OLYMPIC

Ultimate Performance and Light Control

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OLYMPIC

Asymmetric floodlighting with ZERO upward light

The development of technology and optical lenses has led to the creation of asymmetric floodlights for sports facilities, stadiums, infrastructure and areas where light control is required to avoid glare and to guarantee maximum light efficiency.

The floodlights should be installed with the glass parallel to the ground in order to avoid light pollution, which is generated by skyward lighting.

At present, during installation procedures most floodlights are tilted to direct light in the most efficient way, thus fulfilling all lighting requirements and guaranteeing even lighting. However, upward light is wasted, causing glare and reduced efficiency as a result.

Olympic is a new Disano asymmetric floodlight. In contrast with traditional solutions, Olympic comes with a 20° tilted glass in relation to the horizontal work surface. Also, its front shield screens upward light perfectly.

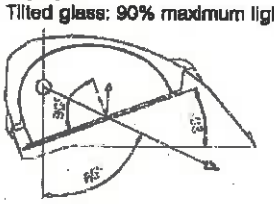
Olympic then allows a perfectly horizontal installation (cut-off), whilst distributing light evenly on the area to illuminate, in compliance with light pollution regulations.

The lamp fitted inside the floodlight can be adjusted in 4 different directions: the designer has 4 different asymmetric angles to facilitate, to fulfil different planning requirements.

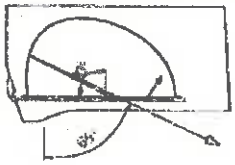
Olympic is a modern and sturdy floodlight that provides high lighting efficiency, excellent light control, easy installation procedures and long life.

Optical lens design

Olympic
Tilted glass: 90% maximum light output



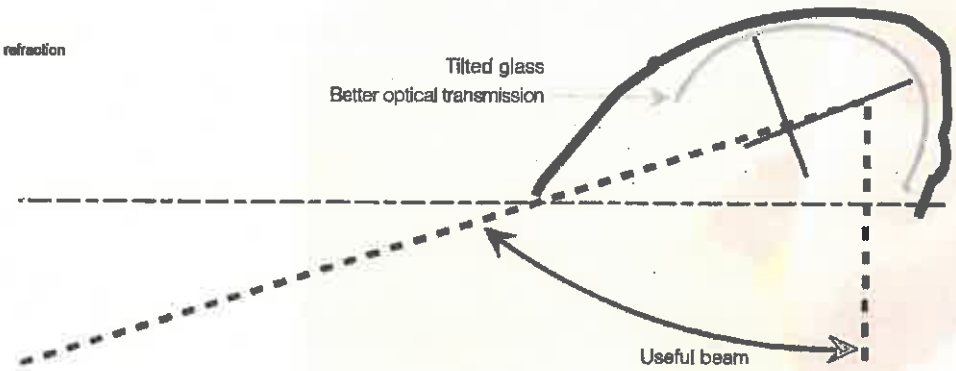
Generic floodlight
Flat glass: 70% maximum light output

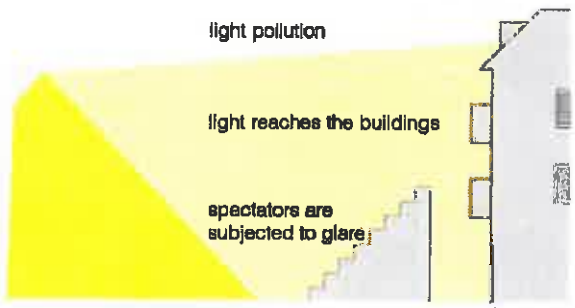


Olympic offers an efficient and extremely sophisticated solution: the lenses were designed to guarantee a 65° asymmetric angle.

This result is achieved through tilting the glass. The light beam is emitted with a very favourable angle, while the light refracted by the glass is reduced, increasing light efficiency as a result.

Stray light is controlled at the top, with zero light emission for angles over 80°.





The expression "light pollution" refers to the redundant illumination of the night sky through the use of artificial light, a growing phenomenon that goes hand in hand with the development of urban and industrial areas.

One of the main causes of light pollution is the use of non-screened luminaires that direct part of the light output skyward.

In recent years, a number of norms and regulations have been set out to reduce energy waste in public lighting and overall, in relation to all outdoor lighting systems.

The amount of light wasted by lighting systems is due to:

- increased artificial light: the light emitted by a light source is reflected by the dust particles floating in the night sky, preventing astronomical observation

- light pollution derived from wasted light: i.e., redundant light that spreads beyond the area to illuminate

- glaring: if the floodlights are not directed correctly, a higher inclination may reduce visual comfort.

Olympic embodies a new optical lens design concept that was developed to take care of all these problems.

Technical specifications

Housing: die-cast aluminium EN AB 46100

Cover: die-cast aluminium EN AB 46100 with cooling fins. Rear lamp housing access. Hinge opening with stainless steel latches

Reflector: asymmetric, in polished aluminium, anodically oxidized and polished, with flux recovery. Allows 4 different photometric distributions

Diffuser: tempered glass, 4 mm thick, thermal shock and impact resistant (UNI EN 121 50-1:2001 tests). 20° tilt glass angle for high asymmetric louvre efficiency and excellent output

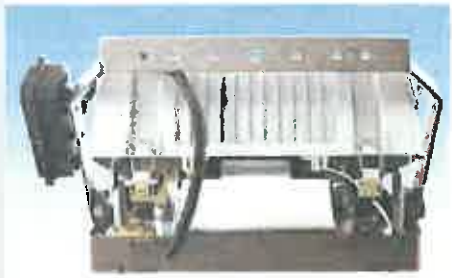
Coating: polyester-resin powder coating, resistant to corrosion and saline environments

Lampholder: adjustable in 4 different positions that allow changing photometric distribution based on the type of installation

Electric gear: 230V/50Hz (1000W) or 400V (2000W) power supply. Hard wire terminated with quick connection admiralty brass clamps, silicone insulation and fibreglass braid, lead cross section 2.5 mm2. 2P+T terminal block, maximum allowed lead cross section 6 mm2.

Standard supply: tool-free maintenance. A knife switch cuts the power supply during maintenance operations.

Equipment: silicone rubber gasket. Nylon cable gland, ½ Gas thread. Galvanized steel bracket with protractor scale. Stainless steel screws. Air circulation valve.

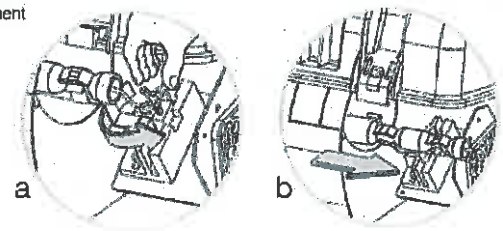


Opens on hinges with safety latch which prevents accidental closure

Stainless steel latches

Steel bracket with protractor scale

Lamp replacement procedures



Ignitor box attached to stirrup bracket

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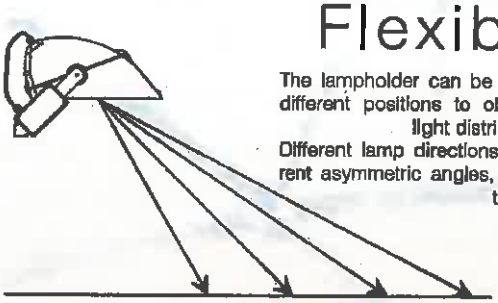
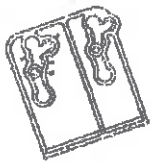
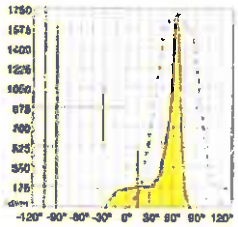
Flexibility

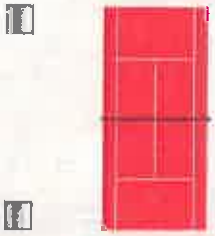
The lampholder can be adjusted in 4 different positions to obtain different light distribution curves.
Different lamp directions enable different asymmetric angles, without tilting the floodlights.

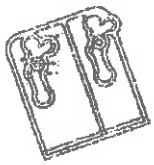




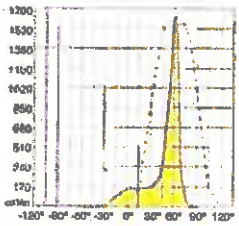
Position 1:
Asymmetry 64°
Output 78.8%

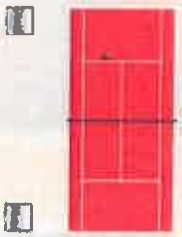


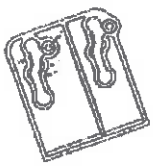




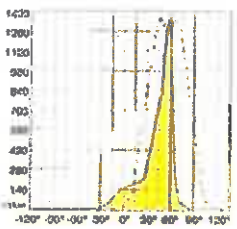
Position 2:
Asymmetry 61°
Output 75.3%

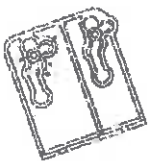




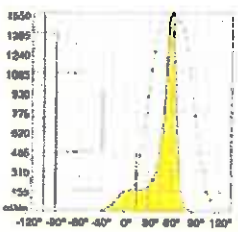


Position 3:
Asymmetry 57°
Output 77.7%





Position 4:
Asymmetry 58°
Output 75.7%



Visit our website www.disano.it: you will find the DIALUX plug-in programme to carry out lighting calculations

L_{ve} is the equivalent veiling luminance of the environment in cd m^{-2}. From the assumption that the reflection of the environment is totally diffuse, the equivalent veiling reflection from the environment may be calculated as $L_{ve} = 0{,}035.\rho.E_{hav}.\pi^{-1}$, in which ρ represents the average reflectance and E_{hav} the average illuminance of the area.

5.9 Surface colours and reflection properties

Surface colours shall be chosen taking into account the usual tasks involved in the intended activities including knowledge of the colours of objects to be viewed against the background in question.

NOTE These surfaces should be matt to avoid glare due to the reflection of bright sources.

5.10 Obtrusive light

To safeguard and enhance the night time environment it is necessary to control obtrusive light, which can present physiological and ecological problems to surroundings and people.

The limits of obtrusive light for exterior lighting installations, to minimise problems for people are given in Table 1 and for road users in Table 2.

Table 1 – Maximum obtrusive light permitted for exterior lighting installations

Environmental zone	Light on properties		Luminaire intensity		Upward light
	E_v lx		I cd		ULR
	Pre-curfew[a]	Post-curfew	Pre-curfew	Post-curfew	%
E1	2	0	2 500	0	0
E2	5	1	7 500	500	5
E3	10	2	10 000	1 000	15
E4	25	5	25 000	2 500	25

[a] In case no curfew regulations are available, the higher values shall not be exceeded and the lower values should be taken as preferable limits.

E1 represents intrinsically dark areas, such as national parks or protected sites;

E2 represents low district brightness areas, such as industrial or residential rural areas;

E3 represents medium district brightness areas, such as industrial or residential suburbs;

E4 represents high district brightness areas, such as town centres and commercial areas;

E_v is the maximum value of vertical illuminance on properties in lx;

I is the light intensity of each source in the potentially obtrusive direction in cd;

ULR is the proportion of the flux of the luminaire(s) that is emitted above the horizontal, when the luminaire(s) is (are) mounted in its (their) installed position and attitude.

GUIDANCE NOTES FOR THE REDUCTION OF OBTRUSIVE LIGHT

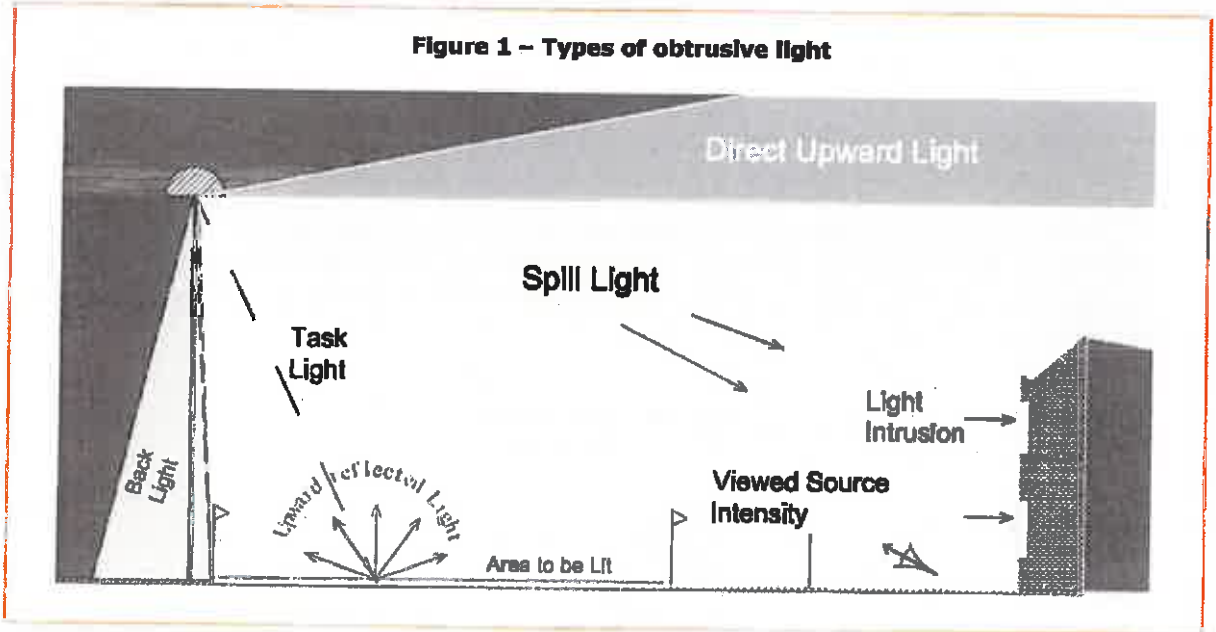
"Think before you light - The right amount of light, where wanted, when wanted."

Man's invention of artificial light has done much to safeguard and enhance our night-time environment but, if not properly controlled, **obtrusive light** (sometimes referred to as light pollution) can present serious physiological and ecological problems.

Obtrusive Light, whether it keeps you awake through a bedroom window or impedes your view of the night sky, is a form of pollution, which may also be a nuisance in law and which can be substantially reduced without detriment to the lighting task.

Sky glow, the brightening of the night sky, **Glare** the uncomfortable brightness of a light source when viewed against a darker background, and **Light Intrusion ("Trespass")**, the spilling of light beyond the boundary of the property or area being lit, are all forms of obtrusive light which may cause nuisance to others and waste money and energy. Think before you light. Is it necessary? What effect will it have on others? Will it cause a nuisance? How can you minimise the problem?

Figure 1 – Types of obtrusive light



Do not "over" light. This is a major cause of obtrusive light and is a waste of energy. There are published standards for most lighting tasks, adherence to which will help minimise upward reflected light. Organisations from which full details of these standards can be obtained are given on the last page of this leaflet.

Dim or switch off lights when the task is finished. Generally a lower level of lighting will suffice to enhance the night time scene than that required for safety and security.

"Good Design equals Good Lighting"

Any lighting scheme will consist of three basic elements: a light source, a luminaire and a method of installation.

Light sources (Lamps)

Remember that the light source output in LUMENS is not the same as the wattage and that it is the former that is important in combating the problems of obtrusive light.

Most nightime visual tasks are only dependant on light radiated within the visual spectrum. It is therefore NOT necessary for light sources to emit either ultra-violet or infra-red radiation unless specifically designed to do so. It is also understood that light from the shorter wavelengths of the spectrum has important effects on both flora and fauna that should be considered.

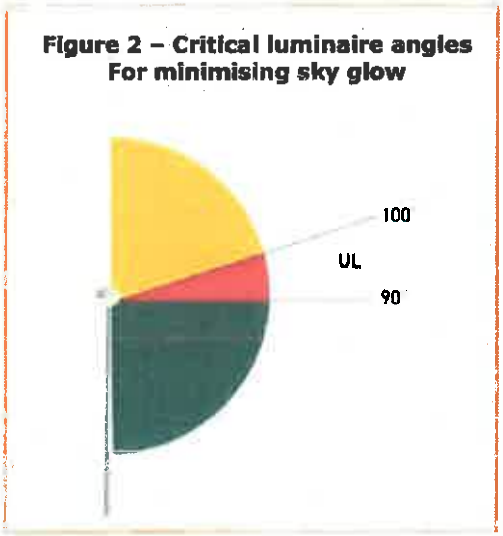
Research indicates that light from the blue end of the spectrum has important non-visual effects on the health of the human body, in particular in our sleep/wake patterns. It is therefore important to appreciate that while in obtrusive light terms the use of blue light should be minimised, there are many night-time tasks such as driving and sports where to be fully awake is an important aid to safety.

Luminaires

Care should always be taken when selecting luminaires to ensure that appropriate products are chosen and that their location will reduce spill light and glare to a minimum.

Use specifically designed lighting equipment that minimises the upward spread of light near to and above the horizontal. The most sensitive/critical zones for minimising sky glow are those between 90° and 100° as shown in Figure 2 and referred to as the lower, upward light output zone (UL).

Figure 2 – Critical luminaire angles For minimising sky glow



For most sports and area lighting installations the use of luminaires with double-asymmetric beams designed so that the front glazing is kept at or near parallel to the surface being lit should, if correctly aimed, ensures minimum obtrusive light.

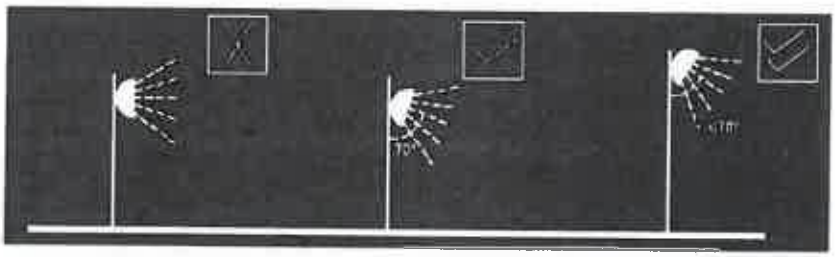
Appendices 1 and 2 to these notes gives more details of how to choose and if necessary modify luminaires.

Installation

In most cases it will be beneficial to use as high a mounting height as possible, giving due regard to the daytime appearance of the installation. The requirements to control glare for the safety of road users are given in Table 3.

Keep glare to a minimum by ensuring that the main beam angle of all lights directed towards any potential observer is not more than 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare. In areas with low ambient lighting levels, glare can be very obtrusive and extra care should be taken when positioning and aiming lighting equipment. With regard to domestic security lighting the ILP produces an information leaflet GN02:2009 that is freely available from its website.

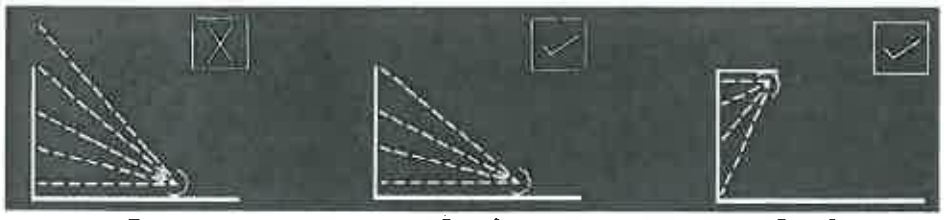
Figure 3 – Luminare aiming angles



When lighting vertical structures such as advertising signs, direct light downwards wherever possible. If there is no alternative to up-lighting, as with much decorative lighting of buildings, then the use of shields, baffles and louvres will help reduce spill light around and over the structure to a minimum.

For road and amenity lighting installations, (see also design standards listed on Page 5) light near to and above the horizontal should normally be minimised to reduce glare and sky glow (Note ULR's in Table 2). In rural areas the use of full horizontal cut off luminaires installed at 0° uplift will, in addition to reducing sky glow, also help to minimise visual intrusion within the open landscape. However in some urban locations, luminaires fitted with a more decorative bowl and good optical control of light should be acceptable and may be more appropriate.

Figure 4 – Façade Illumination



Since 2006 "Artificial Light" has been added to the list of possible Statutory Nuisances in England, Wales and Scotland. The monitoring of such nuisances will be the responsibility of Environmental Health Officers (EHOs) for which separate guidance is being produced.

With regard to the planning aspect, many Local Planning Authorities (LPAs) have already produced, or are producing, policies that within the planning system will become part of their local development framework. For new developments there is an opportunity for LPAs to impose planning conditions related to external lighting, including curfew hours.

The Scottish Executive has published a design methodology document (March 2007) entitled "Controlling Light Pollution and Reducing Energy Consumption" to further assist in mitigating obtrusive light elements at the design stage.

ENVIRONMENTAL ZONES

It is recommended that Local Planning Authorities specify the following environmental zones for exterior lighting control within their Development Plans.

Table 1 – Environmental Zones

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark	UNESCO Starlight Reserves, IDA Dark Sky Parks
E1	Natural	Intrinsically dark	National Parks, Areas of Outstanding Natural Beauty etc
E2	Rural	Low district brightness	Village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Small town centres or suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.

NB: Zone E0 must always be surrounded by an E1 Zone.

DESIGN GUIDANCE

The following limitations may be supplemented or replaced by a LPA's own planning guidance for exterior lighting installations. As lighting design is not as simple as it may seem, you are advised to consult and/or work with a professional lighting designer before installing any exterior lighting.

Table 2 – Obtrusive Light Limitations for Exterior Lighting Installations – General Observers

Environmental Zone	Sky Glow ULR [Max %][1]	Light Intrusion (into Windows) E_v [lux] [2]		Luminaire Intensity I [candelas] [3]		Building Luminance Pre-curfew [4]
		Pre-curfew	Post-curfew	Pre-curfew	Post-curfew	Average, L [cd/m^2]
E0	0	0	0	0	0	0
E1	0	2	0 (1*)	2,500	0	0
E2	2.5	5	1	7,500	500	5
E3	5.0	10	2	10,000	1,000	10
E4	15	25	5	25,000	2,500	25

ULR = **Upward Light Ratio of the Installation** is the maximum permitted percentage of luminaire flux that goes directly into the sky.

E_v = **Vertical Illuminance in Lux** - measured flat on the glazing at the centre of the window.

I = **Light Intensity in Candelas (cd)**

L = **Luminance in Candelas per Square Metre (cd/m^2)**

Curfew = **the time after which stricter requirements (for the control of obtrusive light) will apply**; often a condition of use of lighting applied by the local planning authority. If not otherwise stated - 23.00hrs is suggested.

***** = **Permitted only from** Public road lighting installations

(1) **Upward Light Ratio** – Some lighting schemes will require the deliberate and careful use of upward light, e.g. ground recessed luminaires, ground mounted floodlights, festive lighting, to which these limits cannot apply. However, care should always be taken to minimise any upward waste light by the proper application of suitably directional luminaires and light controlling attachments.

(2) Light Intrusion (into Windows) – These values are suggested maxima and need to take account of existing light intrusion at the point of measurement. In the case of road lighting on public highways where building facades are adjacent to the lit highway, these levels may not be obtainable. In such cases where a specific complaint has been received, the Highway Authority should endeavour to reduce the light intrusion into the window down to the post curfew value by fitting a shield, replacing the luminaire, or by varying the lighting level.

(3) Luminaire Intensity – This applies to each luminaire in the potentially obtrusive direction, outside of the area being lit. The figures given are for general guidance only and for some sports lighting applications with limited mounting heights, may be difficult to achieve.

(4) Building Luminance – This should be limited to avoid over lighting, and related to the general district brightness. In this reference building luminance is applicable to buildings directly illuminated as a night-time feature as against the illumination of a building caused by spill light from adjacent luminaires or luminaires fixed to the building but used to light an adjacent area.

Table 3 – Obtrusive Light Limitations for Exterior Lighting Installations – Road Users

Road Classification (1)	Threshold Increment (TI)	Veiling Luminance (Lv)
No road lighting	15% based on adaptation luminance of 0.1cd/m^2	0.04
ME6/ ME5	15% based on adaptation luminance of 1cd/m^2	0.25
ME4/ ME3	15% based on adaptation luminance of 2cd/m	0.40
ME2 / ME1	15% based on adaptation luminance of 5cd/m^2	0.84

TI = **Threshold Increment** is a measure of the loss of visibility caused by the disability glare from the obtrusive light installation

Lv = **Veiling Luminance** is a measure of the adaptation luminance caused by the disability glare from the obtrusive light installation

(1) = **Road Classifications** as given in BS EN 13201 - 2: 2003 Road lighting Performance requirements. Limits apply where users of transport systems are subject to a reduction in the ability to see essential information. Values given are for relevant positions and for viewing directions in path of travel. For a more detailed description and methods for determining, calculating and measuring the above parameters see CIE Publication 150:2003.

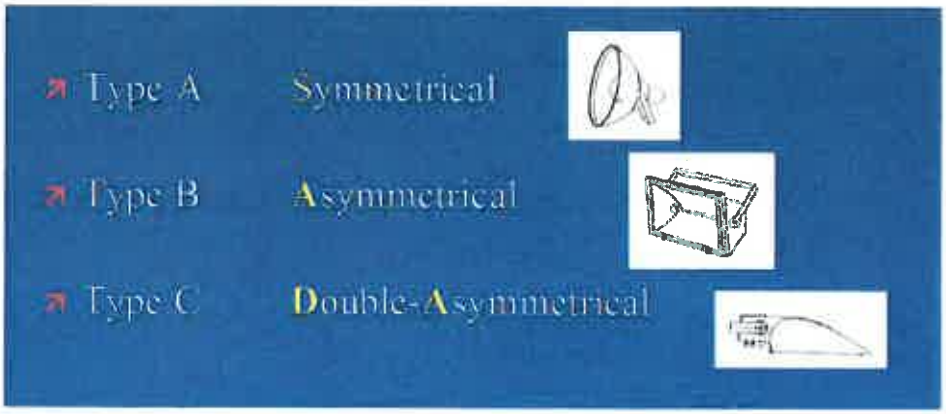
RELEVANT PUBLICATIONS AND STANDARDS:

British Standards: www.bsi.org.uk	BS 5489-1: 2003 Code of practice for the design of road lighting – Part 1: Lighting of roads and public amenity areas BS EN 13201-2:2003 Road lighting – Part 2: Performance requirements BS EN 13201-3:2003 Road lighting – Part 3: Calculation of performance BS EN 13201-4:2003 Road lighting – Part 4: Methods of measuring lighting performance. BS EN 12193: 1999 Light and lighting – Sports lighting BS EN 12464-2: 2007 Lighting of work places – Outdoor work places	
Countryside Commission/ DOE	Lighting in the Countryside: Towards good practice (1997) *(Out of Print but available on www.communities.gov.uk/index.asp?id=1144823)*	
UK Government / Defra www.defra.gov.uk	Statutory Nuisance from Insects and Artificial Light – Guidance on Sections 101 to 103 of the Clean Neighbourhoods and Environment Act 2005	
	Road Lighting and the Environment (1993) (Out of Print)	
CIBSE/SLL Publications: www.cibse.org	CoL	Code for Lighting (2002)
	LG1	The Industrial Environment (1989)
	LG4	Sports (1990+Addendum 2000)
	LG6	The Exterior Environment (1992)
	FF7	Environmental Considerations for Exterior Lighting (2003)
CIE Publications:	01	Guidelines for minimizing Urban Sky Glow near Astronomical Observatories (1980)
www.cie.co.at	83	Guide for the lighting of sports events for colour television and film systems (1989)
	92	Guide for floodlighting (1992)
	115	Recommendations for the lighting of roads for motor and pedestrian traffic – Second Edition (2010)
	126	Guidelines for minimizing Sky glow (1997)
	129	Guide for lighting exterior work areas (1998)
	136	Guide to the lighting of urban areas (2000)
	150	Guide on the limitations of the effect of obtrusive light from outdoor lighting installations (2003)
	154	The Maintenance of outdoor lighting systems (2003)
ILP Publications: www.thelp.org.uk	TR 5	Brightness of Illuminated Advertisements (2001)
	TR24	A Practical Guide to the Development of a Public Lighting Policy for Local Authorities (1999)
	GN02	Domestic Security Lighting, Friend or Foe
ILP/CIBSE Joint Publications	Lighting the Environment - A guide to good urban lighting (1995)	
ILP/CSS Publications	Joint Code of Practice for the installation, maintenance and removal of seasonal decorations. (2005)	
ILP/CfDS Joint Publication www.dark-skies.org	Towards Understanding Sky glow. 2007	
IESNA www.iesna.org	TM-15-07 (R) Luminaire Classification System for Outdoor luminaires	

NB: These notes are intended as guidance only and the application of the values given in Tables 2 & 3 should be given due consideration along with all other factors in the lighting design. Lighting is a complex subject with both objective and subjective criteria to be considered. The notes are therefore no substitute for professionally assessed and designed lighting, where the various and maybe conflicting visual requirements need to be balanced.

APPENDIX 1 - PROPOSED OUTDOOR LUMINAIRE CLASSIFICATION SYSTEM

Variable Aim Luminaires – General Classifications:



Proposed labelling System:

Fixed Position luminaires

Variable Aim Luminaires
(Shown here for a 45° Double-Asymmetric luminaire aimed at 70° – with and without a cowl).

APPENDIX 2 - ILLUSTRATIONS OF LUMINAIRE ACCESSORIES FOR LIMITING OBTRUSIVE LIGHT (images provided by Philips and Thorn)

Cowl (or Hood)

External Louvre

SHIELD

SHEILD "Barn Doors"

Double Asymmetric Luminaire

Simple Hood

Circular Louvre

Cowl & Louvre

Internal Louvre (horizontal)

Internal Louvre (vertical)