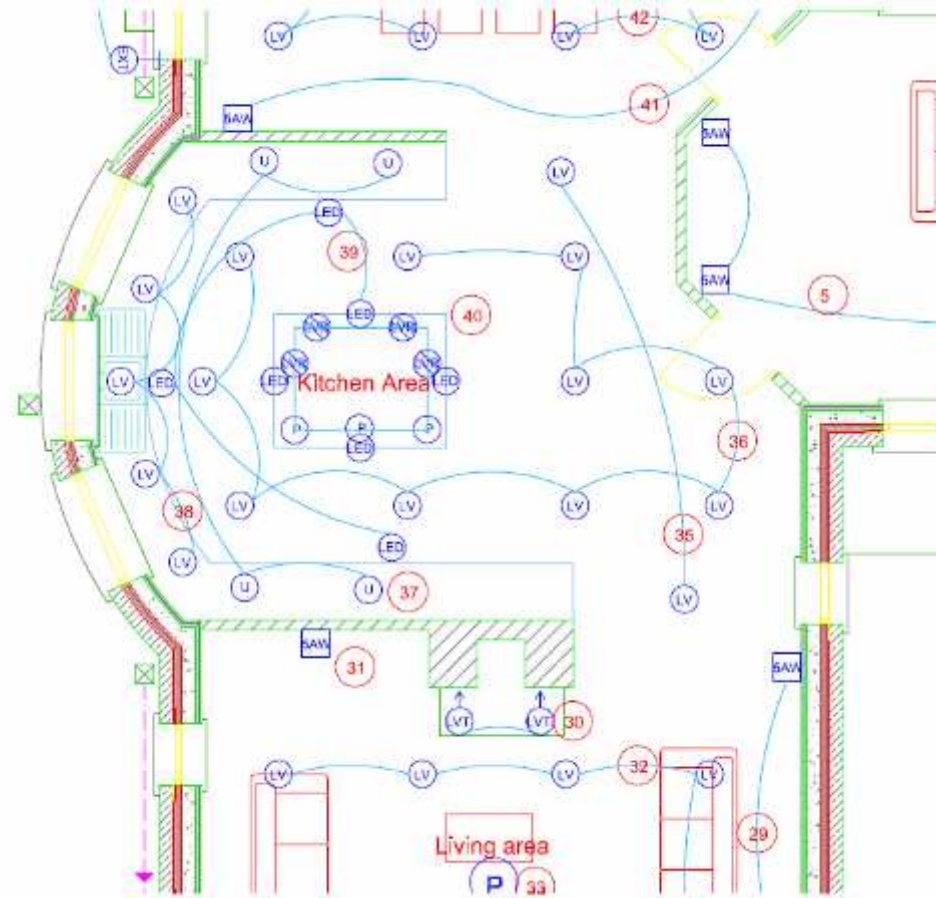


- The use of circuits
- How to overcome providing light in difficult to access areas
- Back lighting, indirect and direct lighting

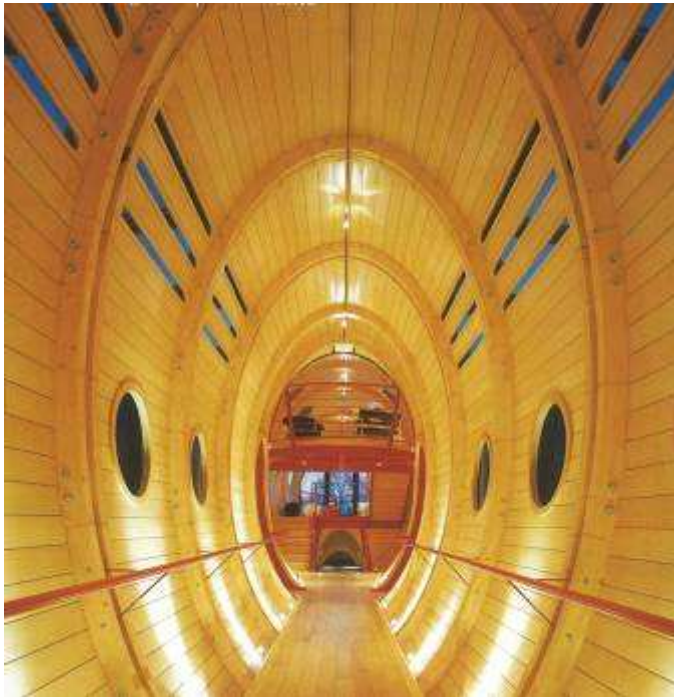
The Use of Circuits



The Use of Circuits



Lighting Difficult Areas



Lighting Difficult Areas



Lighting Difficult Areas



New Technologies and Advancements

Induction, LED and Plasma
Lighting



New Generation LED

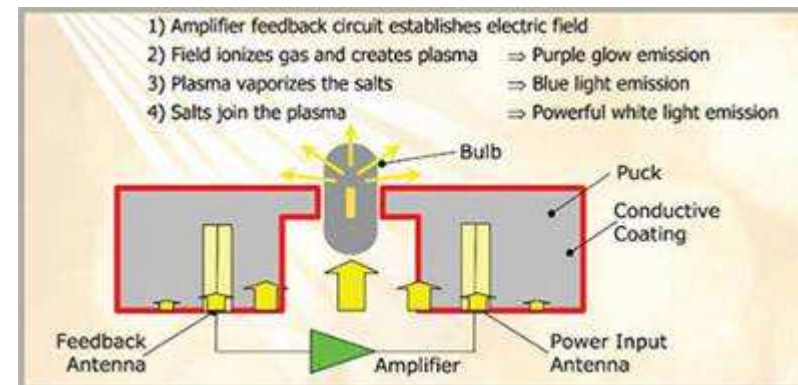


- Blue LED covered by layer of Nano crystals
- Turn blue light into warm white
- Could produce light at efficiency of over 300 lumens per watt
- Existing LEDs based on blue light through phosphor coating

Plasma Light



- Colour rendering is 91
- Life span 20,000 hours
- Bulb can produce 30,000+ lumens
- Fully dimmable
- Standard running 140 lumens per watt

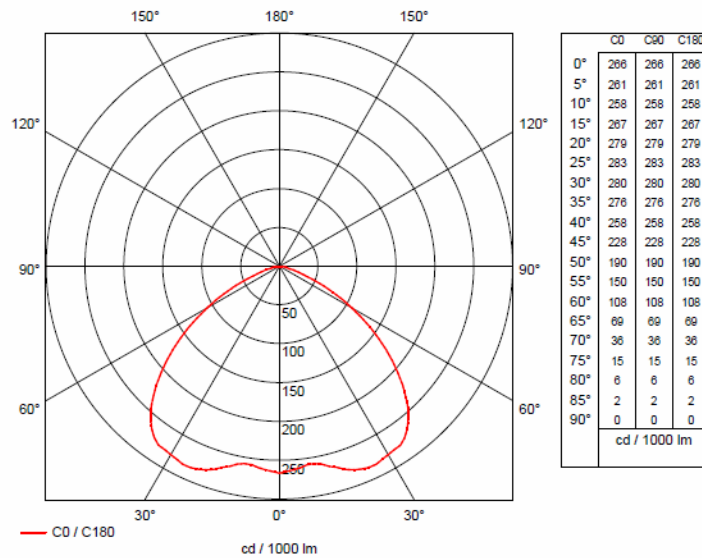


Light Calculations

Polar curves, light maps,
Lux levels



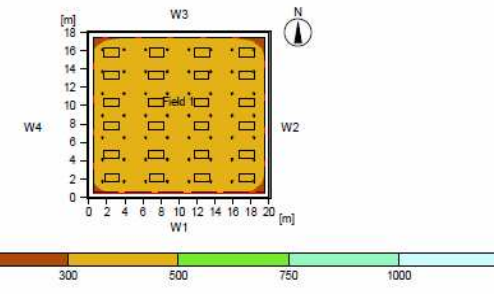
Photometric Data



Manufacturer : Aurora
 Order number : IAU-P224
 Luminaire name : P
 Equipment : 1 x CFL 50 W / 2700 lm
 Dimensions : D 245 mm x H 300 mm
 File name : AU-PC24.ltd

Efficiency factor : 80.06% (A40)
 Light distribution : rotationally symmetric
 Beam Angle : 111.9° C0-C180

2.1.1 Result overview, Reference plane 1



General

Calculation algorithm used
 Height of evaluation surface
 Height of luminaire plane
 Maintenance factor

Average indirect fraction with light colours
 0.75 m
 2.80 m
 0.85

Total luminous flux of all lamps
 Total power
 Total power per area (360.00 m²)

151200 lm
 3024 W
 8.40 W/m² (1.93 W/m²/100lx)

Illuminance

Average illuminance
 Minimum illuminance
 Maximum illuminance
 Uniformity g1
 Uniformity g2

Eav 435 lx
 Emin 262 lx
 Emax 485 lx
 Emin/Em 1:1.66 (0.6)
 Emin/Emax 1:1.85 (0.54)

Type No. Make

1 56



Aurora
 Order No. : IAU-P224
 Luminaire name : P
 Equipment : 1 x CFL 50 W / 2700 lm 4000K

Garden Lighting

Its importance and how it
interacts with interior design
schemes

- More is less



Lighting Effects



Uplighting



Down Lighting

Lighting Effects

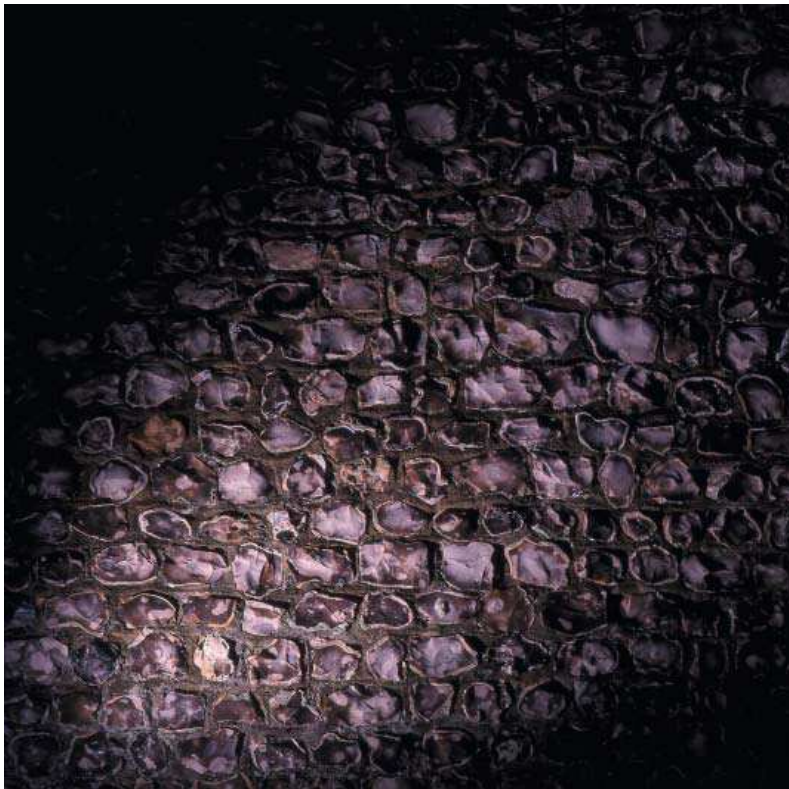


Silhouetting



Path Lighting

Lighting Effects



Wash Lighting



Spread Lighting

Lighting Effects

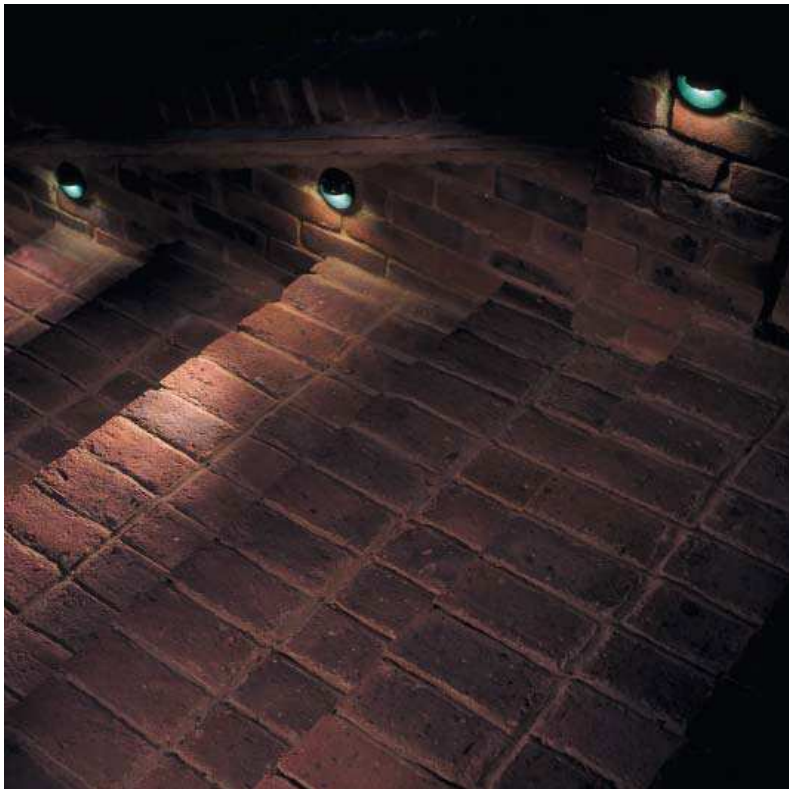


Cross Lighting

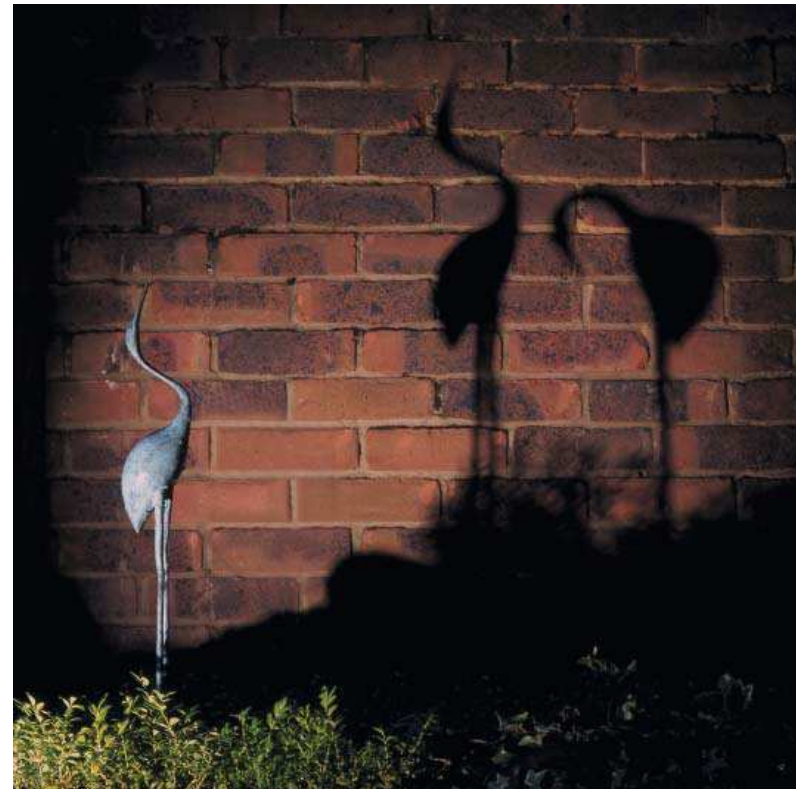


Moon Lighting

Lighting Effects



Step Lighting



Shadowing

Lighting Effects



Water Reflection



Water Feature Lighting



IP Ratings

First identification number

Protection against the ingress of solids

Symbol	Number	Measure of protection	Test
	IP2X	Against foreign bodies ≥ 12.5mm Ø	Ball 12mm Ø and finger test
	IP3X	Against foreign bodies ≥ 2.5mm Ø	Steel wire 2.5mm Ø
	IP4X	Against foreign bodies ≥ 1.0mm Ø	Steel wire 1.0mm Ø
p	IP5X	Against harmful dust deposits (dust proof)	Talcum powder – particles 1 µm Ø
o	IP6X	Against any entry of dust (dust tight)	Talcum powder – particles 1 µm Ø

IP Ratings

Second identification number
Protection against the ingress of liquids

Symbol	Number	Measure of protection	Test
	IPX1	Against falling drops of water	Water falling vertically
•	IPX2	Against falling drops of water	Water falling up to 15 ° from vertical
w	IPX3	Against spraying water (rain proof)	Water sprayed at 60 ° from vertical
e	IPX4	Against splashed water (splash proof)	Water from all directions
ee	IPX5	Against jets of water (jet proof)	Water from all directions projected by a nozzle
	IPX6	Against heavy seas or powerful water jets	Water from all directions projected by a nozzle
••	IPX7	Against temporary immersion effects, and not for continuous underwater application	Immersion in water < 1m for 30 minutes
••...m	IPX8	Against continuous submersion (pressure water-tight)	Immersion in water ≥ 1m for 30 minutes – max. depth tested indicated after symbol

***We are all in business to
do business.
How can we help?***

Thank You.

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