CAW KEJURUTERAAN ELEKTRIK



REKABENTUK PEMASANGAN ELEKTRIK VOLTAN RENDAH (LANJUTAN)

- *LIGHTING SIMULATION USING DIALUX EVO*

Penceramah
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Jadual

Masa	Tempoh (minit)	Aktiviti
11.00 am	15	Ceramah Pengenalan
11.15 am	15	Pengenalan Dialux *(Features in Dialux)* 1) Demo 1 : Pejabat
11.30 am	10	Analisa Keputusan Simulasi
11.40 am	10	Hands-on oleh peserta
11.50 am	15	2) Demo 2 : Dewan
		Analisa Keputusan Simulasi
12.05 pm	15	3) Demo 3 : Lobi
		Analisa Keputusan Simulasi
12.20 pm	15	4) Demo 4 : Kawasan Letak Kereta
		Analisa Keputusan Simulasi
12.35 pm	15	5) Demo 5 : Gelanggang Sukan
		Analisa Keputusan Simulasi
12.50 pm	10	Penutup

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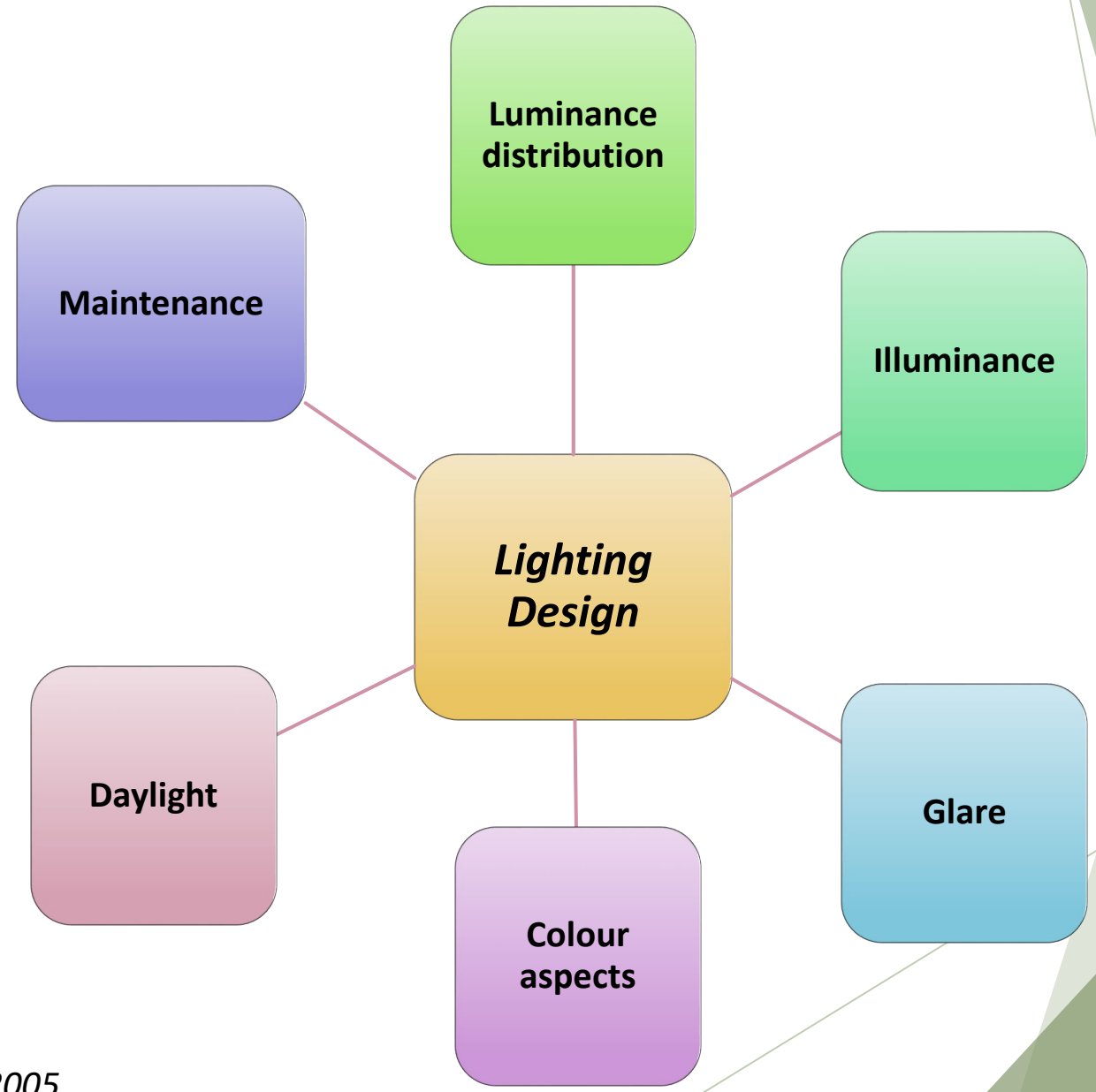
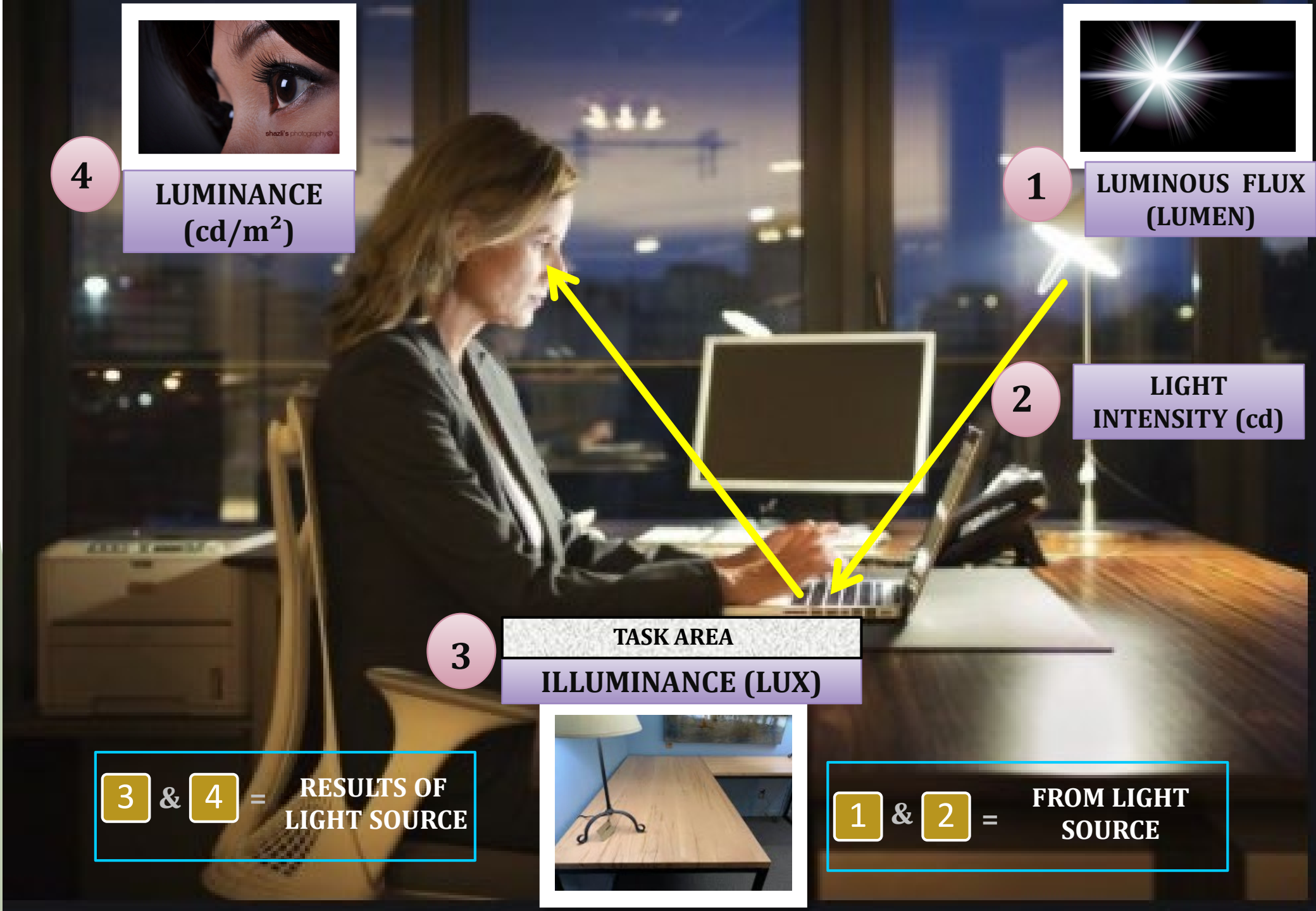
Introduction



Source : MS ISO 8995: 2005


4
LUMINANCE (cd/m²)
1
LUMINOUS FLUX (LUMEN)
2
LIGHT INTENSITY (cd)
3
TASK AREA
ILLUMINANCE (LUX)
3 & 4 = RESULTS OF LIGHT SOURCE
1 & 2 = FROM LIGHT SOURCE

The photometric quantities

Measure	Definition	Units
Luminous flux	That quantity of radiant flux which expresses its capacity to produce visual sensation	lumens (lm)
Luminous intensity	The luminous flux emitted in a very narrow cone containing the given direction divided by the solid angle of the cone, i.e. luminous flux/unit solid angle	candela (cd)
Illuminance	The luminous flux/unit area at a point on a surface	lumen/m^2
Luminance	The luminous flux emitted in a given direction divided by the product of the projected area of the source element perpendicular to the direction and the solid angle containing that direction, i.e. luminous intensity/unit area	candela/m^2
Luminance coefficient	The ratio of the luminance of a surface to the illuminance incident on it	candela/lumen
Reflectance	The ratio of the luminous flux reflected from a surface to the luminous flux incident on it	

For a diffuse surface: luminance = (illuminance × reflectance) / π

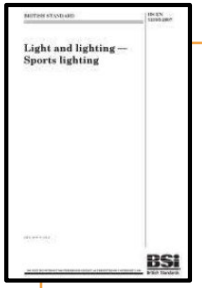
Source : SLL Code for Lighting

Standards

MS 1525: 2019 Energy Efficiency and Use of Renewable Energy for Non-Residential Buildings

CIE 115 : 2010 Lighting of Roads for Motor and Pedestrian Traffic

MS ISO 8995 : 2005 Lighting of Indoor Work Places



BS EN 12193 : 2007 Light and Lighting – Sports Lighting

MS ISO 8995 : 2005 Lighting of Indoor Work Places

- Visual task – the visual elements of the task to be carried out
- Task area – the partial area in the work place in which the visual task is located and carried out
- Maintained illuminance – value below which the average illuminance on the specified surface should not fall
- Unified glare rating (UGR) – the CIE discomfort glare measure
- Limiting unified glare rating (UGR_L) – the maximum allowable design UGR value for the lighting installation
- Working plane – the reference surface defined as the plane at which work is usually done

Figure 17.2 A hospital reception area (courtesy of Nicholas Bukorović)

THE SCHEDULE OF INTERIORS (AREAS) TASKS AND ACTIVITIES WITH SPECIFICATION OF ILLUMINANCE, GLARE LIMITATION AND COLOUR QUALITY

Type of interior, task or activity	$\overline{E}_m$ lux	UGR_L	R_a	Remarks
1. General building areas				
Entrance halls	100	22	60	
Lounges	200	22	80	
Circulation areas and corridors	100	28	40	At exits and entrances provide a transition zone and avoid sudden changes.
Stairs, escalators, travelators	150	25	40	
Loading ramps/bays	150	25	40	
Canteens	200	22	80	
Rest rooms	100	22	80	
Rooms for physical exercise	300	22	80	
Cloakrooms, washrooms, bathrooms, toilets	200	25	80	
Sick bay	500	19	80	
Rooms for medical attention	500	16	90	T_{cp} at least 4000 K
Plant rooms, switch gear rooms	200	25	60	

MS ISO 8995 : 2005 Lighting of Indoor Work Places

THE SCHEDULE OF INTERIORS (AREAS) TASKS AND ACTIVITIES WITH SPECIFICATION OF ILLUMINANCE, GLARE LIMITATION AND COLOUR QUALITY

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Plant rooms, switch gear rooms	200	25	60	
22. Offices				
Filing, copying, circulation, etc.	300	19	80	
Writing, typing, reading, data processing	500	19	80	For VDT-work see clause 4.10.
Technical drawing	750	16	80	
CAD workstation	500	19	80	For VDT-work see clause 4.10.
Conference and meeting rooms	500	19	80	Lighting should be controllable.
Reception desk	300	22	80	
Archives	200	25	80	

Coefficient of Utilization (CoU) / Utilization Factor (UF)

- The utilisation factor (UF) of a luminaire in an installation is the ratio of the luminous flux received by the reference surface to the sum of the rated lamp luminous fluxes of the lamps of the installation. The ratio depends on the proportions of the room, the design of the fitting, and the reflection factors of the rooms' surfaces.

Reflectance of surfaces

- *Range of useful reflectance for the major interior surfaces are :*

ceiling	*0.6 to 0.9*
walls	*0.3 to 0.8*
working planes	*0.2 to 0.6*
floor	*0.1 to 0.5*

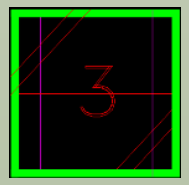
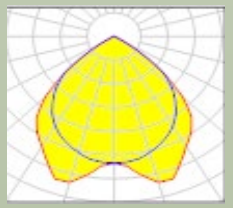
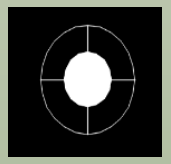
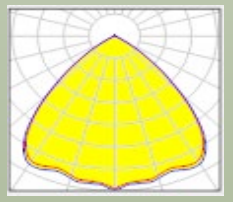
Source : MS ISO 8995: 2005

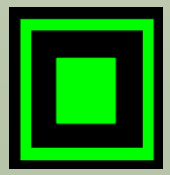
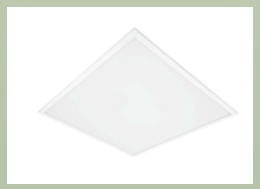
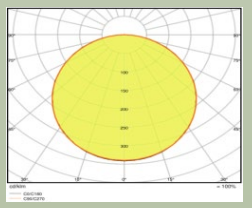
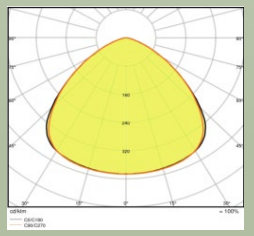
Utilisation Factor										
Reflectance values										
Ceiling		0.8	0.8	0.8	0.7	0.7	0.7	0.5	0.5	0.5
Walls		0.7	0.5	0.3	0.7	0.5	0.3	0.7	0.5	0.3
Floor		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Room Index (k)	0.60	0.40	0.24	0.13	0.38	0.22	0.12	0.33	0.19	0.11
	0.80	0.46	0.28	0.17	0.43	0.27	0.15	0.37	0.23	0.13
	1.00	0.74	0.62	0.54	0.71	0.60	0.52	0.65	0.56	0.50
	1.25	0.81	0.69	0.61	0.77	0.67	0.59	0.71	0.62	0.56
	1.50	0.85	0.75	0.67	0.81	0.72	0.65	0.75	0.67	0.61
	2.00	0.91	0.82	0.74	0.87	0.79	0.72	0.80	0.73	0.67
	2.50	0.95	0.86	0.79	0.90	0.83	0.77	0.83	0.77	0.71
	3.00	0.97	0.90	0.83	0.93	0.86	0.81	0.85	0.80	0.75
	4.00	1.01	0.95	0.89	0.96	0.91	0.86	0.88	0.84	0.80
	5.00	1.03	0.97	0.93	0.98	0.94	0.89	0.90	0.86	0.83

SIMULATION - DEMONSTRATION (DIALUX EVO 9.2)

https://www.dialux.com/en-GB/download

Schedule of Luminaires (Example)

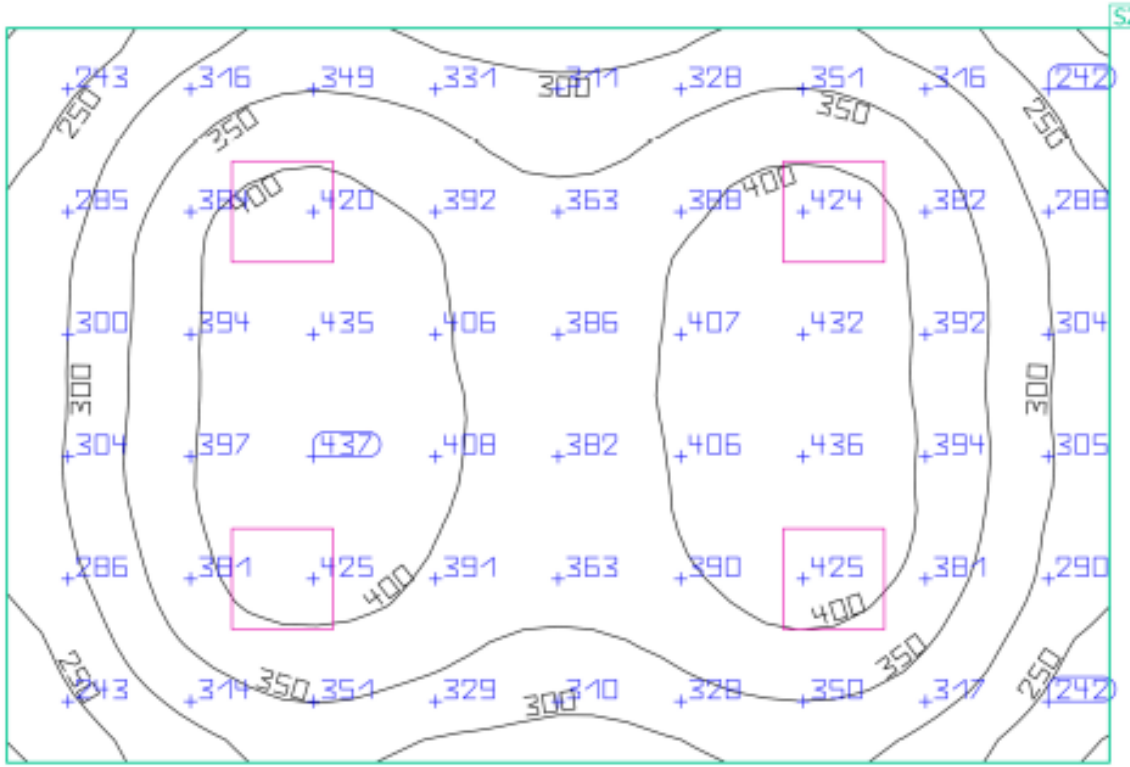
Symbol	Luminaire	Description	Polar Curve	Colour Temperature (CCT)	Ingress Protection (IP)	Dimension
		3 x T26 18W/840, primary anti-glare with specular louver of aluminium, ECG Control gear		4000K	IP20	Length : 598mm Diameter : 598mm
		NIKKON AL25400 M0250 Highbay c/w RAL15W Reflector & MH 250W Bulb Lamp		3800K	IP65	Diameter : 495mm

Symbol	Luminaire	Description	Polar Curve	Colour Temperature (CCT)	Ingress Protection (IP)	Dimension
		LED panel luminaires, Aluminium housing, polystyrene diffuser, compatible with selected DALI drivers		4000K	IP20	Length : 595mm Diameter : 595mm
		LEDVANCE 4058075074385 HIGH BAY Gen 2 200 W 4000 K 110DEG IP65 BK		4000K	IP65	Diameter : 410mm

DEMONSTRATION - DIALUX EVO

1. Office (Pejabat)
2. Hall (Dewan)
3. Lobby (Lobi)
4. Parking Area (Kawasan Letak Kereta)
5. Sports Court (Gelanggang Sukan)

Output from Dialux Simulation



Properties	Ē (Target)	E_{min}	E_{max}	g_1	g_2	Index
Workplane (Room 1) Perpendicular illuminance (adaptive) Height: 0.800 m, Wall zone: 0.000 m	353 lx (≥ 300 lx) ✓	197 lx	436 lx	0.56	0.45	S2

Utilisation profile: Offices, Writing, typewriting, reading, data processing

THANK YOU

Ir. ANA SALMI BINTI AHMAD SALMAN, 2021