5. Lighting Code

This section presents the political decisions to participate in the IDA DSC program as well as the development and design of the lighting guideline.

A) RESOLUTION DATED APRIL 6, 2017, PASSED BY THE CITY COUNCIL AND SIGNED BY LORD MAYOR DR. WINGENFELD

Auszug aus der 11. Sitzung des Magistrats vom 03.04.2017

101/2017 MAG
Bewerbung der Stadt Fulda für eine Mitgliedschaft in der „Dark Sky Community (DSC)" – Haushaltsanträge der Stadtverordnetenfraktionen der CDU (Nr. 95) vom 6. November 2016 und von Bündnis 90/Die Grünen (Nr. 131) vom 8. November 2016.

Der Magistrat beschließt, dass sich die Stadt Fulda für eine Mitgliedschaft in der „Dark Sky Community (DSC)" bewerben soll und dafür von der Verwaltung eine Beleuchtungsrichtlinie für die „Bewahrung der Nacht" im Sinne der Ziele der „International Dark Sky Association (IDA)" erarbeitet wird. Der Intention der Haushaltsanträge wird damit entsprochen.

Einstimmig, 0 Enthaltungen

Beglaubigt:
Happ
Lothar Happ

Stadt Fulda 10

Fulda, 03.04.2017
gez. Dr. Heiko Wingenfeld
Oberbürgermeister

EINGEGANGEN
- Stadtplanungsamt -
04. Mai 2017
Gesehen:
61.1 | 61.2 | 61.L | 61.D | 61.S

BSA

Amt 61

Translation: "The City Council hereby resolves that the City of Fulda should apply for membership of the Dark Sky Community (DSC). The city authorities are hereby instructed to develop lighting guidelines for "protecting the night" in line with the objectives of the International Dark Sky Association (IDA)."

B) RESOLUTION DATED APRIL 25, 2017 PASSED BY THE COMMITTEE FOR CONSTRUCTION, URBAN PLANNING AND THE ENVIRONMENT AND SIGNED BY THE CHAIRMAN WALTER KRAH, UPHOLDING AND CONFIRMING THE COUNCIL RESOLUTION OF APRIL 6, 2017.

Auszug aus der 3. Sitzung des Ausschusses für Bauwesen, Stadtplanung und Umwelt vom 25.04.2017

101/2017 BSA
Bewerbung der Stadt Fulda für eine Mitgliedschaft in der „Dark Sky Community (DSC)" – Haushaltsanträge der Stadtverordnetenfraktionen der CDU (Nr. 95) vom 6. November 2016 und von Bündnis 90/Die Grünen (Nr. 131) vom 8. November 2016.

Der Vorsitzende erteilt zunächst Frau Frank das Wort und bittet sie, dem Ausschuss einen Überblick über die Thematik zu geben. Frau Frank erläutert anhand einer Präsentation sehr anschaulich, wie Menschen, Tiere und die Natur im weitesten Sinne von Licht beeinflusst werden. Gleichzeitig zeigt sie beispielhaft auf, wie mit intelligenten Lösungen und technischen Möglichkeiten diese Beeinflussung reduziert werden kann.
Letzteres wird von Herrn Hahner, der mit der „OsthessenNetz" im Auftrag der Stadt für die öffentliche Beleuchtung verantwortlich zeichnet, detailliert und mit konkreten Beispielen aus der Stadt Fulda untermauert. In diesem Zusammenhang spricht sich der Ausschuss dafür aus, in der „dunklen Jahreszeit" im Rahmen eines Ortstermins die unterschiedlichen Beleuchtungsvarianten in der Stadt in Augenschein zu nehmen.
Abschließend bedankt sich der Vorsitzende bei Frau Frank und Herrn Hahner für die ausführliche und sehr interessante Vorstellung.

Der Ausschuss für Bauwesen, Stadtplanung und Umwelt beschließt, die Stadt Fulda möge sich für eine Mitgliedschaft in der „Dark Sky Community (DSC)" bewerben. Die Verwaltung wird beauftragt, als Voraussetzung hierfür eine Beleuchtungsrichtlinie für die „Bewahrung der Nacht" im Sinne der Ziele der „International Dark Sky Association (IDA)" zu erarbeiten.
Der Intention der Haushaltsanträge wird damit entsprochen.

Einstimmig, 0 Enthaltung(en)

Fulda, 25.04.2017

Der Ausschussvorsitzende

Walter Krah

EINGEGANGEN
- Stadtplanungsamt -

C) DEVELOPMENT OF THE LIGHTING GUIDELINES:

To start with, a well-known German lighting engineer was entrusted with the task. His work was then transferred to a working group consisting of employees of the city of Fulda from various offices, employees of the RhönEnergie, Andreas Hänel from Dark Sky Germany as well as a representative of the Sternenpark Rhön. Further external lighting engineers, familiar with dark sky matters, were consulted. The lighting guidelines comply overall with the IDA criteria.

A strategy of emission trading is also being discussed in order to account for the light emitting from the shop windows and to prevent the increase of total light volumes. The first draft is currently being reviewed.

D) ENACTED LIGHTING GUIDELINES AS ADOPTED BY THE MAGISTRATE OF THE CITY OF FULDA

Auszug aus der 24. Sitzung des Magistrats vom 06.08.2018

254/2018 MAG
Veröffentlichung der „Richtlinie der Stadt Fulda zum nachhaltigen Umgang mit funktionalem und gestalterischen Licht im Außenbereich" im Rahmen der Bewerbung der Stadt Fulda für die Aner-kennung als „Sternenstadt" in der „Dark Sky Community (DSC)".

Der Magistrat beschließt die, u. a. mit Unterstützung des Sternenparks im Biosphärenreservat Rhön und der deutschen Sektion der International Dark Sky Community erstellte, „Richtlinie der Stadt Fulda zum nachhaltigen Umgang mit funktionalem und gestalterischen Licht im Außenbereich".
Die Richtlinie soll öffentlichen, privaten und gewerblichen Beleuchtern Anleitung zur Errichtung und Änderung von umweltgerechten und energiesparenden Beleuchtungs- und Werbeanlagen sein.
Sie soll über die Internetseite der Stadt Fulda und als Broschüre Interessenten und Bauherren zugänglich gemacht werden.

Einstimmig, 0 Enthaltungen

Beglaubigt:
Happ
Lothar Happ

Stadt Fulda 10

Fulda, 06.08.2018
gez. Dr. Heiko Wingenfeld
Oberbürgermeister

Amt 61

EINGEGANGEN
- Stadtplanungsamt -
08. Aug. 2018
Gesehen:
61.1 | 61.2 | 61.L | 61.D | 61.S

E) LIGHTING GUIDELINES OF THE CITY OF FULDA

Above all, the IDA criteria are in terms of light control, amount of light and color of light are applied. This is pointed out clearly on page 2 of the guidelines. The regulations in force in Germany must also be observed.

Important note: The upper limits for the installed amount of light per area are proposed values (see page 6/7 of the guidelines). Although these values are based on the lower limits of the MLO considering Fulda being in the MLO lighting zones 2–3 (few parts in lz 4), they are not based yet on empirical values taken in Germany, which are estimated to be lower.

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Policy developed by the City of Fulda for a sustainable approach to functional and ornamental outdoor lighting

Dear citizens,

Fulda is well-known for its attractive urban ensemble, which is characterised in particular by the streets dating from the Middle Ages and its Baroque buildings. The synthesis of historic structures side-by-side with modern buildings makes the urban centre in East Hesse a fascinating destination for tourists and conference visitors. The proximity to the UNESCO biosphere reserve and dark sky reserve of the Rhön enrich the quality of life and the leisure opportunities and at the same time carries with it a particular ecological responsibility.

The problem of light pollution belongs in this context of environmental politics: Too much, and in particular badly directed light in cold colour temperatures leads to an overall brightening the sky. This skyglow has been scientifically proven to have a negative impact on the lives of many nocturnal creatures, disturbs plants and also compromises human health.

This does not have to be the case. It is not difficult to deploy artificial light in a way that is tailored to the particular location and specific requirements. It is thus possible to reduce light pollution, cut costs and save energy while making a contribution to environmental protection. If used intelligently, it is also possible to avoid having to compromise on comfort and safety.

With this policy, the municipal authority aims to make an active contribution to protecting the city's appearance and atmosphere from being degraded or spoilt by excessive or wrongly implemented light. By optimising the lighting of streets and squares, commercial properties and private houses, we can effectively enhance the unique urban character and atmosphere.

In view of this, I would like to encourage all citizens of Fulda, together with property developers, shopkeepers and commercial property owners to approach the subject of light in a responsible manner.

The City of Fulda has been leading the way for several years, installing time controls for dimming and switching off the luminaires in all newly installed lighting systems within the city boundaries.

Yours sincerely,

Daniel Schreiner
Stadtbaurat

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1. Scope of application and definitions

This policy is aimed at all projects relating to the implementation or amendment of lighting measures with architectural impact in the public and private domain, as well as lighting for commercial and advertising purposes.
Its reach is to be underpinned by publication on the City of Fulda's website, promotional events and brochures. The aim is to raise awareness and encourage involvement among the operators of public, private and commercial lighting. Operators will be approached directly as necessary.

General requirements

Open landscape and unbuilt areas do not as a rule require lighting. The city authorities inspect every new building and restoration project with a view to whether or not public lighting is necessary. Public areas that are regularly used by pedestrians or other forms of traffic during the hours of darkness require lighting in the interests of safety. This policy focusses on the form which this lighting (especially public lighting) takes.

When planning lighting systems, all valid regulations, standards and workplace guidelines must be complied with as the basis for the plans (e.g. Technical Regulations for Workplaces ASR A3.4, DIN-EN13201, DIN-EN 12464 or DIN 67528). The lighting quality selected and required for the various applications is also the maximum level, in order to avoid excessive light.
Lighting that meets requirements can in particular be achieved by harnessing LED technology together with flexible controls. In combination with sensors and timers, this makes it possible to adjust lighting according to requirements (traffic levels, time of day) using controllers and dimmers. All public luminaires are fitted with motion sensors and timers.
The lighting systems are to be designed such as to harmonise with the surrounding architecture and streetscape in terms of scale, form and colour. Individual lighting systems must therefore take a form that does not produce a disruption.

This applies notwithstanding the provisions of the German Acts on the Preservation of Historic Monuments, Environmental Protection and Pollution Control, together with the implementation statutes issued by the Federal/State Governments' Working Group on Pollution Control.
Moreover, the IDA criteria for International Dark Sky Communities (http://www.darksky.org), which essentially cover the use of needs-based lighting volumes, fully shielded luminaires and a colour temperature of less than 3000 Kelvin (K).

For further information, please refer to the brochure "Sustainable Outdoor Lighting" published by the State of Hesse.

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Functional lighting

The term "functional lighting" refers to fixed lighting for traffic areas, such as streets, paths and squares, as well as private and commercial lighting.

Functional lighting systems should be designed in an environmentally friendly way as possible, while at the same time meeting the applicable guidelines and regulations in order to achieve the best possible level of visibility for the various road users in the context of the public duty to ensure road safety.

Ornamental lighting

"Ornamental lighting" refers to the way light is used in the context of building design. This makes a significant contribution to the appearance of the city at night (façade lighting or other illumination of buildings), even if this has only a temporary impact.

Lighting measures include:

(1) The operation of permanent stationary lighting systems of any kind which illuminate a building or parts of it above the ground floor from inside or outside, irrespective of their installation and which can attract attention in darkness. Darkness is defined as the period in which the natural level of illumination is less than or equal to 30 lux (corresponding to the point at which street lighting is switched on).

(2) The permanent installation of light fixtures and the corresponding masts (lighting system).

(3) This does not include temporary projections or projects of material significance.

2. Rules for functional lighting

In addition to the general requirements, the following rules apply:

<u>Quantity of light:</u>

- If lighting systems are to meet the relevant standards, the lighting option emitting the lowest quantity of light should be selected. The standard values applied are at the same time the maximum values for the quantity of light and should complied with as closely as possible.

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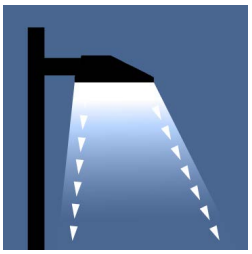
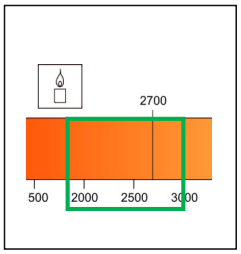
Direction of light:

The definition of the character of radiation has an impact on upward light emission and helps to avoid light pollution. The upper light ratio (ULR) defines the light emitted upwards.

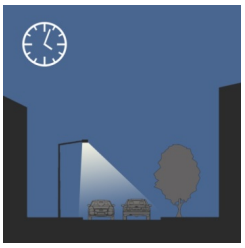
Luminaires for functional lighting should generally be fully shielded.



No upward emission



Permitted colour temperature



Control via timers or sensors

- In the case of functional luminaires no light can be emitted above horizontal (full cut-off). Moreover, the luminaires must not be installed at an angle (horizontal installation). If necessary, appropriate shielding measures should be put in place to avoid stray light and thus prevent the unnecessary brightening of the surrounding area. Wall-mounted luminaires with free light distribution (e.g. fluorescent bulbs or their LED substitutes) should be avoided in favour of directional lighting.
- The limits set by the threshold increment (TI) for restricting physiological glare must be taken into account. The TI value specifies the percentage increase in contrast required between an object and its background as a result of glare. If the TI process cannot be practically applied, luminaires with a luminous intensity of G6 should be selected.
- Traffic areas outside of populated areas should not be lit.

Light colour

- White static light containing between 4% and 14% max. short-wave (ultra-violet and blue light) radiation under a wavelength of 500 nanometers (nm) of all visible light (380-780 nm is permitted. This warm white light is appropriately equivalent to a colour temperature of 2000 Kelvin (K) to max. 3000 K and is predominantly non-damaging to people, insects and nocturnal animals.

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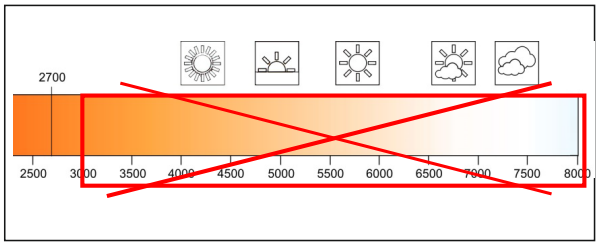
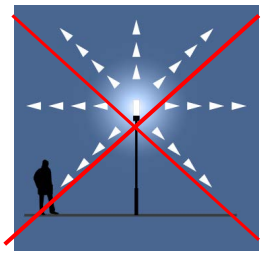
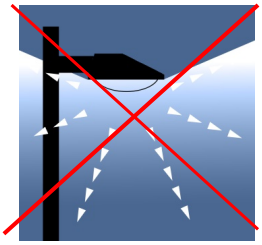


Inadmissible colour temperature



Unshielded luminaires are not permitted



Unshielded luminaires are not permitted

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3. Rules for ornamental lighting

Coordinating ornamental light and regarding it in the context of surrounding functional lighting forms the basis for a balanced overall impact. Lighting should be designed in context, i.e. taking into account the significance of the ensemble and its surrounding area. Ornamental lighting is justified by the benefit it offers in aesthetic, cultural and/or urban context. "Lighting as required," is the principle on which design and timing should be based.

Limiting the operating hours for architectural lighting defines the nightly curfews. This applies in the city centre – parallel to the switch-off times for street lighting – from 10:30pm to 5:30am. The City of Fulda can set other switch-off times for temporary periods.

When planning private and commercial lighting, the relevant regulations and requirements (e.g. the law on the protection of historic monuments) and workplace guidelines must be taken into account. Advertising displays, including in particular those with rapidly changing and moving light, are also subject to the particular requirements of the Building Code for Hesse, as well as the Local By-Laws of the City of Fulda for Design in the Urban Context, Free Spaces, Buildings and Advertising Displays, passed on 20 February 2006.

Raising awareness for the issue of light pollution supports efforts to protect the image of the city from negative impacts and excessive self-presentation using lighting.
In order to avoid excessive illumination of buildings in the city center, the requirements on decorative lighting must be observed for public and private buildings.

Additional rules:

Quantity of light:

If the surroundings are appropriately dark, a lower level of luminence is generally required.

Limiting the aggregate quantity of light:

Operators of private and commercial lighting are to be given support in determining the maximum quantity of light required for general lighting purposes. The quantity of light required can vary depending on how the space is used, but it should not exceed an aggregate quantity of light per area. The relevant indicators are generated by calculating the total luminance for all luminaires on the site, which is specified on the packaging, and dividing this by the area of the site.

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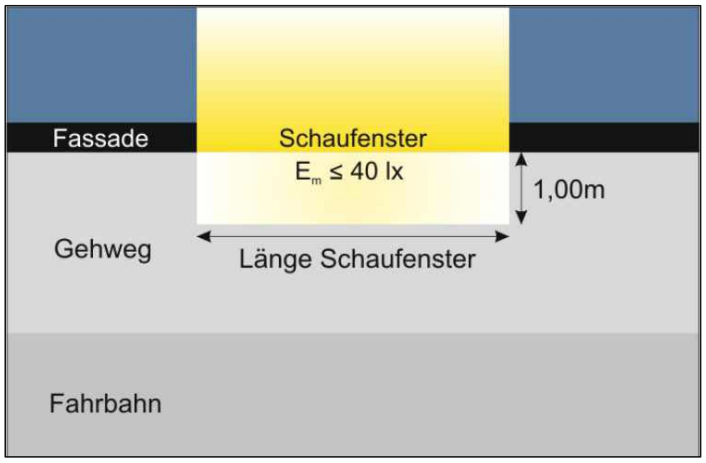
In residential areas, the quantity of light for paved areas to be lit is max. 10 lumen per m² (lm/m²) [generally 5-7 lm/m²].

In industrial, commercial and trade areas, where night lighting is necessary for reasons of security, an aggregate light volume of 35 lm/m² should not generally be exceeded for the areas requiring illumination (e.g. carparks, pathways, etc.)
In exceptional cases, e.g. in order to ensure safe performance of works and tasks, an aggregate light volume of 100 lm/m² may be permitted. Luminaires for exceptional lighting should be fitted with motion sensors or timers in order to ensure that the luminaires are not in operation for any longer than is necessary.

- Excessive luminance from display windows (e.g. light curtains and displays) should be avoided, since this contributes indirectly to a brightening of the night sky and limits visual comfort in public spaces. Lighting should be focused on the objects and goods on display and emission into the street and surrounding urban space should be avoided. The maximum value for mean illumination is 40 lux across an area of 1.0m, and applies to the entire length of the window, measured on the ground.



Field for calculation outside display window

- Display window lighting is to be limited to operating hours, according to requirements: the night-time switch-off period for the city centre is the same as for the street lighting, namely 10:30pm to 5:30am as a general rule.

Direction of light:

Decorative luminaires for ornamental lighting should generally be fully shielded.

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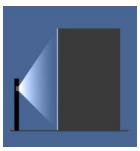
- The luminaires are to be selected and installed such that they emit only below the horizontal (full cut-off) and thus ensure glare-free, targeted lighting. Emission outside the dedicated area (e.g. above the horizontal, areas and objects not to be lit) should be avoided. Shutters, tubus and glare protection can aid targeted lighting.
- Spotlights require particular brightness control. They are only permitted during periods of darkness outside the nightly recovery phases (10.30pm - 5.30am), and must be planned such that no light passes by the illuminated object (gobo-technology). In all other cases illumination must be top-down.
- Architectural lighting should be low-emission.

Good lighting avoids light pollution

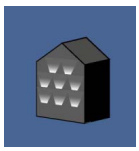
Projection



Contour illumination

Objects in space

Highlighting (top downwards)



Window frames

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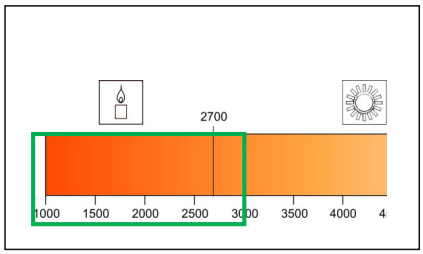
Policy developed by the City of Fulda for a sustainable approach to functional and ornamental outdoor lighting

Light colour:

- The light colour should be appropriate for the architecture, the material and the surface.

White static light containing between 4% and 14% max. of short-wave (ultra-violet and blue light) radiation under a wavelength of 500 nm of all visible light (380-780 nm) is permitted. This warm white light is appropriately equivalent to a colour temperature of 2000 K to max. 3000 K and is predominantly non-damaging to people, insects and nocturnal animals.



Permitted colour temperature

Advertising

Advertising displays using lighting with high visibility should be appropriate to the use of the relevant property area or business. Purely decorative (e.g. coloured) lighting with no advertising purpose should be avoided. The requirements set out in the German Federal Act on Pollution Control also apply.

Additional rules:

- Luminescent displays for advertising purposes only should not exceed a maximum luminance of 100 candela per square meter (cd/m²).
- Luminescent signs of general public interest (e.g. hospitals) should not exceed a maximum luminance of 200 cd/m².
- The background (largest area) should be in dark or warm tones.

Light writing on a dark background represents the best solution.

- The upper edge of advertising displays (stand-alone or on buildings) should avoid being higher than the eaves wherever possible.
- Displays with rapidly changing and/or moving light should be avoided if at all possible.

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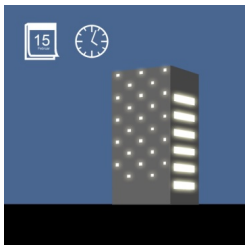
- Lit advertising is to be limited to operating hours, according to requirements: the night-time switch-off period for the city centre is the same as for the street lighting, namely 10:30pm to 5:30am as a general rule.



Light acc. to requirements with time limit

Light projection on objects and goods

Backgrounds in display windows as dark as possible

Displays and measures that are not permitted for ornamental lighting:

The installation and operation of lighting systems

- with glare that could endanger traffic (luminance in excess of 750 cd/m²);
- for illumination with white light with a colour temperature higher than 3000K on buildings or parts of buildings;
- for the use of dynamic light (see definition below) and the interplay of light on buildings and parts of buildings;
- such as uplights and sky beamers, since these make a significant contribution to the direct brightening of the sky and can disturb migrating birds, etc.,

are not permitted.

Definition of dynamic light

Lighting systems whereby static lights are moved in themselves or on any form of structure are regarded as dynamic light.

Flashing lights include all lighting systems involving the complete switching on and off of individual luminaires in sequence without additional effects.

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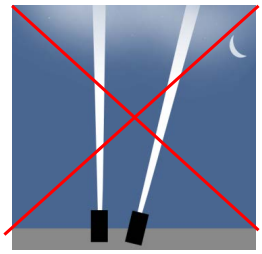
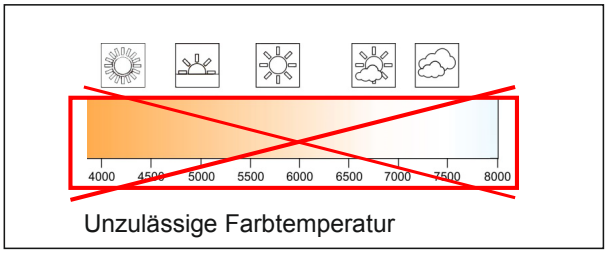
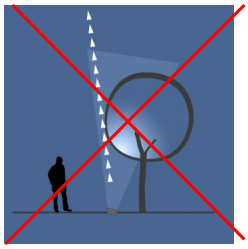
The interplay of light is deemed to exist if:

- luminous areas, lines or areas comprising several lines, letters or symbols continuously change their brightness, with slow, gradual transitional phases without phases of darkness;
- the light is switched off completely between certain switchings, resulting in phases of darkness;
- the source of light is split to give the appearance of moving letters, figures or symbols.





Unzulässige Farbtemperatur



Uplights and sky beamers are unacceptable

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At a glance

Functional lighting: General lighting. Serves purposes of orientation and provides basic lighting for functional areas such as traffic and leisure zones.

a) Examples in the public sphere/interest:

- Street lighting
- Car parks
- Square lighting
- Parks, public spaces
- Utility lighting (e.g. fire brigade)
- Sports facilities
- Entrances and access routes

b) Examples in the private/commercial sphere/interest:

- Car parks
- Commercial properties and production sites
- Courtyard entrances
- Footpaths, steps

Ornamental lighting: Lighting cotrinuting to the aesthetic and creating accents. Ornamental lighting can have a functional effect

a) in the public sphere/interest:

- old city – atmospheric lighting
- illuminating historic sites and buildings
- public buildings
- advertising and informational signs
- squares, festivals

b) in the private/commercial sphere/interest:

- display windows
- advertising and informational signs
- homes, gardens
- commercial properties and sites

Not permitted: sky projectors, uplighters, in-ground spotlights, dynamic light, colour temperature > 3000 k

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Wrong:

Right:

Fulda, 2018