

1 INTRODUCTION

Background

- 1.1 This lighting strategy has been prepared on behalf of Nascot Homes to discharge planning conditions in relation to external lighting of the residential development proposed at the former Gardeners Arms public house.
- 1.2 It has been produced to discharge Planning Condition 9 of the Reading Borough Council decision notice (Ref 190040).
- 1.3 The condition requires that wildlife is not adversely affected by the proposed development.
- 1.4 The Gardeners Arms and surrounding site was subject to an Ecological Appraisal and External and Internal Inspection for bats in August and September of 2018 (Windrush 2018). No bats or evidence of bats was found during the initial bat survey with the public house and surrounding buildings having ‘negligible’ bat roost potential. The emergence survey concluded that levels of bat activity were ‘low’.

Ecological Context

- 1.5 The Gardeners Arms is located in a principally residential area of undulating topography. There are a variety of existing light sources, including the existing property, neighbouring residential properties and street lighting along public highways. This could have contributed to the low presence of bats noted during previous surveys.
- 1.6 The site was observed to be used by low numbers of foraging and commuting bats including the common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus* and noctule *Nyctalus noctula*.
- 1.7 Although concluding the site to offer low and negligible habitat potential and low bat activity, the ecological appraisal highlighted that in particular light spillage should be avoided along the site boundaries. The site is bounded to the north east by a small area of scrub woodland.
- 1.8 The other areas which have been highlighted as appropriate for low impact lighting include the locations of the proposed wildlife boxes (bat and bird boxes) and any new substantial planting areas. With the addition of artificial lighting, bats could become confused, have reduced foraging opportunities, alter their commuting paths or even abandon a roost altogether, depending on the light sensitivity of the species.
- 1.9 Stone (2013) developed a matrix which identified which species of bat are most sensitive to light pollution. The species most frequently recorded at the Gardeners Arms (Common and Soprano Pipistrelles and Noctule bat) are all listed as “low impact” species with regards to the addition of artificial light whilst foraging or commuting. Other species are more sensitive to light pollution but were not recorded on site.
- 1.10 On this basis, methods to reduced light-spill have been proposed in order to avoid illuminating the site boundaries, proposed wildlife enhancement features and significantly planted areas or corridors, whilst ensuring that the development is safe to use for all future occupants.

- 1.11 No other important ecological features were identified during the previous site surveys, however the measures identified to reduce the impacts from lighting for bats will be beneficial to other light sensitive species.

2 LIGHTING STRATEGY

Aims and Objectives

- 2.1 The lighting strategy has three principal elements:
- *External lighting will be minimised to the extent required for safely using the proposed dwellings;*
 - *Use of PIR and timed activation wherever possible;*
 - *Direct lighting of potential areas of bat foraging, commuting and roosting habitat will be avoided; and*
 - *Where lighting is required, its obtrusiveness will be minimised through the application of best practice measures undertaken in accordance with technical guidance issued by the Bat Conservation Trust (2016) and the Institution of Lighting Professionals (2018) as well as recommendations given in the Windrush Ecology Report (2018)*

Types of Luminaires

- 2.2 Following relevant guidance, luminaires have been chosen to minimise impacts on bats and other light sensitive species, including the use of LED lights lacking light in the UV spectrum (Bat Conservation Trust, 2018; Stone, 2018).
- 2.3 The luminaires being used all have an LED light source (Philips LED Classic GU10 LED CLA 35W) (Appendix 1). The lamps do not emit any UV or Infra-red (IR) and are a sharp cut off in the photometric output.
- 2.4 LED lights have been selected as they produced a more directional and narrow light, thereby minimising light spill. LED lights are recommended by the Bat Conservation Trust (2018) “*due to their sharp cut-off, lower intensity, good colour rendition and dimming capability*”.
- 2.5 The emitted wavelength of the lights will be between 400nm – 800nm, principally circa 600nm. The warmer light ranges (>550nm) are considered to have lower impact on bats (Bat Conservation Trust, 2018). Invertebrates meanwhile are less attracted to lights between the 590nm – 660nm wavelengths (Bruce-White & Shardlow, 2011)
- 2.6 Invertebrates are drawn to UV light, and therefore by eliminating this light spectrum from the lighting plans, potential impacts on the local invertebrate colonies are minimised (Bruce, White & Shardlow, 2011).

Light Spill

- 2.7 To minimise light spill into the wider area, all lights will be mounted in fittings that are directed downwards. The luminaires specified have a 30° light spread, which represents a focused light beam. The extent and direction of light spill is demonstrated in the **Lighting Plans 1 & 2**.
- 2.8 As described above, the design of the luminaires results in minimal backward spill and no upward spill, thereby limiting light spill to the immediate vicinity and reducing sky glow.

- 2.9 LED lamps are equivalent to a conventional flat glass luminaire which minimises any upward light so reducing sky glow and further unnecessary light spill.
- 2.10 Hoods and cowls should only be used as a last option to reduce light spill (Bat Conservation Trust, 2018). Due to the design of the luminaires and their positions, with minimal backward spill and no upward spill, neither cowls nor hoods are required.

Lux Levels and Enhancement Features

- 2.11 Lux levels at ground level and at a height of 3m above ground are shown in **Lighting Plans 1 & 2** respectively.
- 2.12 Ecological enhancements at ground level include Hedgehog *Erinaceus europaeus* boxes. Although nocturnal, Hedgehogs are not known to be significantly negatively impacted by the present of artificial light (Finch *et al.* 2020). Nevertheless, the Hedgehog box is located within an area subject to no artificial light from on-site sources, thereby minimising potential impacts (**Lighting Plan 1**).
- 2.13 The wildflower planting area will also provide an ecological enhancement area and potential foraging habitat for bats, this area again is subject to light levels of 1.0 lux or less.
- 2.14 Bat boxes are generally position, where possible, at a height of greater than 4m. Bird boxes are positioned at around 3m height. Enhancement boxes will therefore be subject to no more than 1.0 lux in positions as shown.
- 2.15 1.0 lux is equivalent to lighting levels at twilight (Bat Conservation Trust, 2018), during which both bats and hedgehogs may be active. With the implementation of the lighting strategy, lighting levels therefore are not considered likely to impact upon these species.

3 SUMMARY

- 3.1 Following the implementation of the lighting strategy described in this report it is considered that impacts on light sensitive species will be negligible. It is recommended that Condition 9 be fully discharged.

REFERENCES

Windrush 2018 - Preliminary Ecological Appraisal. Windrush Ecology Limited. October 2018.

Bat Conservation Trust (2009) Bats and the Built Environment Series: Bats and Lighting in the UK

Bat Conservation Trust (2014) Interim Guidance: Artificial lighting and wildlife - Recommendations to help minimise the impact of artificial lighting

Bat Conservation Trust (2018): Guidance Note on Bats and Artificial Lighting in the UK (Guidance Note 08/18)

Bruce-White, C. & Shardlow, M. 2011. A review of the impact of artificial light on invertebrates. Buglife.

Finch, D., Smith, B.R., Marshall, C., Coomber, F.G., Kubasiewicz, L.M., Anderson, M., Wright, P.G. and Mathews, F., (2020). Effects of Artificial Light at Night (ALAN) on European Hedgehog Activity at Supplementary Feeding Stations. *Animals*, 10(5), p.768.

RCEP Report on Artificial Light in the Environment – 23/04/12 RCEP report summarising environmental impacts of artificial lighting

Stone, E.L. (2013) Bats and lighting: Overview of current evidence and mitigation

LIGHTING PLANS



ISOLUX CONTOURS AT GROUND LEVEL

ISOLUX CONTOUR KEY

- 1.0 lux
- 10.0 lux
- 50.0 lux
- 100.0 lux

LUMINAIRE SCHEDULE

- 1 Philips LED Classic GU10 LED CLA 35W
IN WALL MOUNTED DOWN-LIGHT
BEAM DIRECTION = DOWN
MOUNT HEIGHT = 1.8m
- 2 Philips LED Classic GU10 LED CLA 35W
IN CEILING MOUNTED DOWN-LIGHT
BEAM DIRECTION = DOWN
MOUNT HEIGHT = 1.8m
PIR AND SWITCH CONTROLLED

ECOLOGICAL FEATURES

- BIRD BOXES
- BAT BOXES
- HEDGEHOG BOX
- WILDFLOWER PLANTING
- POTENTIAL LOW LIGHT FORAGING AND COMMUTING ROUTES (BATS)

LIGHT PLAN 1

SCALE 1:500 @ A4

DRAWING NUMBER

NH014 / PL-LP1

REV.

A

PLANNING

nascot
HOMES

GARDENERS ARMS
CAVERSHAM

A	FURTHER BAT/BIRD BOXES	NH	NH	JUN-21
REV.	AMENDMENTS	DN.	CK.	DATE



ISOLUX CONTOURS AT 3m ABOVE GROUND LEVEL

ISOLUX CONTOUR KEY

1.0 lux
10.0 lux
50.0 lux
100.0 lux

LUMINAIRE SCHEDULE

- 1 Philips LED Classic GU10 LED CLA 35W
IN WALL MOUNTED DOWN-LIGHT
BEAM DIRECTION = DOWN
MOUNT HEIGHT = 1.8m
- 2 Philips LED Classic GU10 LED CLA 35W
IN CEILING MOUNTED DOWN-LIGHT
BEAM DIRECTION = DOWN
MOUNT HEIGHT = 1.8m
PIR AND SWITCH CONTROLLED

ECOLOGICAL FEATURES

-  BIRD BOXES
-  BAT BOXES
-  HEDGEHOG BOX
-  WILDFLOWER PLANTING
-  POTENTIAL LOW LIGHT FORAGING AND
COMMUTING ROUTES (BATS)

ALL PROPOSED LIGHT FITTINGS BELOW 3m AND
DOWNWARD FACING - NO LIGHT SPILL AT THIS LEVEL

LIGHT PLAN 2

SCALE 1:500 @ A4

DRAWING NUMBER

NH014 / PL-PL2

REV.

A

PLANNING

nascot
HOMES

GARDENERS ARMS
CAVERSHAM

A	FURTHER BAT/BIRD BOXES	NH	NH	JUN-21
REV.	AMENDMENTS	DN.	CK.	DATE

APPENDIX 1 – LUMINAIRE DATA SHEET



Standard LED spots GU10

LEDClassic 35W GU10 865 100-240V 36D ND

Standard and Glass LEDspots are a perfect fit for spot lighting and deliver warm halogen-like light. They are compatible with most existing fixtures with a GU10 socket and are designed as a retrofit replacement for halogen spots. Standard and Glass LEDspots are the perfect solution for your basic lighting needs: they provide the beautiful light and performance you expect from the LED technology at an affordable price.

Product data

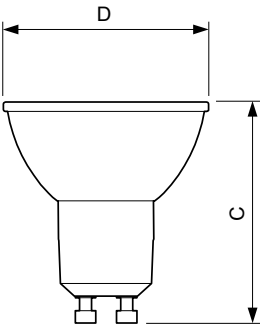
General Information		Operating and Electrical	
Cap-Base	GU10 [GU10]	Input Frequency	50 to 60 Hz
EU RoHS compliant	Yes	Power (Nom)	4.5 W
Nominal Lifetime (Nom)	25000 h	Lamp Current (Max)	55 mA
Switching Cycle	50000X	Lamp Current (Min)	40 mA
Technical Type	4.5-35W	Wattage Equivalent	35 W
Light Technical		Starting Time (Nom)	0.5 s
Color Code	865 [CCT of 6500K]	Warm Up Time to 60% Light (Nom)	0.5 s
Beam Angle (Nom)	36 °	Power Factor (Nom)	0.4
Luminous Flux (Nom)	350 lm	Voltage (Nom)	100-240 V
Luminous Intensity (Nom)	800 cd	Temperature	
Color Designation	Cool Daylight	T-Ambient (Max)	45 °C
Correlated Color Temperature (Nom)	6500 K	T-Ambient (Min)	-20 °C
Luminous Efficacy (rated) (Nom)	77.00 lm/W	T-Case Maximum (Nom)	85 °C
Color Consistency	<6	Controls and Dimming	
Color Rendering Index (Nom)	80	Dimmable	No
LLMF At End Of Nominal Lifetime (Nom)	70 %		

Standard LED spots GU10

Approval and Application	
Energy Efficiency Label (EEL)	A+
Suitable For Accent Lighting	Yes
Energy Consumption kWh/1000 h	- kWh
Product Data	
Full product code	871869682028500
Order product name	LEDClassic 35W GU10 865 100-240V 36D ND

EAN/UPC - Product	8718696820285
Order code	929001911611
Numerator - Quantity Per Pack	1
Numerator - Packs per outer box	10
Material Nr. (12NC)	929001911611
Net Weight (Piece)	0.040 kg

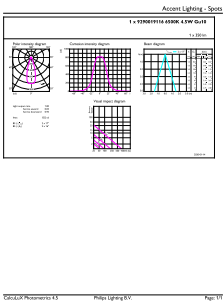
Dimensional drawing



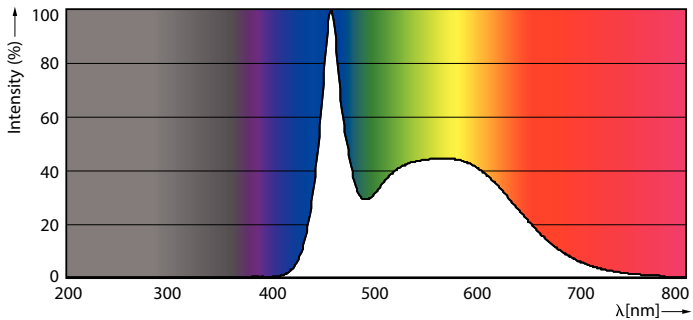
GU10 4.5-35W 350lm 36D 6500K ND

Product	D	C
LEDClassic 35W GU10 865 100-240V 36D ND	50.5 mm	54.5 mm

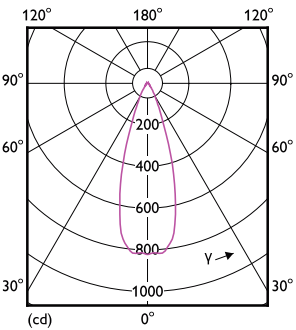
Photometric data



LEDspots 4,5W PAR16 GU10 865 36D



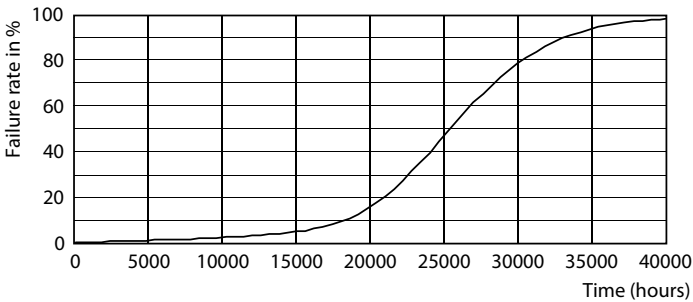
LEDspots 4,5W PAR16 GU10 865 36D



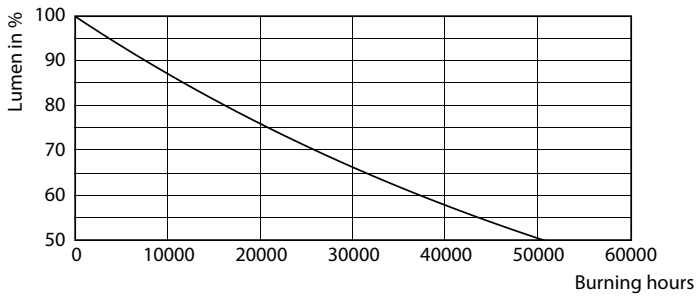
LEDspots 4,5W PAR16 GU10 36D

Standard LED spots GU10

Lifetime



LEDspots LED 25K



LEDspots LMP 25K



Description

Professional range of GU10 wall lights, designed for use with Enlite ICETM lamps. High quality corrosion resistant finishes for use in coastal applications. Available in down, up/down or adjustable options for different exterior lighting effects.

ENHANCE YOUR GARDEN WITH COLOURED ICE LAMPS



Features & Benefits

- EN-WDL822 & EN-WDL832 - IP65 Mains voltage 316 stainless steel wall lights
- EN-WAL541/AN - IP54 Mains voltage anodised aluminium adjustable wall light for increased corrosion resistance. Vertical adjustment of 200°
- For use with GU10 lamps - lamps not included (Max 35W)
- Screw on cover for easy lamp change
- 3 year warranty

LUMINAIRE HOLDER TYPE 1



NEW EN-WDL822 
240V GU10 IP65 Fixed
Wall Light



NEW EN-WDL832 
240V GU10 IP65 Up/Down
Wall Light

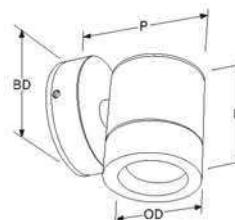


EN-WAL541/AN 
240V GU10 IP54 Adjustable
Anodised Wall Light

Suitable for Internal
and External use

Cat. No.	Description	Max (W)	Overall (Ø)	Height	Projection	Base Diameter (Ø)
EN-WDL822	Down	35W	60mm	115mm	86mm	73mm
EN-WDL832	Up/down	2 x 35W	60mm	160mm	86mm	73mm
EN-WAL541/AN	Adjustable	35W	56mm	86mm	90mm	68mm

Technical Information



- (H) Height (see table)
(P) Projection (see table)
(BD) Base Ø (see table)
(OD) Overall Ø (see table)

9969137

 5W LED
 230V ~ 50Hz

LUMINAIRE HOLDER TYPE 2



(DE) Bestimmungsgemäße Verwendung

(GB) Intended use / (FR) Utilisation conforme / (NL) Beoogd gebruik / (PL) Stosowanie zgodnie z przeznaczeniem /

(NO) Riktig bruk / (DK) Korrekt brug / (SE) Avsedd användning / (FI) Määräystenmukainen käyttö

(IT) Impiego appropriato / (ES) Uso prescrito / (CZ) Použití v souladu s určením / (PT) Utilização correta / (GR) Ενδεδειγμένη χρήση

(DE)	Ortsfeste Verwendung als Deckenleuchte im Außenbereich	(GB)	Provided for stationary outdoor use on ceilings
(FR)	Installation fixe en tant qu'plafonnier extérieure	(NL)	Vast gebruik als plafondlamp buitenshuis
(PL)	Do montażu stacjonarnego jako lampa sufitowa na zewnątrz	(NO)	Til stasjonær bruk som taklampe utendørs
(DK)	Til stationær brug som loftlampe udendørs	(SE)	Används som fast taklampa utomhus
(FI)	Kiinteä käyttö ulkotilojen kattovalaisimena	(IT)	Impiego fisso come plafoniera in ambienti esterni
(ES)	Empleo fijo en tanto lámpara de techo en el exterior	(CZ)	Stacionární použití jako stropní svítidlo v exteriéru
(PT)	Aplicação fixa como luminária de teto em exteriores	(GR)	Σταθερή χρήση ως φωτιστικό οροφής σε εξωτερικό χώρο

(DE) Verwendete Symbole

(GB) Safety Precautions / (FR) Symboles utilisés / (NL) Gebruikte symbolen / (PL) Stosowane symbole / (NO) Brukte symboler /

(DK) Brugte symboler / (SE) Använda symboler / (FI) Käytetyt symbolit / (IT) Simboli usati / (ES) Símbolos empleados /

(CZ) Použité symboly / (PT) Símbolos utilizados / (GR) Χρησιμοποιούμενα σύμβολα

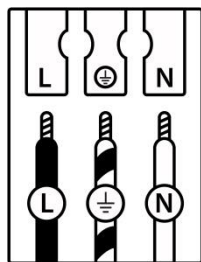
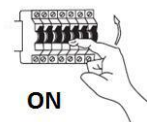
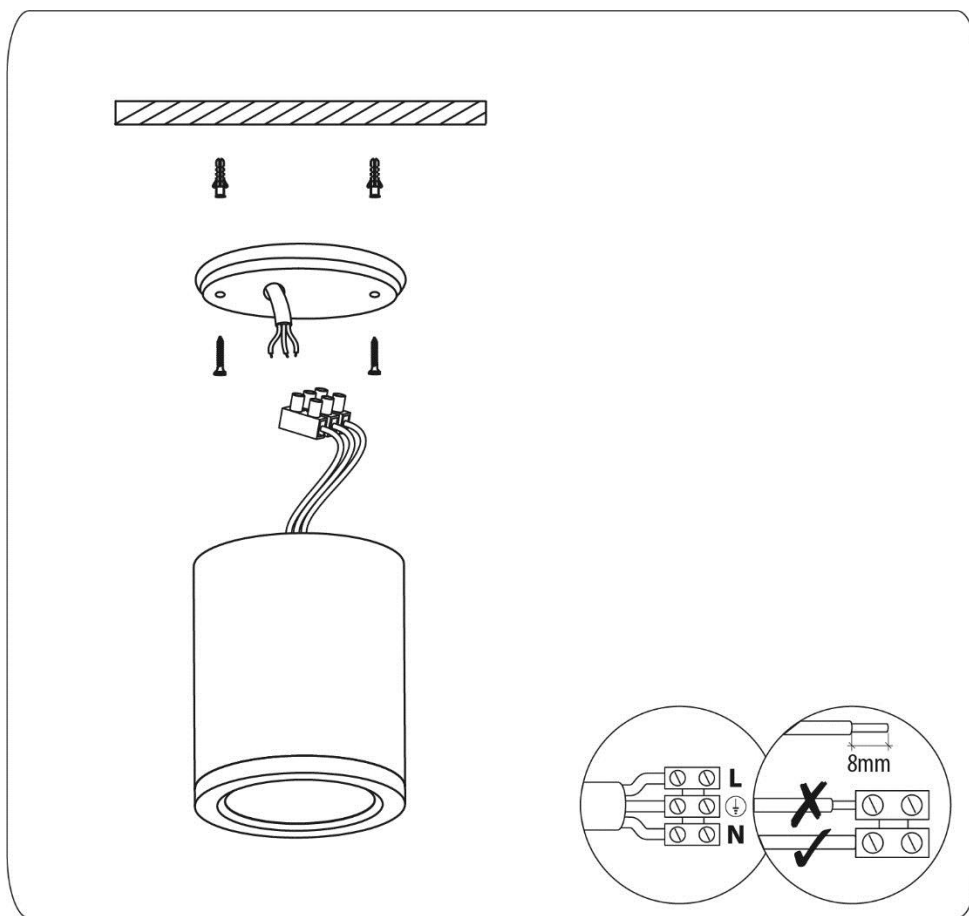
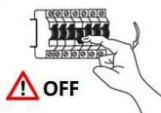
IP 54



(DE) Lieferumfang

(GB) Package contents / (FR) Contenu de la livraison / (NL) Bij de levering inbegrepen / (PL) Zakres dostawy / (NO) Leveringsomfang / (DK) Leveringsomfang / (SE) Leveransomfattning / (FI) Toimitussisältö / (IT) Fornitura / (ES) Volumen de suministro / (CZ) Rozsah dodávky / (PT) Material fornecido / (GR) Παραδοτέος εξοπλισμός

(DE)	1 Deckenleuchte Montagematerial Montageanleitung	(GB)	1 Ceiling lamp Installation hardware Mounting instructions	(FR)	1 Plafonnier Matériel de montage Instructions de montage
(NL)	1 Plafondlamp Monteringsmateriale Montagehandleiding	(PL)	1 Lampa sufitowa Elementy montażowe Instrukcja montażu	(NO)	1 Taklampe Monteringsmateriale Brukerveiledning
(DK)	1 Loftlampe Monteringsmateriale Brugervejledning	(SE)	1 Taklampa Monteringsmaterial Monteringsanvisning	(FI)	1 Kattovalaisin Asennusmateriaali Asennusohjeet
(IT)	1 Plafoniera Materiale di montaggio Istruzioni di montaggio	(ES)	1 Lámpara de techo Material de montaje Instrucciones de montaje	(CZ)	1 Stropní svítidlo Materiál pro montáž Návod k montáži
(PT)	1 Luminária de teto Material de montagem Instruções de montagem	(GR)	1 Φωτιστικό οροφής Υλικό συναρμολόγησης Οδηγίες συναρμολόγησης		



	(DE)	(GB)	(FR)	(NL)	(PL)	(NO)	(DK)
L	Stromführender Leiter	Live conductor	Conducteur	Spanning-voerende draad	Przewód prądowy	Strømførende leder	Strømførende leder
	Schutzleiter	Earth conductor	Conducteur de protection (terre)	Aardkabel	Przewód uziemiający	Jordledningen	Jordledningen
N	Neutralleiter	Neutral conductor	Conducteur neutre	Nulleider	Przewód zerowy	Nøytralleider	Neutralleider

	(SE)	(FI)	(IT)	(ES)	(CZ)	(PT)	(GR)
L	Strömförande ledare	Virtajohdin	Conduttore sotto tensione	Líneas conductoras de corriente	Vodič pod napětím	Condutor vivo	Ρευματοφόρος αγωγός
	Skyddsledare	Suojajohdin	Conduttore di terra	Conductor de protección	Ochranný vodič	Condutor de terra	Αγωγός γείωσης
N	Neutralledare	Nollajohdin	Conduttore neutro	Conductor neutro	Neutrální vodič	Condutor neutro	Ουδέτερος αγωγός

(DE) Die Lichtquelle dieser Leuchte ist nicht ersetzbar; wenn die Lichtquelle ihr Lebensdauerende erreicht hat, ist die gesamte Leuchte zu ersetzen.

(FR) La source lumineuse de cette lampe n'est pas remplaçable. Lorsque celle-ci ne fonctionnera plus, il faudra alors procéder à un échange complet du luminaire.

(PL) Źródło światła w tej lampie jest niewymienne, gdy osiągnie koniec żywotności, należy wymienić całą oprawę.

(DK) Lyskilden til denne lampe kan ikke udskiftes; når lyskilden har nået enden på sin levetid, vil hele lampen skulle udskiftes.

(FI) Tämän valaisimen valonlähde ei voi vaihtaa. Kun valonlähde on tullut elinkaarensa päähän, on koko valaisin vaihdettava.

(ES) La fuente de luz de esta lámpara no es reemplazable. Cuando la fuente de luz haya llegado al final de su vida útil, tiene que reemplazarse toda la lámpara.

(PT) A fonte de luz deste candeeiro não permite a substituição; quando a fonte de luz tiver atingido o fim de vida útil é necessário substituir o candeeiro completo.

(GB) The light source of this luminaire is not replaceable; when the light source reaches its end of life, the whole luminaire shall be replaced.

(NL) De lichtbron van deze lamp is niet vervangbaar; wanneer de lichtbron het einde van zijn levensduur heeft bereikt, moet het complete armatuur vervangen worden.

(NO) Lyskilden i denne lampen er ikke mulig å bytte ut, når lyskildens livet tar slutt, må hele lampen skiftes ut.

(SE) Ljuskällan i denna lamp är inbyggd och är inte utbytbar. När ljuskällan når sitt slut, får man byta ut hela armaturen.

(IT) La sorgente luminosa di questa lampada non è sostituibile; quando la sorgente luminosa ha raggiunto la fine della sua vita utile, occorre sostituire l'intera lampada.

(CZ) Světelný zdroj nelze vyměnit, pokud světelný zdroj dosáhl konce své životnosti, je nutné vyměnit celé světlo.

(GR) Η πηγή φωτισμού αυτού του φωτιστικού δεν μπορεί να αντικατασταθεί. Όταν η πηγή φωτισμού φτάσει το τέλος της διάρκειας ζωής της, πρέπει να αντικαταστήσετε ολόκληρο το φωτιστικό.