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## Consultation RIS – Lighting

9 March 2017

Submission from:

### **Zumtobel Group Lighting Australia**

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Submission to:

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### Zumtobel Group Australia Submission

Dear Karen,

Thank you for the opportunity to provide feedback on the Australian Federal Government Equipment Energy Efficiency (E3), Regulation Impact Statement (RIS) – Lighting, regarding proposals to improve the policy for the energy efficiency of residential and commercial lighting in Australia and New Zealand.

We have carefully considered the proposed changes to the Greenhouse and Energy Minimum Standards (GEMS) Act 2012. Zumtobel Group (ZG) understand and support the need for a review of current Minimum Energy Performance Standards (MEPS) for lighting. ZG also strive to achieve reductions in greenhouse gas emissions related to lighting, by designing and manufacturing, high quality, energy efficient luminaires for all areas of indoor and outdoor lighting. Zumtobel Group have significant concerns regarding the policy proposals and suggested new legislation as outlined in the RIS.

### Zumtobel Group - Company Background

The Zumtobel Group is an international lighting group and a leading player in the field of innovative lighting solutions and components. With its three internationally established brands, Thorn, Tridonic and Zumtobel, and its two smaller brands, acdc and Reiss, the Group offers its customers around the world a comprehensive range of products and services. In the lighting business the Group with its Thorn, Zumtobel and acdc brands is the European market leader. Through its lighting components brand, Tridonic, the Group plays a leading role worldwide in the manufacture of hardware and software for lighting systems (LED light sources and LED drivers, sensors and lighting management).

The Group is listed on the Vienna Stock Exchange (ATX) and employs a global workforce of 6,761 employees. The Zumtobel Group headquarters is based in Dornbirn Austria and the company has manufacturing plants in Europe, UK, USA and the Asia Pacific region including China, Australia and New Zealand.

Zumtobel Group Australia (ZG Lighting Australia Pty Ltd) is a professional commercial luminaire supplier and manufacturer with approximately 120 employees. The Australian operation has its headquarters, factory and distribution center based in the Western Sydney suburb of Wetherill Park. Zumtobel Group Australia represents its own brands ZUMTOBEL, THORN, ACDC, and TRIDONIC and offers a mixture of Australian Made and imported lighting products from Europe and China. ZG Lighting Australia is also the sales distribution agent for BEGA, who manufacture premium outdoor luminaires made in Germany ([www.bega.de](http://www.bega.de)).

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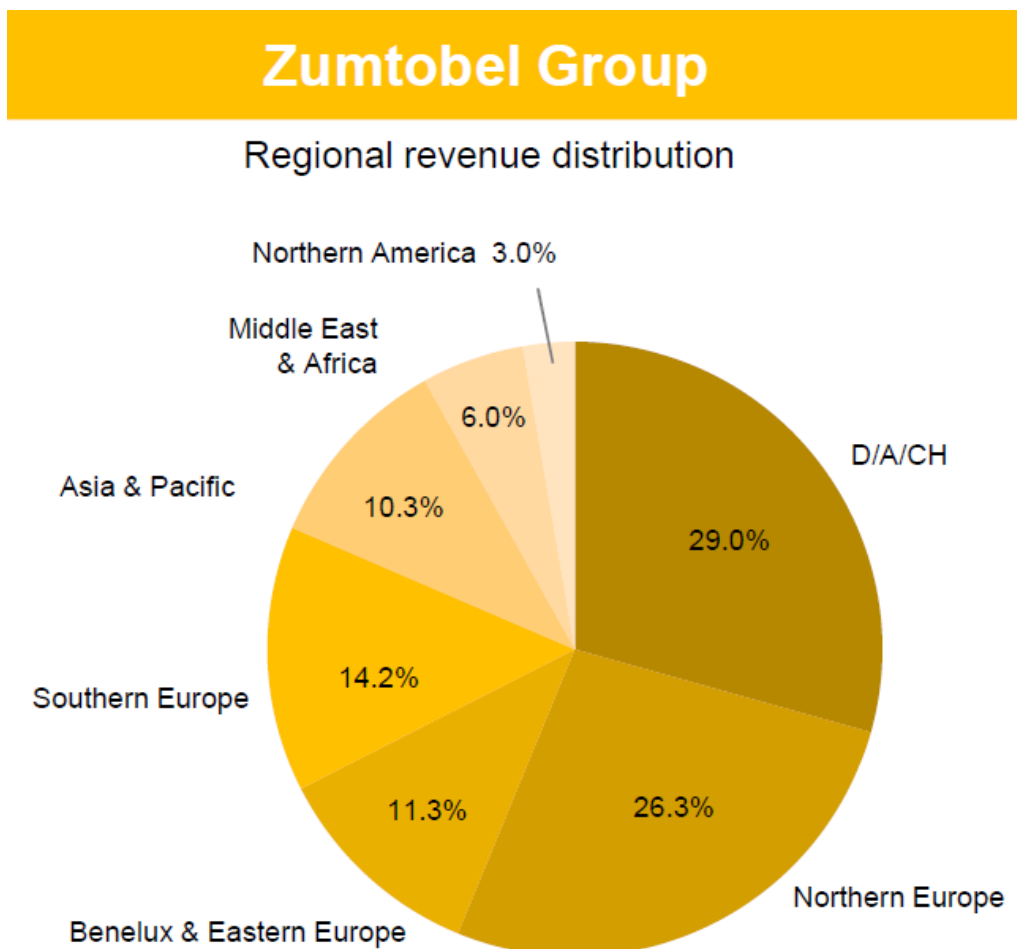
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## Zumtobel Group – Financial Results

In the 2015/16 financial year the Group posted revenues of EUR 1,356.5 million. Zumtobel Group AG Annual Financial Results published on the company web site: [http://www.zumtobelgroup.com/en/investor\\_relations.htm](http://www.zumtobelgroup.com/en/investor_relations.htm)

The chart below from a ZG investor relations report illustrates the Zumtobel Group global regional revenue distribution for 2015/16. As can be seen approximately 80% of Group sales are made in European markets.

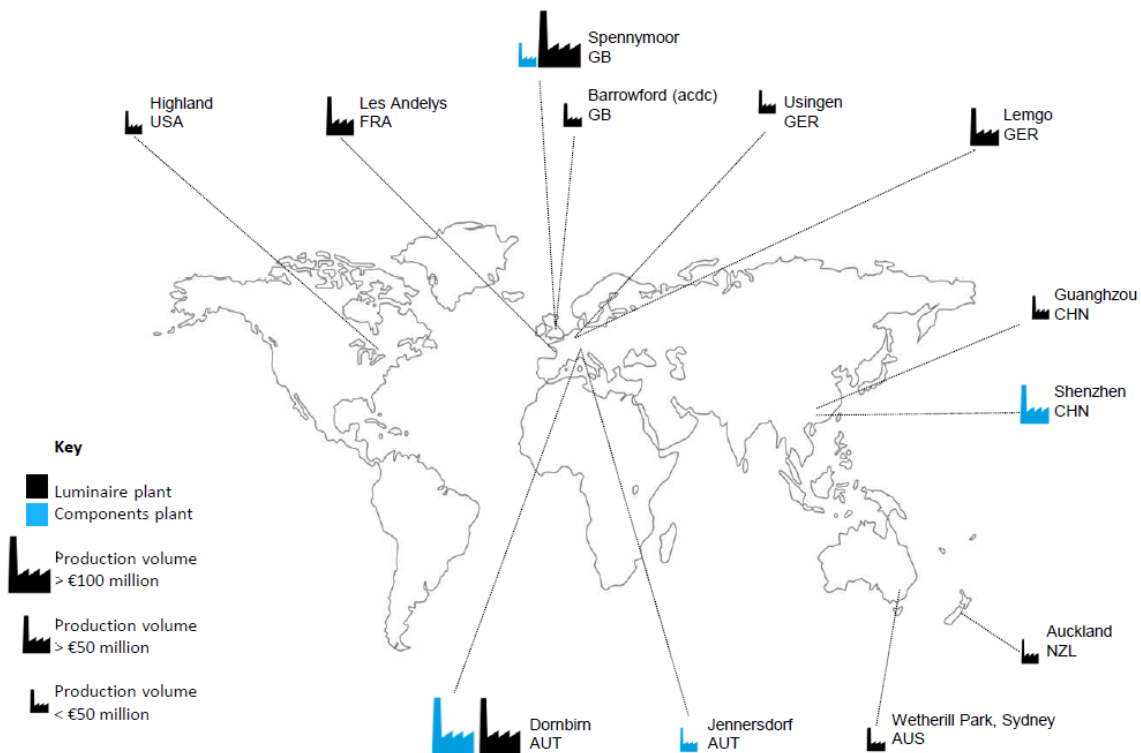
Zumtobel Group is well established in Australia, the THORN and ZUMTOBEL Brands have both operated in Australia for over 20 years. The Asia Pacific region comprises Australia, New Zealand, China and the ASEAN countries who jointly generate approximately 10% of global revenue. **It should be noted that the revenue from Australia, even with long standing brands, only represents approximately 3% of global lighting revenue.** Zumtobel Group Australia achieves similar annual revenue results as the newly established Zumtobel Lighting in North America.



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## Zumtobel Group – Quality and Environmental Standards

As a leading global supplier, for the international lighting industry, Zumtobel Group offer luminaire ranges that are suitable for international markets. The majority of ZG luminaires are designed in Europe and these international product families are promoted on various international web sites. ZG Lighting Australia has local control for the product selection that is promoted via the ZUMTOBEL and THORN .com.au web sites, but depend on international .com web sites for the ACDC, TRIDONIC and BEGA brands.



Compliance with quality and environmental standards is a high priority for the Zumtobel Group. All of the Group's major production plants are certified to ISO 9001. Seven lighting factories as well as all of the Tridonic electronics plants also work to the standards of the ISO 14001 environmental management system. The Zumtobel Group's plants in Dornbirn have received the Ökoprofit award 16 times in recognition of their active environmental protection.

In addition to ISO 9001, Tridonic Dornbirn is also certified to ISO 14001 for environmental management systems. In 2013 the site was the first in the Zumtobel Group to achieve certification to ISO 50001, which means it meets the internationally recognized standards for energy management systems (EMS). The goal of this certification is to increase energy efficiency within the organization as well as minimizing energy costs, energy consumption and CO2 emissions.

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## Zumtobel Group – Light for People

Zumtobel has an international customer presence thanks to its own sales organizations in 23 countries and commercial agencies in more than 50 other countries. The company has its roots in Austria but sets great store by international contacts in order to maintain its worldwide network of specialists and design partners in the lighting sector.

As an innovation leader Zumtobel supplies an extensive range of premium luminaires and lighting control systems for various professional building lighting application areas:

- Offices and Communication
- Education and Science
- Presentation and Retail
- Hotel and Wellness
- Art and Culture
- Health and Care
- Industry and Engineering
- Façades and architecture

Zumtobel uses integral lighting solutions to create lighting scenes that make it possible to experience the interplay between light and architecture in all its diverse complexity. The combined use of luminaires, lighting management and emergency lighting systems is geared towards the architecture of a building and the particular application situation.

Zumtobel conducts research into the health-promoting effects of light and makes it ever easier to exploit these effects in order to provide people with the best possible lighting quality. Zumtobel's applied research attaches particular importance to energy efficiency. Daylight-based lighting control and luminaires with higher light output ratios produce more light and brightness than standard solutions, assuming identical light sources are used.

Lighting solutions by Zumtobel are characterized by an integral approach. The company caters for customers' requirements and users' needs individually in various application areas. Hence, perfect lighting quality meets maximum energy efficiency. From application-oriented lighting design through to the use of innovative light sources and luminaires as well as intelligent lighting management, Zumtobel makes a valuable contribution to a building's life cycle assessment and actively supports public and private building owners during environmental certification of their buildings.

Zumtobel undertakes extensive product research and development to constantly strive to provide the most energy efficient LED luminaires possible to suit the application. Efficacy upgrades are published every six months on the Zumtobel web site:

<http://www.zumtobel.com/com-en/products/efficiencyupgrade.html>

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## Zumtobel Group – Lighting Products and the Environment

For Zumtobel Group using resources responsibly starts within the company and is brought to perfection in energy-efficient customer projects.

Zumtobel makes sure a product's impact on the environment is transparent. Zumtobel was the first company in the lighting industry to publish environmental product declarations in compliance with the international ISO 14025 and EN 15804 standards. Environmental Product Declarations (EPDs) are prepared by Zumtobel in compliance with a process verified by independent auditors.

The environmental product declaration lists in detail all traces left by a product in the environment over its entire life cycle: which raw materials are processed? How much energy is required for production, transport and waste disposal, how much is reclaimed through recycling? This information is relevant not only for environmental certifications such as LEED or ÖGNI; it is also a sound basis that helps green-minded customers make their decisions.

### GEMS Lighting RIS - Scope - Zumtobel Group

Zumtobel Group Australia has extensively studied and discussed the GEMS MEPS Lighting RIS with our internal expert colleagues in Europe and Asia. Further analysis and consideration has been done in Australia in partnership with independent lighting specifiers and designers who form the majority of our customer base.

Zumtobel Group is primarily a luminaire manufacturer, so *all comments and scope in this submission are limited to the RIS requirements related to integral LED luminaires and traditional luminaires only*. Zumtobel Group does not supply ZG branded LED or traditional lamps in Australia, instead the company on-sells lamps from other suppliers.

Due to the rapid uptake of LED luminaires in the international lighting market, the Zumtobel Group portfolio is currently in quick transition toward becoming a 100% LED luminaire supplier. For these reasons this report is focused on luminaires only.

- Zumtobel Group **conditionally** support the introduction of MEPS for integral LED luminaires and traditional luminaires, provided significant modifications to the proposed MESP are undertaken. The requirements less onerous, less costly and less time consuming and fairer. Please refer to our recommendations below.
- Zumtobel Group **do not** support the introduction of new or additional labelling for integral LED luminaires and traditional luminaires. Please refer to our reasons below.

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## GEMS Lighting RIS - MEPS - Zumtobel Group Luminaires

Zumtobel Group Australia have reviewed the proposed MEPS for integral LED luminaires and traditional luminaires.

The table below lists the quantity of ZG luminaires within the scope of the RIS MEPS for LED luminaires and the LER / LOR requirements for traditional luminaires. The number of product codes (articles) that are within the scope and are currently promoted on the various brand web sites totals approximately 6,600. It should be noted that of these 6,600 articles approximately **only 10%** of the total, actually result in sales, into the Australian Lighting market.

ZG Brand	Light Sources	Number of Articles in Scope	MEPS failure rate based on RIS proposed minimum lm/W	Web Site Link
ZUMTOBEL	LED	4300	40%	<a href="http://www.zumtobel.com.au">www.zumtobel.com.au</a>
ACDC	LED	1600	5%	<a href="http://www.acdclighting.co.uk">www.acdclighting.co.uk</a>
THORN	LED & FL	700	15%	<a href="http://www.thornlighting.com.au">www.thornlighting.com.au</a>

Zumtobel Group Australia are extremely concerned with the RIS proposed minimum efficacy (lm/W, LER) requirements for luminaires and the resulting failure rates of up to 40% especially for Zumtobel branded luminaires.

The resulting total failure rate for all three brands is approximately 29% and would result in the withdrawal of approximately 1900 articles from our market offer. A similar proportional reduction in sales revenue would obviously also follow.

ZG Lighting Australia Pty Ltd is currently operating in a highly competitive lighting market, with many new local and overseas entrants, and any proposed Government legislation that resulted in such a large shrinkage of our luminaire portfolio offer would have a devastating effect on our business.

This result is totally unacceptable for ZG Lighting Australia Pty Ltd. Please refer to our recommendations regarding proposed minimum efficacy (lm/W, LER) MEPS requirements for luminaires in the following sections.

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## GEMS Lighting RIS - MEPS – Problematic Example Luminaires

Modern LED luminaires, although greatly improved in efficacy compared to traditional lamp luminaires, still suffer from light output and efficiency losses, due to many factors including electrical losses, thermal losses, LED chip inefficiency with warm white LEDs, LED chip inefficiency with high CRI, and optical losses due to light beam control, glare control and other intended optical effects. The table below provides some examples of Zumtobel luminaires that will not comply with the proposed MEPS draft. Luminaire Data Sheets for each item below are attached at the end of this report.

LED Luminaire Type	Problem & Reason	Product Web Link
Small Tilting Adjustable LED Downlight < 2500lm	Only 49lm/W due to small light aperture diameter, recessed light source, CRI>90 and 2700K LED	<a href="http://www.zumtobel.com/au-en/products/1338.html?60816916">http://www.zumtobel.com/au-en/products/1338.html?60816916</a>
Small Lensed Adjustable LED Downlight < 2500lm	Only 30lm/W due to adjustable lens system for controlled directed light beam, small light aperture diameter, CRI>90 and 2700K LED	<a href="http://www.zumtobel.com/au-en/products/1338.html?60817499">http://www.zumtobel.com/au-en/products/1338.html?60817499</a>
Large High Wattage Fixed Beam LED Downlight To Replace Metal Halide Downlights > 2500lm	Only 80lm/W which is less than 110lm/W and less than 90lm/W, due to LED chip high operation temperature, CRI>90 and 2700K LED	<a href="http://www.zumtobel.com/au-en/products/1338.html?60816726">http://www.zumtobel.com/au-en/products/1338.html?60816726</a>
LED Spotlight with Wall Wash Optic for Exhibition Spaces < 2500lm	Only 40lm/W due to controlled beam Wall Wash optical control, CRI>90 and 3000K LED	<a href="http://www.zumtobel.com/au-en/products/1338.html?60713235">http://www.zumtobel.com/au-en/products/1338.html?60713235</a>
Miniature Linear LED Track Mounted Wall Washer < 2500lm	Only 54lm/W due to Wall Wash optical control, small light aperture width, CRI>90 and 3000K LED	<a href="http://www.zumtobel.com/au-en/products/1338.html?42927733">http://www.zumtobel.com/au-en/products/1338.html?42927733</a>
Industrial 6500K IP65 LED Batten > 2500lm	141lm/W, but not sure if allowed due to CRI 70, but maybe excluded due to IP65? RIS Exclusions currently only apply to small and large luminaires?	<a href="http://www.zumtobel.com/au-en/products/1338.html?42182731">http://www.zumtobel.com/au-en/products/1338.html?42182731</a>
Recessed Circular LED Large/Planar Luminaire To replace Circular Fluorescent luminaires > 2500lm	104 lm/W which passes 90lm/W if considered to be a Planar Luminaire, but fails 110lm/W if considered to be a Large Luminaire?	<a href="http://www.zumtobel.com/au-en/products/1338.html?42185022">http://www.zumtobel.com/au-en/products/1338.html?42185022</a>
Very Slim Linear LED with Office Optic for UGR19 Glare Control < 2500lm	Only 54lm/W due to glare control optic, small light aperture width, and 2700K LED	<a href="http://www.zumtobel.com/au-en/products/1338.html?42183946">http://www.zumtobel.com/au-en/products/1338.html?42183946</a>

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## GEMS Lighting RIS - Testing Costs - Zumtobel Group

Zumtobel Group Australia have serious concerns regarding the new additional costs due to testing and compliance for the remaining 4700 articles to be promoted.

The definition and maximum size of luminaire product families that can be registered at one time is not well defined in the RIS. This unresolved question makes it difficult to put an accurate cost against the RIS proposals.

Zumtobel Group have some product families listed by range names with only 1 article and other product families well over 500 articles. The average is 50-80 articles per family product.

We therefore estimate that we will have to register 94 product families of approximately 50 articles each for the compliant luminaires. Furthermore due to the frequent upgrade of product efficiency and new product launches every six months we expect to have to register over 100 product families per year.

For each of the 100 luminaire product families to be registered, **MEPS Table 2 - Integrated LED luminaires** list 8 different required laboratory tests to be done and checked for each product family:

1. LM79
2. LM80/TM 21 ISTMT
3. AS/NZS IEC 62301
4. CIE S025
5. IEC 62722.2.1
6. IEC 6100.3.2
7. IEC 6100.4.7
8. IEEE 1789

In reality, luminaire manufacturers do a few tests, many at component level, during product development and these results get applied to many variants of the fully assembled luminaire families. The RIS MEPS draft appears to be more technically specific and it appears that more specific tests will be required to check for various technical, electrical and lighting quality parameters.

Therefore if we assume that additional external laboratory testing is required, for say 4 of the above tests at a cost of approximately \$1000 per test. This then calculates out as shown in the table below:

Number of Families of 50 to register each year	Number of additional Laboratory Tests	Cost Per Laboratory Test	Additional testing cost per year
100	4	\$1000	\$400,000

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## GEMS Lighting RIS – Registration and Administration Costs - Zumtobel Group

Zumtobel Group Australia, furthermore have serious concerns regarding the additional costs associated with administration and product registration for the 100 product families of approximately 50 articles per year.

Number of Families of 50 to register each year	Number of Laboratory Tests to be checked for compliance per family	ZG Administration cost at \$100/h  1 hour to request test reports  1 hour to review test reports  1 hour to register test reports	Additional ZG Administration cost per year
100	8	\$300	\$240,000

The cost of product registration prior to promotion is then finally added to the above annual costs as calculated in the table below:

Number of Families of 50 to register each year	Estimated Government Registration Fee	Additional ZG Administration cost per year
100	\$440	\$44,000

## GEMS Lighting RIS – Total Costs - Zumtobel Group

Zumtobel Group Australia's total cost to comply with the Australian Federal Government Equipment Energy Efficiency (E3), Regulation Impact Statement (RIS) – Lighting, proposals to improve the policy for the energy efficiency of residential and commercial lighting in Australia would result in **a total cost of \$684,000 per year**.

This additional cost would need to be recouped by either reducing company costs in other areas such as reducing employee headcount of 10 assuming an annual individual salary of \$68,000, or by increasing the selling price of the luminaires sold in the Australian lighting market as calculated in the table below. Zumtobel Group do not consider either of these to be viable options for future success.

Estimated Number of Luminaires Pieces in MEPS Scope Sold pa	Total Cost of Compliance pa	Average Additional Cost per Luminaire Sold
100,000	<b>\$684,000</b>	<b>\$6.84</b>

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## GEMS Lighting RIS – International Regulations

Zumtobel Group as a global luminaire supplier, strongly recommend that Australian lighting MEPS requirements are aligned with international energy standards from Europe and North America. It should be emphasized that Australia represents only 3% of the global lighting market. Furthermore ZG estimate that approximately 85% of all luminaires sold in Australia are imported international products and only 15% of luminaires are Made in Australia.

Zumtobel Group Europe is currently actively involved with the development of European MEPS legislation for lighting:

- Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for lighting products.

The current draft of this European directive is considering minimum efficacy requirements of approximately 66lm/W with further compensating reduction factors to allow for high colour rendering LEDs and to allow for luminaires with optical beam / glare control, resulting in minimum requirements of around 50lm/W.

Meanwhile in North America the US Department of Energy (DOE) Energy Conservation Program: ISSUANCE 2016-02-12: General Service Lamps Notice Of Proposed Rulemaking (NOPR) Energy Conservation Standards for General Service Lamps is considering a minimum efficacy standard of 45lm/W, as the minimum backstop effective January 1, 2020, for all general service lamps. The US Department of Energy also state in the last paragraph on page 106 of this notice that the “**DOE recognise that ENERGY STAR requirements are meant to distinguish a certain premium among available products on the market**”, please see web link below:

- US Department of Energy General Service Lamp NOPR:  
<https://energy.gov/eere/buildings/downloads/issuance-2016-02-12-energy-conservation-program-energy-conservation>

Furthermore the latest version of Green Star USA for Residential Luminaires has minimum requirements of 50-70lm/W for the most energy efficient luminaires used in the United States of America

- Energy Star for LED Luminaires Effective June 1, 2016,  
<https://www.energystar.gov/sites/default/files/asset/document/Luminaires%20V2%200%20Final.pdf>

This therefore begs the question: Why are the proposed *Minimum* Energy requirements for luminaires to be used in Australian homes *higher than* what the US Department of Energy recognize as the most *premium* of energy efficient luminaires used in American homes?

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## GEMS Lighting RIS – Zumtobel Group MEPS Recommendations

With consideration to the above points of discussion Zumtobel Group have the following recommendations regarding Minimum Energy Performance Standards (MEPS) for ALL integrated LED luminaires and traditional lamp luminaires for use in Australia.

ZG counsel that if the Australian Government legislate minimum lm/W efficacy requirements for LED luminaires, then exactly the same lm/W limits need to also apply for traditional non-LED luminaires. The reason for this is to stop a situation where lm/W MEPS for traditional luminaires is either non-existent or less onerous than the new lm/W MEPS for LED luminaires, which could result in backsliding from LED luminaires to less efficient and lower cost traditional lamp luminaires.

The proposed lm/W MEPS therefore also need to be lower than the draft suggests to allow for luminaire optics and other luminaire electrical losses and manufacturing tolerances and measurement errors and to make a level playing field for ALL luminaires.

### Zumtobel Group propose the following MEPS for ALL Australian Luminaires

- Luminaires that consume less than 10W should be excluded from MEPS regulations, regardless of their lm/W, due to their already low power consumption.

<b>Minimum Energy Performance Standards (MEPS)</b>	
<b>ALL Integrated LED Luminaires &amp; Traditional Lamp LOR Luminaires</b>	
Small Luminaires	Large Luminaires
>100lm and <2,000lm	>2,000lm and <50,000lm
Minimum Efficacy <b>45lm/W</b> (LER)	Minimum Efficacy <b>65lm/W</b> (LER)
Minimum Colour Rendering Index (CRI): <b>70</b> (Ra)	

Reasoning for above MEPS proposal:

- To reduce confusion and to remove potential loopholes, ZG suggest the removal of the “Planar/Batten/Troffer” category.
- To compensate for minimum efficacy requirements that are lower than proposed in the RIS, and to capture LED and T16 office lighting in the 2000lm to 2500lm bracket, ZG suggest moving the delineation between small and large luminaires down from 2500lm to 2000lm.
- To allow for high efficacy 6500K LEDs used in industrial applications, ZG suggest a minimum Colour Rendering Index (CRI) of 70.
- The above requirement would result an acceptable 10% removal of in-scope inefficient luminaires and would provide a level playing field for all luminaires.

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## GEMS Lighting RIS – Product Registration Recommendations

With regard to product family registration ZG suggest the following:

- Product families should not be based on technical grouping requirements, instead luminaire families should be grouped based on the supplier's **marketing family range names**; e.g. PANOS Downlights, CREDOS Downlights, MELLOWLIGHT Troffers, etc,
- Product families should be allowed for families of 1 to 500 individual articles, and all individual product codes / article numbers / order codes are to be uploaded at the time of product family registration.
- The luminaire supplier is to provide ONE test report only per family, being the LM79 (or equal) test report, for the worst performing luminaire in each product family registration.
- The luminaire supplier shall then make a legal declaration that all of the associated up to 499 other article numbers in the same family are “equal to” or “better than” the example given by the LM79 (or equal) test report.

## GEMS Lighting RIS – Luminaire Labelling Recommendations

Zumtobel Group suggest that mandatory labelling for luminaire products and packaging should remain unchanged and stay as it currently is done according to Australian Standard AS/NZS 60598.1 Section 3. Most ZG luminaires are shipped in plain brown cardboard boxes. Any additional labelling of luminaires and packaging has zero influence over the selection of such products by lighting specifiers, who primarily select luminaires based on technical data published on ZG web sites. This applies for the vast majority of lighting projects supplied by Zumtobel Group, around the world.

## GEMS Lighting RIS – Recommended Additional Exclusions

- IP54 Outdoor luminaires.
- LED Luminaires that are supplied with separately supplied LED drivers.
- Shelf lighting systems.
- Luminaires with concave, convex, and/or fresnel lenses.
- Medical devices and laboratory equipment.
- Electronic displays and projection equipment.
- Luminaires designed for horticulture and animal farm application.
- Luminaires designed for operation in environments with ambient temperatures below -20°C or above 50°C.
- Luminaires designed to generate artificial light reproducing the natural sun light as well as natural sky.
- Luminaires designed for special colour enhancing installations in butchers and bakers.
- Luminaires with a primary function of generating coloured visual radiation; (RGB, RGBW).

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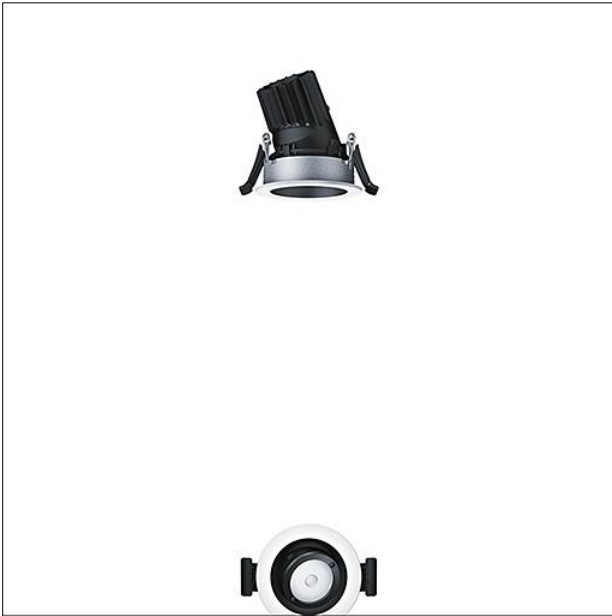
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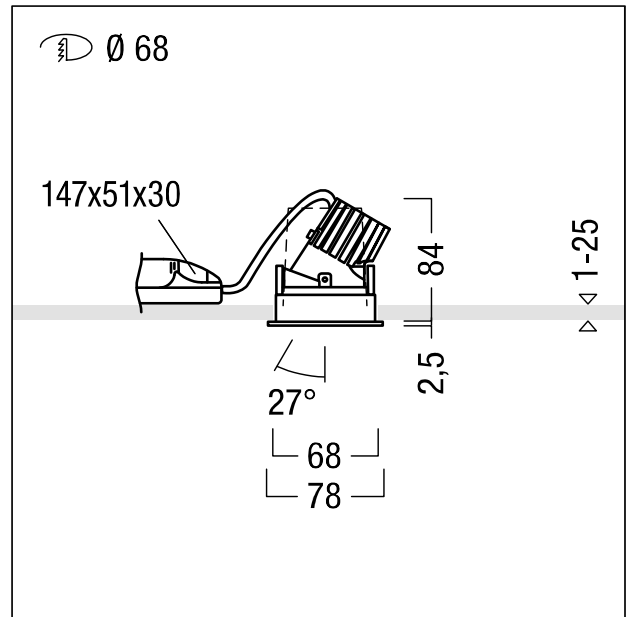
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LED ceiling-recessed luminaire

LED ceiling-recessed luminaire (complete luminaire, adjustable), with innovative lens technology; with lens system for high-quality flexible accent lighting; tool-free, intuitive setting of light cone with switched-on luminaire, light cone rotates through 355° and can be tilted up to 27°; with optimised uniform light distribution with high intensity and soft transitions, with reduced stray light from the light cone; lamp(s): 10 W LED927, FLOOD distribution characteristic; reflector: smooth, coated black (30 °); Colour rendering Ra > 90, colour temperature 2700 K (warm white); Chromaticity tolerance (initial MacAdam): 3; Luminaire luminous flux: 475 lm, Luminaire efficacy: 49 lm/W; service life: 50000h at 80% luminous flux; includes separate control unit, dimmable Dali only/switchDim; high quality optic unit of LED PCB, glass lens and film integrated in optimised thermal management of die-cast aluminium; secondary optic/trim is one unit made of high-quality, UV-resistant polycarbonate; white cover ring; mounting ring of die-cast aluminium; degree of protection IP23: (when installed in closed ceilings; luminaire unit can be fitted quickly without tools using EASY-CLICK catch; luminaire wired with halogen-free leads; power connection: 5-pole connector terminal; mains voltage: 220-240V / 0/50/60Hz; installation: tool-free quick installation using antislip spring clips in ceilings of thickness 1-25mm; ceiling cutout: 68mm, recess depth: 103mm; weight: 0.32 kg



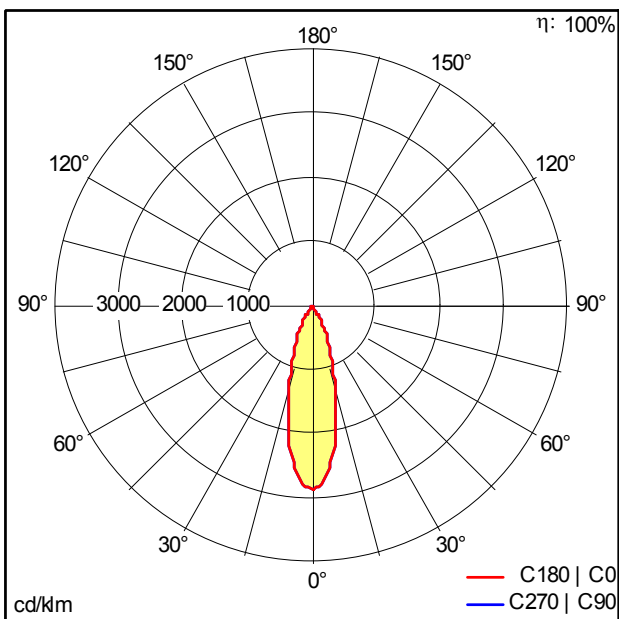
ZS\_PA1\_F\_R68\_WH\_geschwenkt.jpg



ZS\_PA1\_M\_R68\_LED\_WH.wmf

Light Distribution

STD - standard



ST8447.lct

- Light Source: LED
- Luminaire luminous flux\*: 475 lm
- Luminaire efficacy\*: 49 lm/W
- Colour Rendering Index min.: 90
- Ballast: 1 x 28000490 LCAI 15W 150mA-400mA ECO slim Z
- Correlated colour temperature\*: 2700 Kelvin
- Chromaticity tolerance (initial MacAdam)\*: 3
- Rated median useful life\*: 50000h L80 at 25°C
- Luminaire input power\*: 9.7 W Lambda = 0.84
- Standby Power\*: 0.2 W
- Dimming: LDO dimmable to 1% over DALI
- Maintenance category: C - Closed Top Reflector

All values marked with an \* are rated values. Luminous flux and connected electrical load are subject to an initial tolerance of +/- 10%. Tolerance of color temperature: +/- 150 K. Unless stated otherwise, the values apply to an ambient temperature of 25°C. Unless otherwise stated all Thorn LED products are suitable for unrestricted use (rated RG0 or RG1) with regard photobiological blue light safety (IEC/EN60598-1).

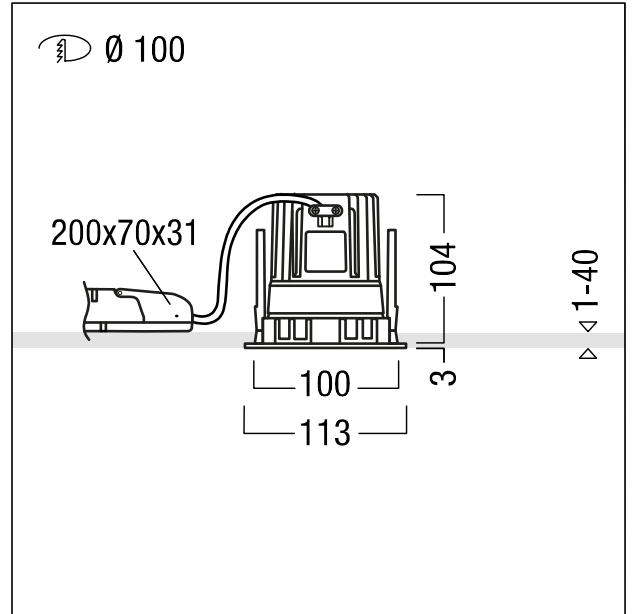


LED ceiling-recessed luminaire

LED ceiling-recessed luminaire (complete luminaire, adjustable), with innovative lens technology; tool-free, intuitive setting of light cone via two rotatable PMMA lenses, with switched-on luminaire; light cone rotates through 360° and can be tilted up to 30°; homogeneous light distribution with high luminous intensity; closed system creates calm ceiling appearance independent of the set light direction; lamp(s): 15 W LED927, SPOT distribution characteristic; reflector: smooth, aluminium-sputtered, highly reflective, iridescence-free (15 °); Colour rendering Ra > 90, colour temperature 2700 K (warm white); Chromaticity tolerance (initial MacAdam): 3; Luminaire luminous flux: 450 lm, Luminaire efficacy: 30 lm/W; service life: 50000h at 80% luminous flux; includes separate control unit Slave luminaire for DALI control (DALI only); high quality optic unit integrated in optimised thermal management of die-cast aluminium; reflector/cover ring is one unit made of high-quality, UV-resistant polycarbonate; white cover ring; mounting ring of Glass fibre-reinforced polycarbonate (PC), grey; luminaire unit can be fitted quickly without tools using twist-and-lock mechanism; luminaire wired with halogen-free leads; power connection: 5-pole connector terminal, loop-in/loop-out possible; mains voltage: 220-240V / 0/50/60Hz, installation: tool-free quick installation using antislip spring clips in ceilings of thickness 1-40mm; ceiling cutout: 100mm, recess depth: 125mm (for ceiling thicknesses 1-25mm); weight: 0.67 kg



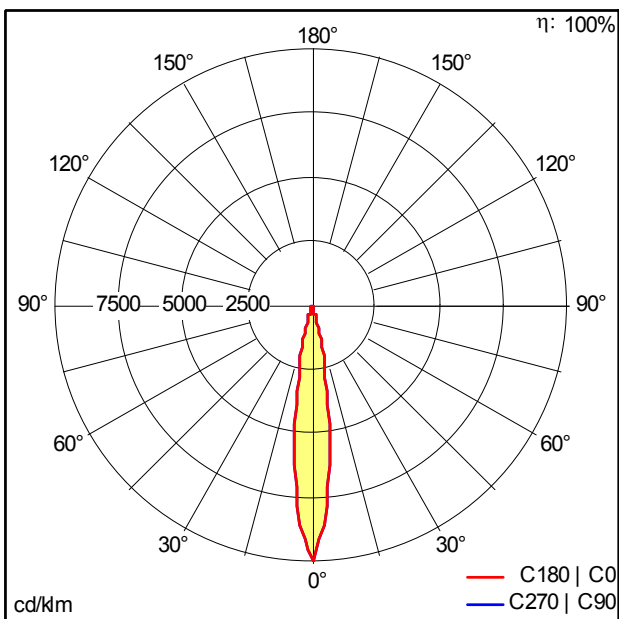
ZS\_PA1\_F\_R100\_Adjust\_HG\_Rahmen.jpg



ZS\_PAN\_M\_INF\_R100V\_LED\_WH.wmf

Light Distribution

STD - standard



ST8734.ltd

- Light Source: LED
- Luminaire luminous flux\*: 450 lm
- Luminaire efficacy\*: 30 lm/W
- Colour Rendering Index min.: 90
- Ballast: 1 x 28001246 DRV TR LCA 25W 1.05A 50V D #O4A SR PRE
- Correlated colour temperature\*: 2700 Kelvin
- Chromaticity tolerance (initial MacAdam)\*: 3
- Rated median useful life\*: 50000h L80 at 25°C
- Luminaire input power\*: 15 W Lambda = 0.96
- Standby Power\*: 0.15 W
- Dimming: LDO dimmable to 1% over DALI
- Maintenance category: C - Closed Top Reflector

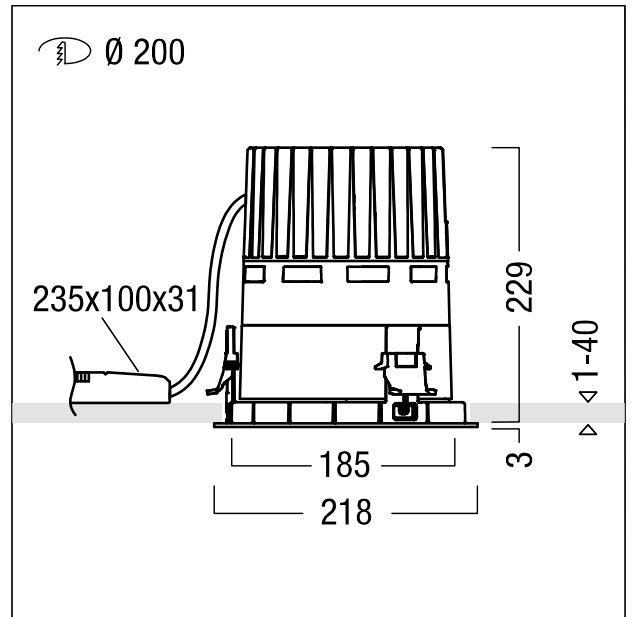
All values marked with an \* are rated values. Luminous flux and connected electrical load are subject to an initial tolerance of +/- 10%. Tolerance of color temperature: +/- 150 K. Unless stated otherwise, the values apply to an ambient temperature of 25°C. Unless otherwise stated all Thorn LED products are suitable for unrestricted use (rated RG0 or RG1) with regard photobiological blue light safety (IEC/EN60598-1).

LED ceiling-recessed luminaire

LED ceiling-recessed luminaire (Komplettleuchte); high luminaire luminous flux for applications with high ceilings; "stableWhite" LED luminaire, optimised lighting technology with symmetric light distribution; lamp(s): 85 W LED927; Colour rendering Ra > 90, colour temperature 2700 K (warm white); Chromaticity tolerance (initial MacAdam): 3; Luminaire luminous flux: 6800 lm, Luminaire efficacy: 80 lm/W; service life: 50000h for luminous flux at 80% of initial value; includes controllable ballast (dimmable Dali only/switchDim), separate unit connected to luminaire via connector system; lighting chamber and high quality reflector unit appear as one harmonised unit; optimised passive thermal management system made of die-cast aluminium, black; 2-part reflector unit made of high quality, UV-resistant polycarbonate; upper reflector part: FLOOD distribution characteristic; reflector: faceted, aluminium-sputtered, highly reflective, iridescence-free (31 °), includes structured glass panel (ESG); lower reflector part/trim: smooth, highly reflective aluminized finish, iridescence-free, white cover ring; luminaire wired with halogen-free leads; electrical connection: 5-pole connector terminal, loop-in/loop-out possible; mains voltage: 220-240V / 0/50/60Hz; for use with 220V DC central battery in compliance with EN 60598-2-22, emergency power level preset to 15% (can be factory programmed between 1% - 100%); installation: mounting ring made of Glass fibre-reinforced polycarbonate (PC), grey with anti-slip spring clips for tool-free recessed mounting in ceilings of thickness 1-40mm; ceiling cut-out: 200mm, recess depth: 250mm + ceiling thickness; luminaire unit can be fitted quickly without tools using twist-and-lock mechanism; weight: 2.98 kg



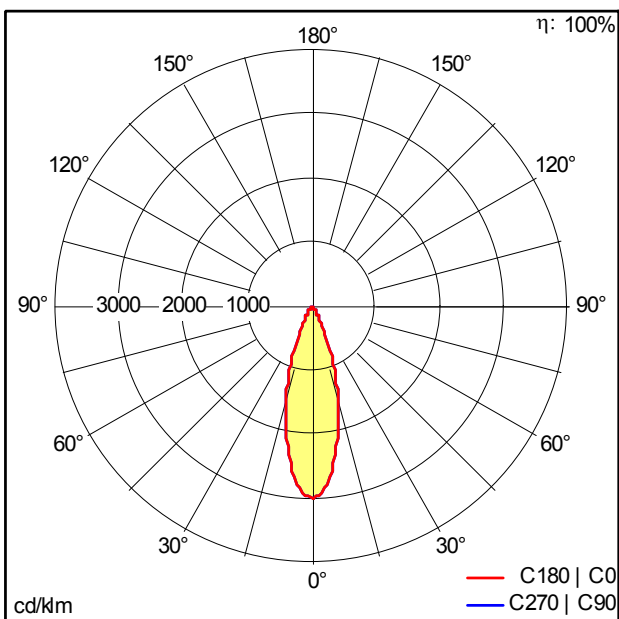
ZS\_PAI\_F\_R200\_HighLumen\_Flood\_Rahmen.jpg



ZS\_PAN\_M\_INF\_R200H\_SP\_FL.wmf

Light Distribution

STD - standard



ST8765.idt

- Light Source: LED
- Luminaire luminous flux\*: 6800 lm
- Luminaire efficacy\*: 80 lm/W
- Colour Rendering Index min.: 90
- Ballast: 1 x 28000256 DRV TR LCAI 100W 1.75A 120V D #ECO SR
- Correlated colour temperature\*: 2700 Kelvin
- Chromaticity tolerance (initial MacAdam)\*: 3
- Rated median useful life\*: 50000h L80 at 25°C
- Luminaire input power\*: 85.4 W Lambda = 0.98
- Standby Power\*: 0.11 W
- Dimming: LDO dimmable to 1% over DALI
- Maintenance category: C - Closed Top Reflector

All values marked with an \* are rated values. Luminous flux and connected electrical load are subject to an initial tolerance of +/- 10%. Tolerance of color temperature: +/- 150 K. Unless stated otherwise, the values apply to an ambient temperature of 25°C. Unless otherwise stated all Thorn LED products are suitable for unrestricted use (rated RG0 or RG1) with regard photobiological blue light safety (IEC/EN60598-1).



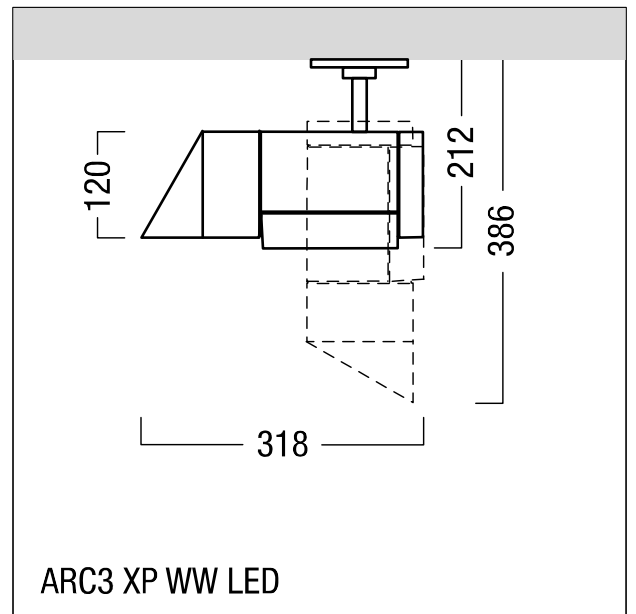


## LED spotlight

LED spotlight, anthracite; with stabilised colour temperature "xpert stableWhite"; optimised for efficient and high quality accent lighting in museums, exhibition spaces and art galleries; applications with high ceiling mounting; combination of reflector and specially designed lens enables precise, homogeneous light distribution characteristics; compact design with minimalist look; innovative thermal design achieves COOL-TOUCH function; Luminaire with L3+DALI universal adapter for DALI controller (for Zumtobel 3-phase/L3+DALI track), only connection with LDE or LDO; Slave luminaire for DALI control (DALI only); lamps: 1/35 W LED930, with wallwasher attachment; Colour rendering  $R_a > 98$ , colour temperature 3000 K; colour tolerance: SDCM  $\leq 2$ , LED PCBs premium-selected; Luminaire luminous flux: 1400 lm, Luminaire efficacy: 40 lm/W; UVA-free and IR-free light; service life: 50000 h for luminous flux at 70% of initial value; dimming of illuminance 1–100 %; mains voltage: 220-240V/ 50/60Hz; recessed pivot; spotlight can rotate through 365° and tilt through 90°; axes of movement fixed independently using Allen key; housing of die-cast aluminium; surface: anthracite microtextured paint; excellent glare reduction via front ring; front ring enables simultaneous tool-free accommodation of several accessories; specular reflector of polycarbonate aluminium-sputtered, mirrorbrite, iridescent-free; specular reflector designed to be interchangeable and retrofitted; dimensions:  $\varnothing 120 \times 386$  mm; weight: 2.4 kg; Note: wall mounting only permitted with Zumtobel 3-phase universal adapter and in conjunction with wall-mounting bracket (please order separately); must be installed in ceiling for use as point outlets.



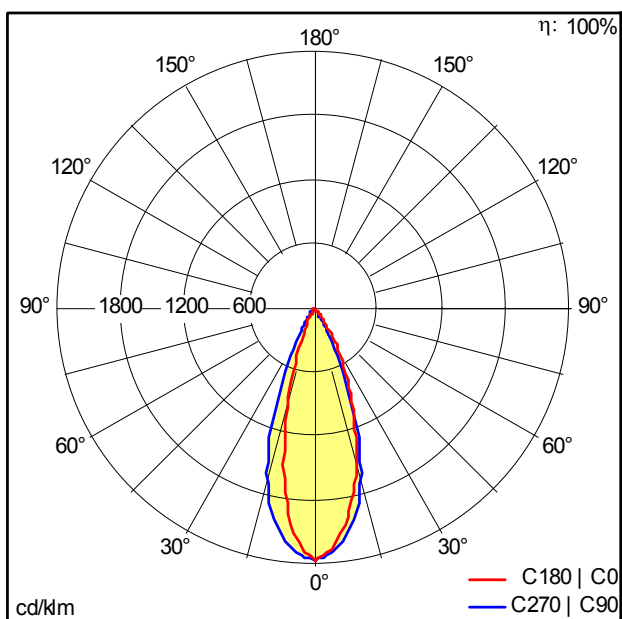
ZS\_AOS\_F\_3\_xpert\_WW\_AZM.jpg



ZS\_AOS\_M\_3\_XP\_LED\_WW.wmf

## Light Distribution

STD - standard



ST7792.Idt

- Light Source: LED
- Luminaire luminous flux\*: 1400 lm
- Luminaire efficacy\*: 40 lm/W
- Colour Rendering Index min.: 90
- Ballast: 1 x 28000126 LCAI 35W 900mA-1750mA ECO C
- Correlated colour temperature\*: 3000 Kelvin
- Chromaticity tolerance (initial MacAdam)\*: 2
- Rated median useful life\*: 50000h L70 at 25°C
- Luminaire input power\*: 35 W  $\lambda = 0.98$
- Standby Power\*: 0.1 W
- Dimming: LDO dimmable to 1% over DALI
- Maintenance category: C - Closed Top Reflector

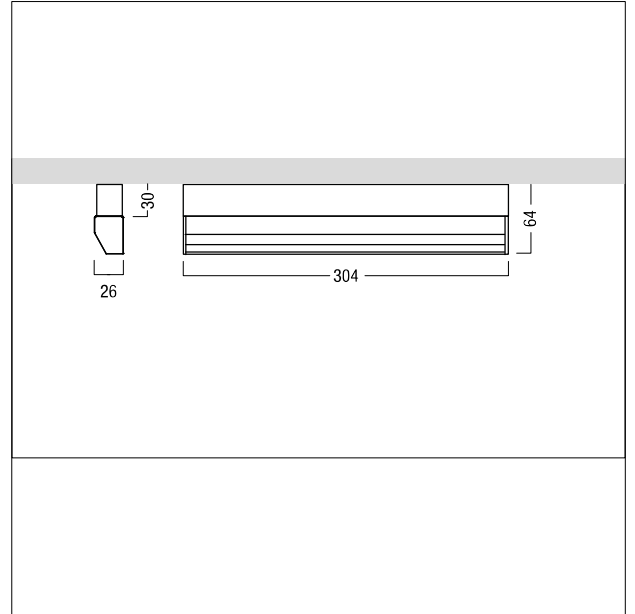
Please also consult the additional information on the next page

LED wallwasher

LED linear wallwasher spotlight, "mini" construction size; optimised for the homogeneous illumination of vertical wall surfaces to heights of 3m in exhibition spaces, reception areas, waiting zones and living rooms; asymmetric light distribution with soft transition due to special lens of acrylic glass and plastic film; excellent glare reduction; Luminaire with low voltage adapter for Zumtobel SUPERSYSTEM II (48 V) low voltage track; adapter is fixed without tools and contains electronics converting the constant voltage (48V) to constant current; lamp(s): 1/11W, Colour rendering Ra > 90, colour temperature 3000 K; Luminaire luminous flux: 599 lm, Luminaire efficacy: 54 lm/W; service life: 50000h for luminous flux at 80% of initial value; dimming of illuminance, Slave luminaire for DALI control (DALI only); luminaire housing made of extruded aluminium section, coated black; total power: 11 W; dimensions: 304x26x64 mm; weight: 0.35 kg



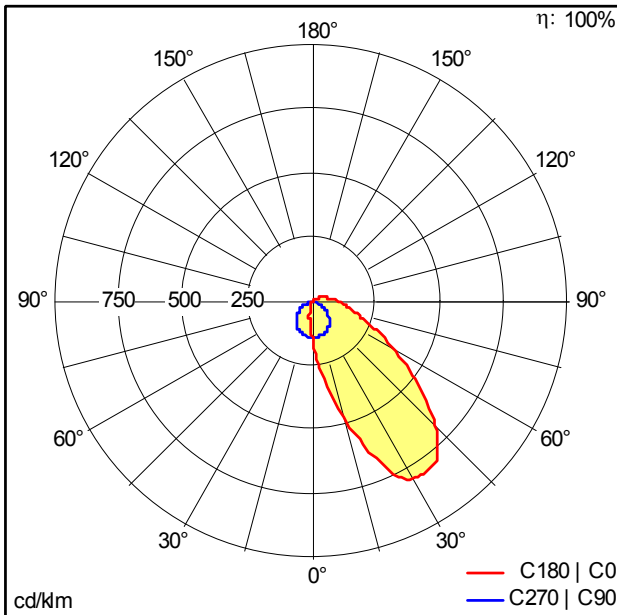
ZS\_SUP\_F\_WW\_30mm\_blm.jpg



ZS\_SU2\_M\_S\_WW\_LED\_TLV.wmf

Light Distribution

STD - standard



ST8271.ltd

- Light Source: LED
- Luminaire luminous flux\*: 599 lm
- Luminaire efficacy\*: 54 lm/W
- Colour Rendering Index min.: 90
- Correlated colour temperature\*: 3000 Kelvin
- Chromaticity tolerance (initial MacAdam)\*: 3
- Rated median useful life\*: 50000h L80 at 25°C
- Luminaire input power\*: 11 W
- Dimming: LDO dimmable to 5% over DALI
- Maintenance category: C - Closed Top Reflector

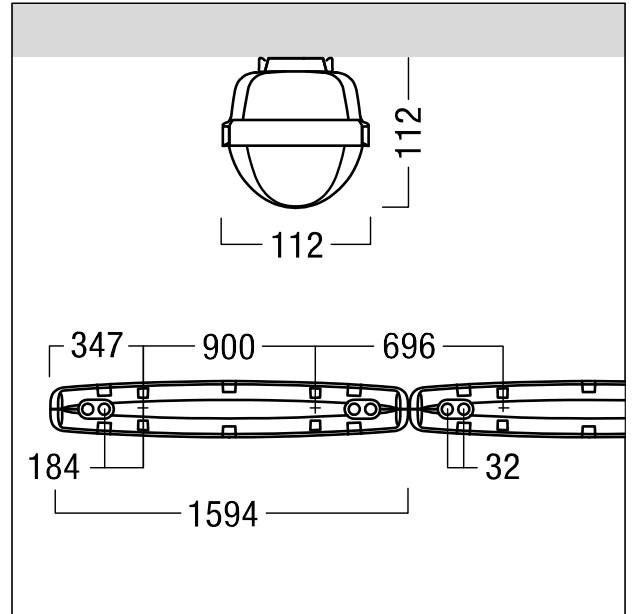
All values marked with an \* are rated values. Luminous flux and connected electrical load are subject to an initial tolerance of +/- 10%. Tolerance of color temperature: +/- 150 K. Unless stated otherwise, the values apply to an ambient temperature of 25°C. Unless otherwise stated all Thorn LED products are suitable for unrestricted use (rated RG0 or RG1) with regard photobiological blue light safety (IEC/EN60598-1).

moisture-proof diffuser luminaire

LED-moisture-proof diffuser luminaire total power: 34 W, DALI controllable luminaire with LED converter; light grey GRP (Glasfibre Reinforced Polyester) housing, halogen-free; polymethylmethacrylate diffuser, made as a single injection-moulded piece patterned internally with prisms, resistant to chemical attack, with high impact strength, UV-resistant; not suitable for through-wiring with H05VV or NYM cable. Please use Zumtobel through-wiring set (order separately). Sealed optical system fitted to luminaire housing without tools. LED service life lasts 50000 h before luminous flux is reduced to 90% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 4800 lm, Luminaire efficacy: 141 lm/W. Colour rendering Ra > 70, colour temperature 6500 K. Fitted to ceiling, wall or trunking using V2A standard spring clips; galvanized sheet steel reflector painted white; 5-pole connector terminal. stainless steel fasteners. ambient temperature: -35°C to +50°C. Approved for indoor use or use in outdoor areas protected by a roof (see installation instructions). Luminaire wired with halogen-free leads. Complies with International Food Standard specifications. Degree of protection: IP65, class of protection: SC1, 650°C glow-wire tested, dimensions: 1594 x 112 x 112 mm; weight: 3.5 kg.



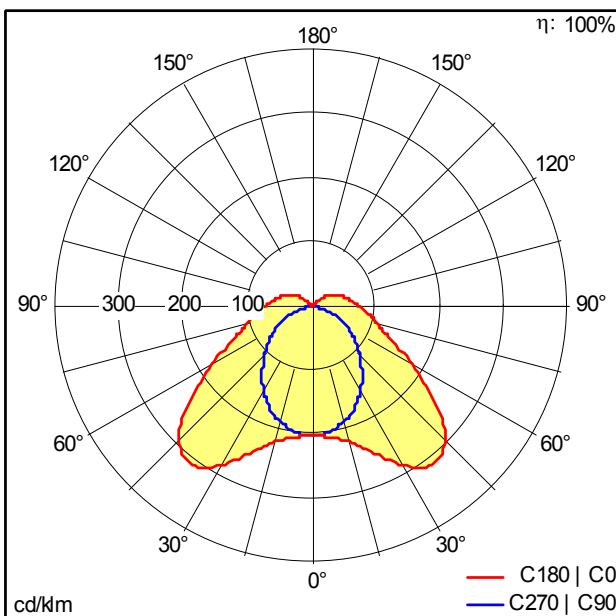
ZS\_SCU\_F\_1fl\_V2A.jpg



ZS\_SCU\_M\_LED.wmf

Light Distribution

STD - standard



D32717AA\_SCUBA\_XT\_PM\_LED4600-765.idt

- Light Source: LED
- Luminaire luminous flux\*: 4800 lm
- Luminaire efficacy\*: 141 lm/W
- Colour Rendering Index min.: 70
- Ballast: 1 x 28000348 LCAI 65W 150mA-400mA ECO INDUSTRY sl
- Correlated colour temperature\*: 6500 Kelvin
- Chromaticity tolerance (initial MacAdam)\*: 3
- Rated median useful life\*: 50000h L90 at 25°C
- Luminaire input power\*: 34 W Lambda = 0.98
- Standby Power\*: 0.123 W
- Dimming: LDE dimmable to 1% over DALI, DSI and switchDIM  
DC level (emergency lighting) is adjustable
- Maintenance category: E - Dust-proof IP5X

All values marked with an \* are rated values. Luminous flux and connected electrical load are subject to an initial tolerance of +/- 10%. Tolerance of color temperature: +/- 150 K. Unless stated otherwise, the values apply to an ambient temperature of 25°C. Unless otherwise stated all Thorn LED products are suitable for unrestricted use (rated RG0 or RG1) with regard photobiological blue light safety (IEC/EN60598-1).

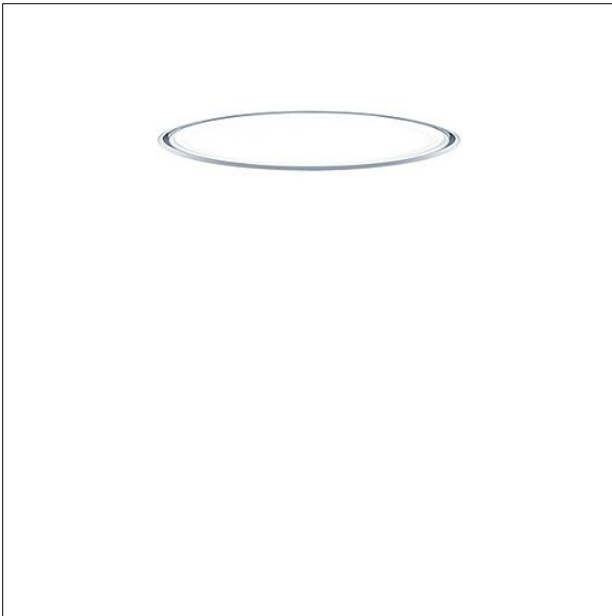
The level of luminous flux reduces over the life cycle due to technological reasons. The failure of up to 4 LED points causes no functional impairment and is therefore no reason for complaint.

The chemical resistance of SCUBA materials to external factors is detailed in the SCUBA brochure and in the download area of the electronic product catalogue. Zumtobel can supply written confirmation on request.

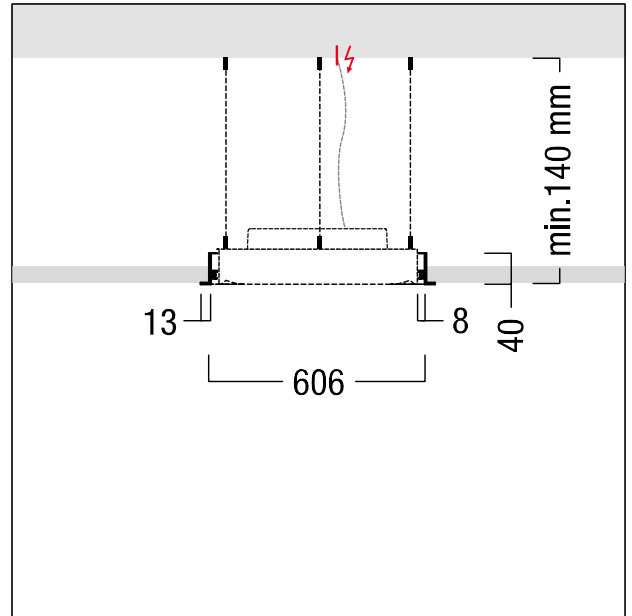


Circular luminaire

Decorative diffuse LED Circular luminaire with LRO cover for recessed installation. Total power: 36.8 W, DALI controllable luminaire with LED converter; LED service life lasts 50000 h before luminous flux is reduced to 90% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 3830 lm, Luminaire efficacy: 104 lm/W. Colour rendering Ra > 80, colour temperature 3000 K. Aluminium housing in white enamelled finish. Plastic cover, LRO light reducing optic in polymethylmethacrylate with frosted surface, fixed to frame. Includes electronic LED converter for DALI control. Luminaire wired with halogen-free leads Dimensions: Ø590 x 85 mm, ceiling cut-out: Ø619 mm; weight: 5.8 kg; Please order recessed-mounting kit for concealing and fixing material separately.



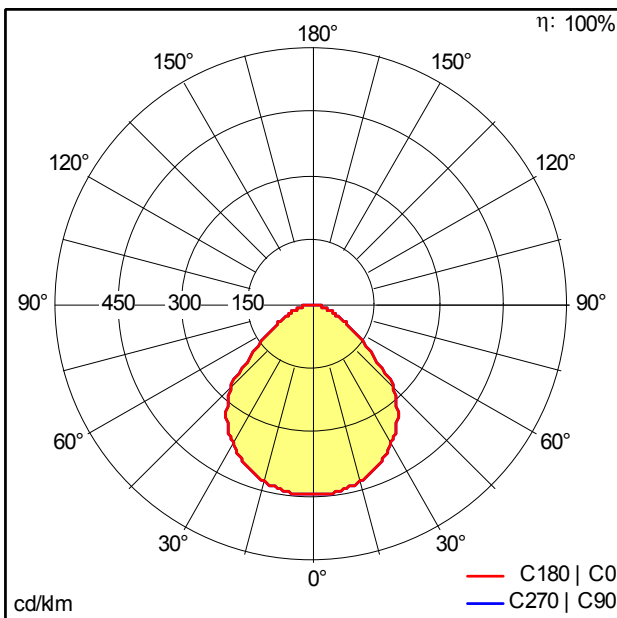
ZS\_OND\_F\_ONDARIA\_590\_Einbau.jpg



ZS\_OND\_M\_590LED\_Einbau.wmf

Light Distribution

STD - standard



D37139AA\_u\_ONDA2\_E\_LRO\_D590\_LED4000-830.idt

- Light Source: LED
- Luminaire luminous flux\*: 3830 lm
- Luminaire efficacy\*: 104 lm/W
- Colour Rendering Index min.: 80
- Ballast: 1 x 28000655 LCA 50W 100mA-400mA one4all Ip PRE
- Correlated colour temperature\*: 3000 Kelvin
- Chromaticity tolerance (initial MacAdam)\*: 3
- Rated median useful life\*: 50000h L90 at 25°C
- Luminaire input power\*: 36.8 W Lambda = 0.98
- Standby Power\*: 0.15 W
- Dimming: LDE dimmable to 1% over DALI, DSI and switchDIM DC level (emergency lighting) is adjustable
- Maintenance category: D - Enclosed IP2X

All values marked with an \* are rated values. Luminous flux and connected electrical load are subject to an initial tolerance of +/- 10%. Tolerance of color temperature: +/- 150 K. Unless stated otherwise, the values apply to an ambient temperature of 25°C. Unless otherwise stated all Thorn LED products are suitable for unrestricted use (rated RG0 or RG1) with regard photobiological blue light safety (IEC/EN60598-1).

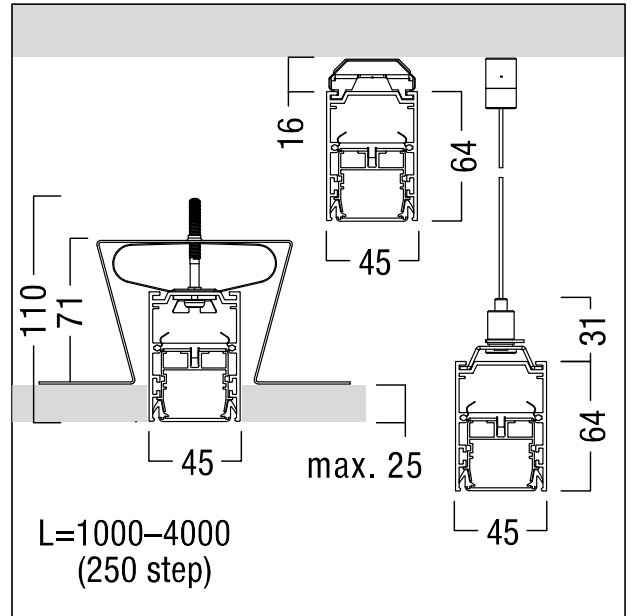


LED light line

DALI-dimmable LED light line with LED converter; LED service life lasts 50000 h before luminous flux is reduced to 85% of the initial value. Chromaticity tolerance (initial MacAdam): 3. Luminaire luminous flux: 1458 lm, Luminaire efficacy: 54 lm/W. Colour rendering Ra > 80, colour temperature 2700 K. Luminaire made of Aluminium. Luminaire with completely uniform appearance due to polycarbonate cover. Light distribution with UGR < 22 in accordance with EN 12464-2011. Luminaire consists of housing and continuous optic of polycarbonate. Includes gear tray, wiring, and end-cap set. Luminaire wired with halogen-free leads. Degree of protection: IP20 below (IP40 above) when recessed / IP20 with surface-mount/pendant. Dimensions: 1004 x 45 x 64 mm weight: 2 kg



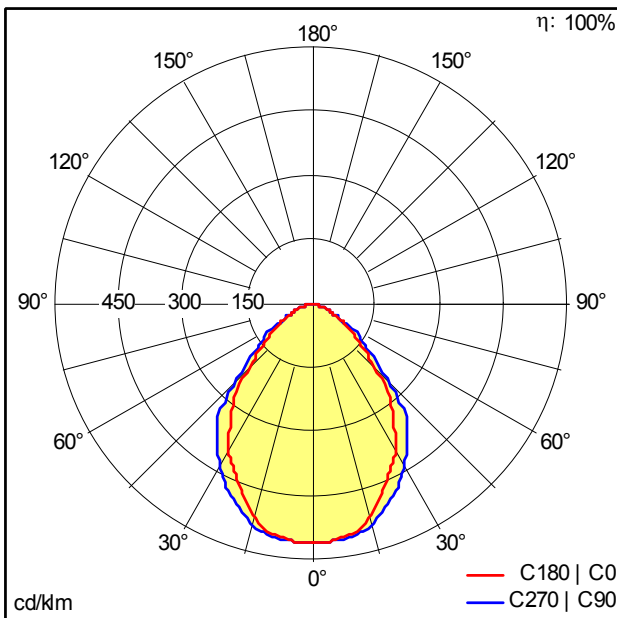
ZS\_SLI\_F\_slim\_Einzelleuchte.jpg



ZS\_SLI\_M\_slim\_Gerade\_alle.wmf

Light Distribution

STD - standard



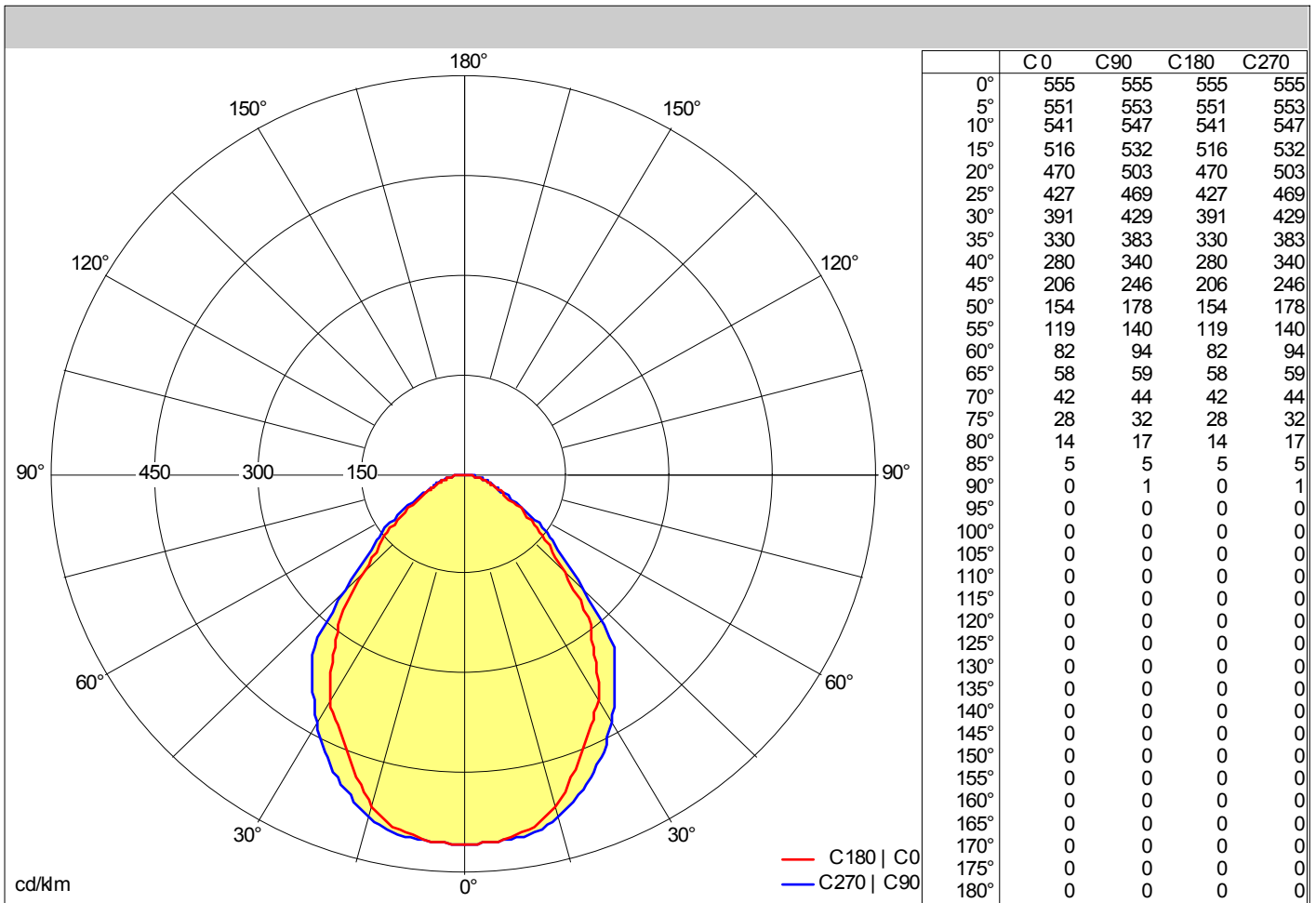
D36768AA\_SLOIN\_slim\_SL\_LED1400-827\_L1004\_PCO.Idt

- Light Source: LED
- Luminaire luminous flux\*: 1458 lm
- Luminaire efficacy\*: 54 lm/W
- Colour Rendering Index min.: 80
- Ballast: 1 x 28000656 DRV TR LCA 50W 1.05A 50V D #O4A Ip PRE
- Correlated colour temperature\*: 2700 Kelvin
- Chromaticity tolerance (initial MacAdam)\*: 3
- Rated median useful life\*: 50000h L85 at 25°C
- Luminaire input power\*: 26.9 W Lambda = 0.98
- Standby Power\*: 0.15 W
- Dimming: LDE dimmable to 1% over DALI, DSI and switchDIM DC level (emergency lighting) is adjustable
- Maintenance category: D - Enclosed IP2X

All values marked with an \* are rated values. Luminous flux and connected electrical load are subject to an initial tolerance of +/- 10%. Tolerance of color temperature: +/- 150 K. Unless stated otherwise, the values apply to an ambient temperature of 25°C. Unless otherwise stated all Thorn LED products are suitable for unrestricted use (rated RG0 or RG1) with regard photobiological blue light safety (IEC/EN60598-1). The level of luminous flux reduces over the life cycle due to technological reasons. The failure of up to 1 LED points causes no functional impairment and is therefore no reason for complaint.



# 42183946 SLOIN slim SL LED1400-827 LDE L1004 PCO



Light output ratio	
LOR	100 %
ULOR	0 %
DLOR	100 %
FFR	0.00 (0:100)
BLF	1.00

Glare Evaluation	
X = 4 H, Y = 8 H	S = 1.00 H
Reflection factors	70/50/20
UGR transversal	19
UGR axial	19
according to AS1680.1	

Classification	
LiTG	A50
EN	
BZ	BZ1/2.5/BZ2
UTE	1.00 C
CIE Flux Codes	66 91 99 100 100

Utilization Factors									
Room Reflectance Ceiling/Walls/Floor	Room Index								
	0.75	1.00	1.25	1.50	2.00	2.50	3.00	4.00	5.00
70 / 50 / 20	70	79	85	89	95	99	101	105	107
70 / 30 / 20	63	73	79	84	90	95	98	102	104
70 / 10 / 20	59	68	75	80	86	91	94	99	102
50 / 50 / 20	68	77	83	87	92	96	98	101	103
50 / 30 / 20	63	72	78	82	88	92	95	98	101
50 / 10 / 20	59	68	74	78	85	89	92	96	99
30 / 50 / 20	67	75	81	84	89	92	95	97	99
30 / 30 / 20	62	71	76	81	86	90	92	95	97
30 / 10 / 20	58	67	73	77	83	87	90	94	96
0 / 0 / 0	56	65	71	75	80	84	86	89	91

According to CIBSE Technical Memorandum No. 5 1980

SHR Nom =	1.25
SHR Max =	1.36
SHR Max TR =	1.45

Photometric data file: D36768AA\_SLOIN\_slm\_SL\_LED1400-827\_L1004\_PCO.ltd  
 The luminous flux, the luminous intensity distribution and the efficacy are determined in accordance to EN ISO 17025:2005 accredited photometric lab for the EN13032 Series and the Standard LM-79: [Certificate](#)