

# *CertaFlux PLM II 4500lm G1 module Application Suggestion Guide*

*Rules of thumb for road lighting*

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# Introduction to this guide

*Thank you for your interest in the Philips CertaFlux PLM II 4500lm G1 module.*

*We have created this Application Suggestions booklet to help facilitate the design-in process. Given the number of changeable factors, all results are only an indication and cannot replace an optimized lighting advice.*

*The tables in this guide cannot replace actual testing for a specific installation. A number of factors can impact optical performance of a luminaire in a given application. Some assumptions were made in order to make the calculations (see next page).*

*Your measurement results (e.g. uniformity, flux, ...) may be different for many reasons, some of which are listed below.*

- Road surface cover type and reflectivity index*
- Road width*
- Pole height*
- Pole spacing to pole height ratio*
- Overhang distance and tilt angle of luminaire*

## **Note:**

***Philips makes no guarantees regarding compliance to regulatory norms and assumes no legal liability or responsibility for loss or damage resulting from the use of these guidelines.***

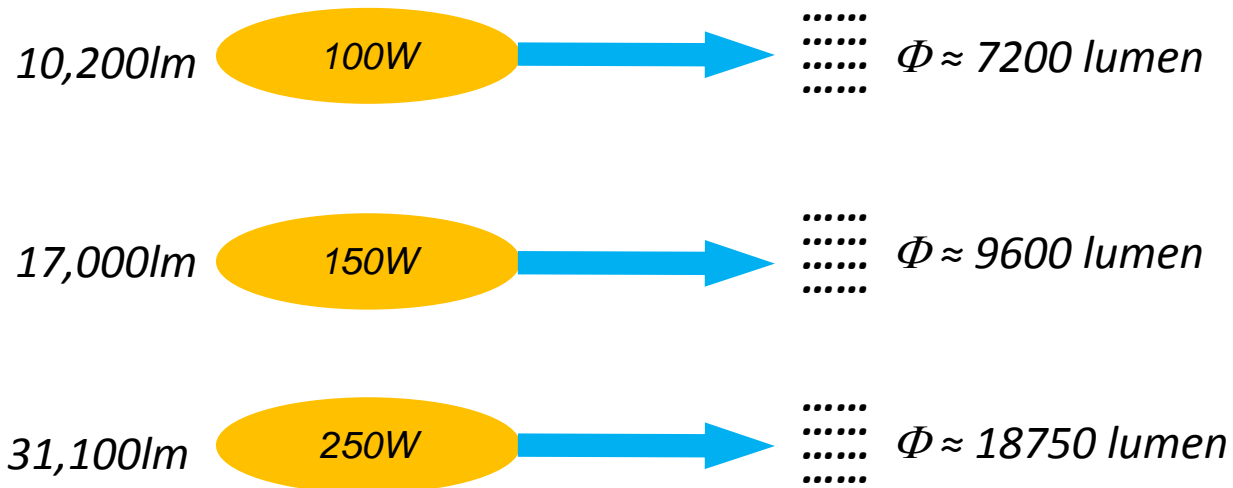
# Key assumptions

- *Compliance calculations are based on CIE 115/CIE 140 2010 /CEN 13201/CJJ 45-2006*
- *Focus on motorized traffic lighting class including application cover Express way and major road, collector road and local road.*
- *With Default Road surface reflection table R3 with  $Q_0 = 0.07$*
- *Assume HPS luminaire LOR is around 70%*
- *With default lane width is 3.75m*

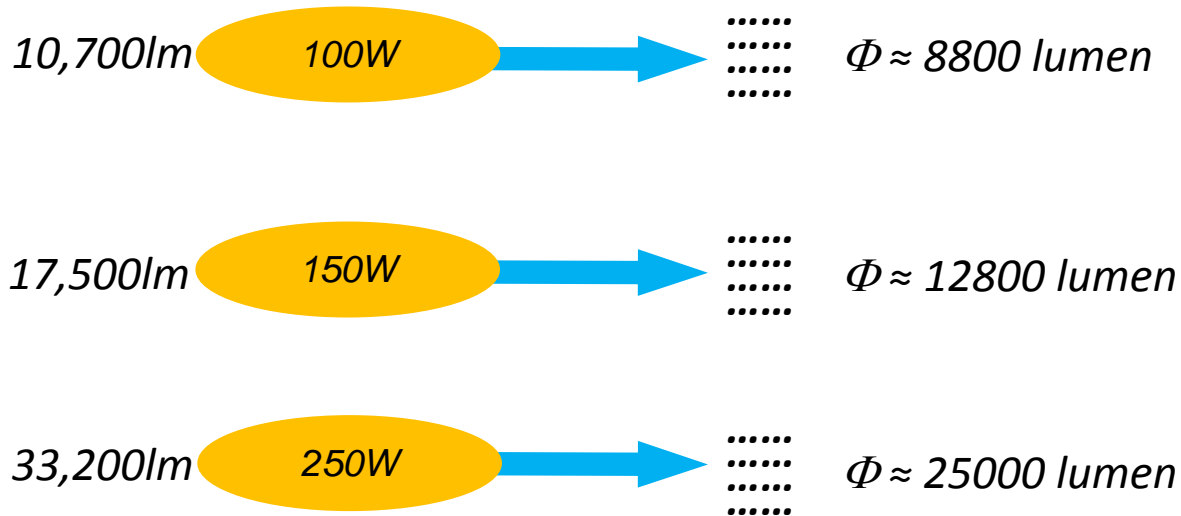
## Note:

- *These are the assumptions Philips used to calculate the table values.*
- *As each project is unique, not all situations will be covered by this booklet.*

# CertaFlux PLM II 4500lm G1 module to replace SON Ovoid lamps

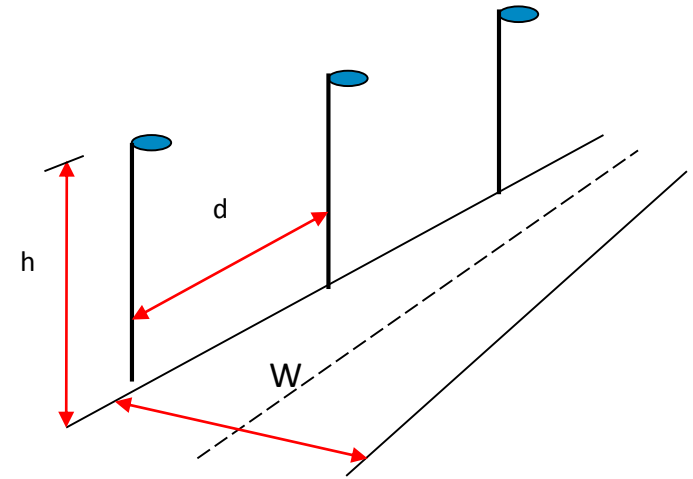


# CertaFlux PLM II 4500lm G1 module to replace SON Tubular lamps



# 2 lanes simulation result

- Road type *Single carriageway with 2 lanes*
- Road width(W) *7.5m*
- Pole arrangement *Single-sided*
- Pole height(h) *8m*
- Overhang *Based on simulation setup*
- Tilt angle *0-15°*

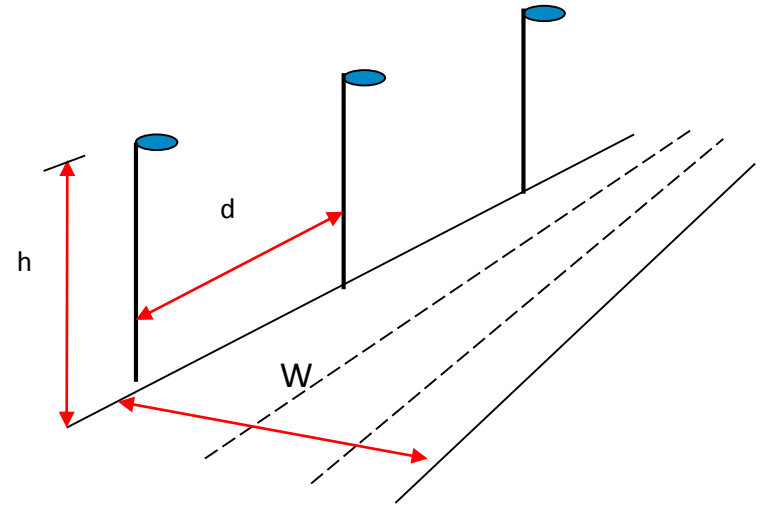


Road class	M1	M2	M3	M4	M5
Pole distance(d)	25m	25m	25m	25m	25m
Light output	13500lm	13500lm	9000lm	9000lm	4500lm
Pole distance(d)	30m	30m	30m	30m	30m
Light output	18000lm	13500lm	9000lm	9000lm	4500lm
Pole distance(d)	35m	35m	35m	35m	35m
Light output	UI*	UI*	UI*	UI*	4500lm

\* UI: longitudinal uniformity not meet target

# 3 lanes simulation result

- Road type *Single carriageway with 3 lanes*
- Road width(W) *11.25 meters*
- Pole arrangement *Single-sided*
- Pole height(h) *9m*
- Overhang *Based on simulation setup*
- Tilt angle *0-15°*



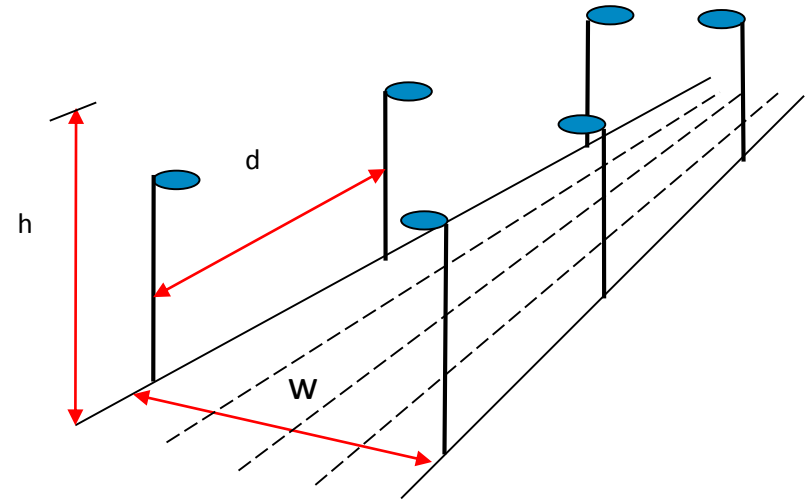
Road class	M1	M2	M3	M4	M5
Pole distance(d)	30m	30m	30m	30m	30m
Light output	22500lm	18000lm	13500lm	9000lm	4500lm
Pole distance(d)	35m	35m	35m	35m	35m
Light output	27000lm	18000lm	13500lm	9000lm	9000lm
Pole distance(d)	40m	40m	40m	40m	40m
Light output	UI*	UI*	UI*	UI*	9000lm

\* UI: longitudinal uniformity not meet target



# 4 lanes simulation result

- Road type *Dual carriageway with 4 lanes*
- Road width(W) *15 meters*
- Pole arrangement *Double-sided*
- Pole height(h) *9m*
- Overhang *Based on simulation setup*
- Tilt angle *0-15°*

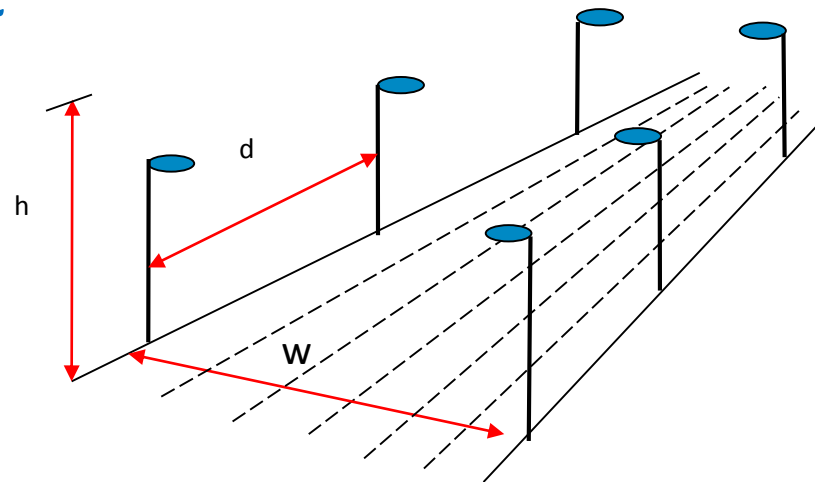


Road class	M1	M2	M3	M4	M5
Pole distance(d)	30m	30m	30m	30m	30m
Light output	13500lm	9000lm	9000lm	4500lm	4500lm
Pole distance(d)	35m	35m	35m	35m	35m
Light output	13500lm	13500lm	9000lm	9000lm	4500lm
Pole distance(d)	40m	40m	40m	40m	40m
Light output	UI*	UI*	UI*	UI*	4500lm

\* UI: longitudinal uniformity not meet target

# 6 lanes simulation result

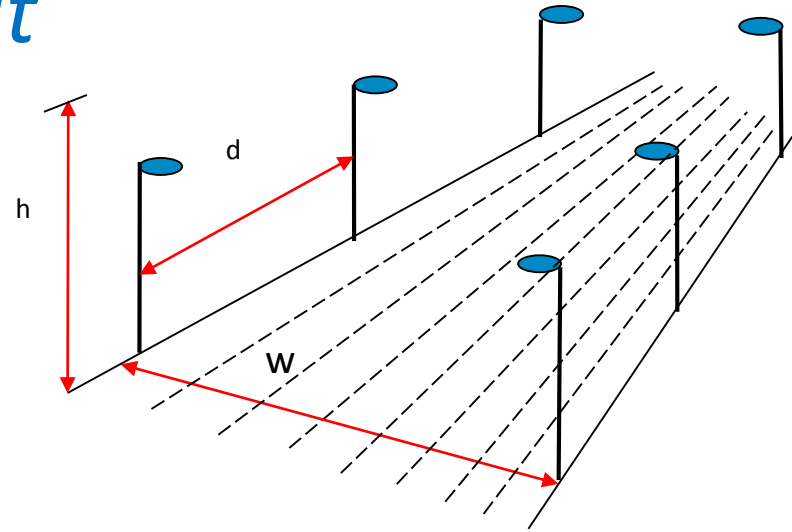
- Road type *Dual carriageway 6 lanes*
- Road width(W) *22.5 meters*
- Pole arrangement *Double-sided*
- Pole height(h) *12m*
- Overhang *Based on simulation setup*
- Tilt angle *0-15°*



Road class	M1	M2	M3	M4	M5
Pole distance(d)	25m	25m	25m	25m	25m
Light output	13500lm	13500lm	9000lm	9000lm	4500lm
Pole distance(d)	35m	35m	35m	35m	35m
Light output	22500lm	18000lm	9000lm	9000lm	4500lm
Pole distance(d)	45m	45m	45m	45m	45m
Light output	27000lm	18000lm	13500lm	9000lm	9000lm

# 8 lanes simulation result

- Road type *Dual carriageway 8 lanes*
- Road width(W) *30 meters*
- Pole arrangement *Double-sided*
- Pole height(h) *12m*
- Overhang *Based on simulation setup*
- Tilt angle *0-15°*



Road class	M1	M2	M3	M4	M5
Pole distance(d)	25m	25m	25m	25m	25m
Light output	18000lm	13500lm	9000lm	9000lm	4500lm
Pole distance(d)	35m	35m	35m	35m	35m
Light output	27000lm	18000lm	13500lm	9000lm	9000lm
Pole distance(d)	45m	45m	45m	45m	45m
Light output	31500lm	22500lm	18000lm	13500lm	9000lm



## ME Lighting classes EN13201

Lighting class	Road surface				Threshold increment	Surround ratio
	Dry		Wet *			
	$L_{av}$ in $cd \cdot m^{-2}$	$U_0$	$U_1$	$U_0$	$TI$ in %	$R_s$
M1	2,0	0,40	0,70	0,15	10	0,5
M2	1,5	0,40	0,70	0,15	10	0,5
M3	1,0	0,40	0,60	0,15	15	0,5
M4	0,75	0,40	0,60	0,15	15	0,5
M5	0,50	0,35	0,40	0,15	15	0,5
M6	0,30	0,35	0,40	0,15	20	0,5

\*Applicable in addition to dry condition, where road surfaces are wet for a substantial part of the hours of darkness and appropriate road surface reflectance data are available.

*Cited from EN 13201*

# CJJ 45-2006 Standard for lighting design of urban road

**Table 3.3.1 Standard Value of Motor Road Lighting**

Grade	Road type	Road luminaire			Road surface illuminance		Maximum initial value (T1(%)) of glare restriction threshold increment	Minimum value of surround ratio (SR)
		Average luminance $L_{av}$ (cd/m <sup>2</sup> )	Minimum value of overall uniformity ( $U_o$ )	Minimum value of longitudinal uniformity ( $U_L$ )	Maintenance value of average illumination ( $E_{av}(lx)$ )	Uniformity ( $U_E$ ) minimum value		
I	Express way and major road (contain Yingbin Road, main roads leading to government agency and large-scale public buildings and the roads located in city center or business center)	1.5/2.0	0.4	0.7	20/30	0.4	10	0.5
II	Collector road	0.75/1.0	0.4	0.5	10/15	0.35	10	0.5
III	Local road	0.5/0.75	0.4	—	8/10	0.3	15	—

*Cited from CJJ 45-2006 Standard for lighting design of urban road*