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Photometric Report

Job / Report / Date	42 / 10692 / 10692-4a / 2013.06.17
Customer	Encapsulite International Ltd.
Luminaire Range	MT50 IP68
Luminaire catalog No.	MT50 28W
Luminaire description	linear cylindrical luminaire with clear cover data derived from range test series
Lamp description	28W/840 HE FH Osram Lumilux
Lamp lumen output	2,600 lm
Lamp quantity	1

Photometric Report

- Pictures
- Luminaire information
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- Polar Curves
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- Principal Axes Intensities
- Light Output Ratios & CIBSE TM5 Results
- Aspect Factors
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- VDI Luminance table
- CIBSE TM10 Glare Index Results
- CIE Glare Limiting (Soellnor) Diagram
- Comments
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Job / Report / Date

42 / 10692 / 10692-4a / 2013.06.17

Customer

Encapsulite International Ltd.

Luminaire Range

MT50 IP68

Luminaire catalog No.

MT50 28W

Luminaire description

linear cylindrical luminaire
with clear cover

Lamp description

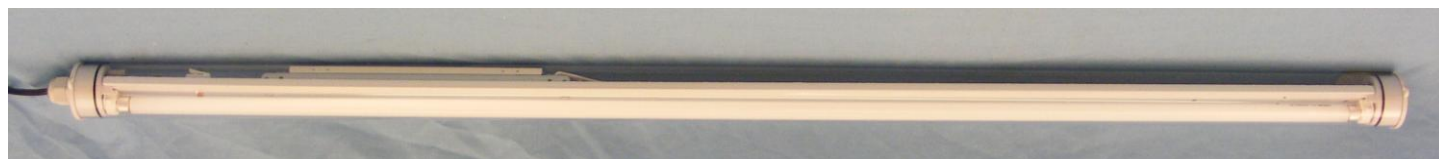
data derived from range test series

Lamp lumen output

28W/840 HE FH Osram Lumilux

Lamp quantity

1



Helvar
www.helvar.com

ELECTRONIC BALLAST EL1x14-35s
220-240V 0/50-60Hz



T5:14W 0.08-0.06A λ 0.96

T5:21,28,35W 0.18-0.09A λ 0.98

ta = -20...+50°C

75

OSRAM FH 28W/840 HE
LUMILUX COOL WHITE



Germany



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Luminaire physical characteristics

Overall Dimensions

Length	1260mm
Width	50mm
Height	50mm

Visible Dimensions when installed

Length	1260mm
Width	50mm
Height	50mm

Luminous Dimensions

Length	1175mm
Width	50mm
Height 0°	25mm
Height 90°	0mm
Height 180°	25mm
Height 270°	0mm

Luminous Areas

Base	0.05875m ²
Sides	0.029375m ² (0°/180° azimuth)
Ends	0m ² (90°/270° azimuth)

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Report Basis

All measurements taken in accordance with EN13032.

Lamp tests were performed with the lamps in a horizontal orientation.

Luminaire tests were performed with the lamps in a horizontal orientation.

The photometric centre of the luminaire was taken as the geometric centre of the lamp.

The photometric nadir was taken to be perpendicular to the front face of the reflector.

The luminaire has been treated as though it has 2 planes of symmetry through the 0°/180° plane and the 90°/270° plane.

The lumen output, light output ratio (LORL) and power consumption of the luminaire were determined at 25°C after 100 hours pre-conditioning.

Lamps used for test were provided by the customer.

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Electrical input & Photometric output characteristics

Control gear

1 * Helvar EL1x14-35S

Ballast Voltage Range 220-240V
Ballast Current Range .09-.18A
Ballast Power Factor 0.98

Sample	Voltage (V)	Current (mA)	Power Factor	Power (W)	VA	Output (lm)	% of Nominal	Efficacy (lm/W)
Luminaire	230.0	129.2	0.982	29.2	29.7	2,133	82%	73.1
Lamp	230.0	133.7	0.984	30.2	30.7	2,265	87%	74.9

Electrical characteristics at 25°C

Ballast Nominal	230V	133.0mA	0.98PF	30.0W	30.6VA
Lamp Nominal	230V	121.7mA	1.00PF	28.0W	28.0VA
Luminaire	230V	129.2mA	0.98PF	29.2W	29.7VA
Lamp	230V	133.7mA	0.98PF	30.2W	30.7VA

Measured Electrical characteristics relative to Ballast Nominal

Luminaire	Current	97%	Power	97%	VA	97%
Lamp	Current	100%	Power	101%	VA	100%

Measured Electrical characteristics relative to Lamp Nominal

Luminaire	Current	106%	Power	104%	VA	106%
Lamp	Current	110%	Power	108%	VA	110%

Lumen Output figures used in this report (lumens)

Nominal Lamp Output	2,600
Measured Luminaire Output	2,133
Measured Lamp Output	2,265

Measured Lumen Output characteristics relative to Lamp Nominal Total

Luminaire	82%
Lamp	87%

Measured luminous efficacy at 25°C

Luminaire	73.1 lm/W
Lamp	74.9 lm/W

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The light output ratio of the luminaire was measured as 0.942 at 25°C.
This is the ratio of the output of the luminaire to the output of the lamp.

The measured lumen output of the luminaire was 2,133 lumens at 25°C.
This figure can be related to the nominal lumen output of the lamp quoted by the manufacturer of 2,600 lumens, to give a nominal light output ratio of 0.820.

The measured lumen output of the lamp was 2,265 lumens at 25°C.
This figure can be related to the nominal lumen output of the lamp quoted by the manufacturer of 2,600 lumens, to give a nominal BLF of 0.871.

For lighting design calculations:

A light output ratio of 1 should be used in conjunction with the measured lumen output of the luminaire of 2,133 lumens.

or

The nominal light output ratio of 0.820 should be used in conjunction with the nominal lumen output of the lamp of 2,600 lumens.

or

The measured light output ratio of 0.942 should be used in conjunction with the measured lumen output of the lamp of 2,265 lumens.

or

The measured light output ratio of 0.942 should be used in conjunction with the nominal lumen output of the lamp of 2,600 lumens and the nominal BLF of 0.871.

This report is based on the following parameters:

The Light Output Ratio is the nominal value of 0.820.

The lamp output is the nominal value of 2,600 lumens.

There is 1 lamp in the luminaire.

No measurements relating to the ballast factor of the control gear were made.

The nominal ballast factor represented by the ratio of the measured lumen output of the lamp to the declared lumen output has been incorporated into the nominal Light Output Ratio figure. The resultant nominal LOR allows lighting calculations to be performed using the declared lamp output without having to incorporate a separate BLF calculation to allow for deviation from the nominal output due to thermal and gear effects.

If the measured LOR figure is used, the measured lumen output of the lamp should be used to perform lighting calculations. If the nominal lamp output is used with the measured LOR figure, an allowance should be made for any deviation of the lamp and gear combination from the published lumen output, represented by the nominal BLF.

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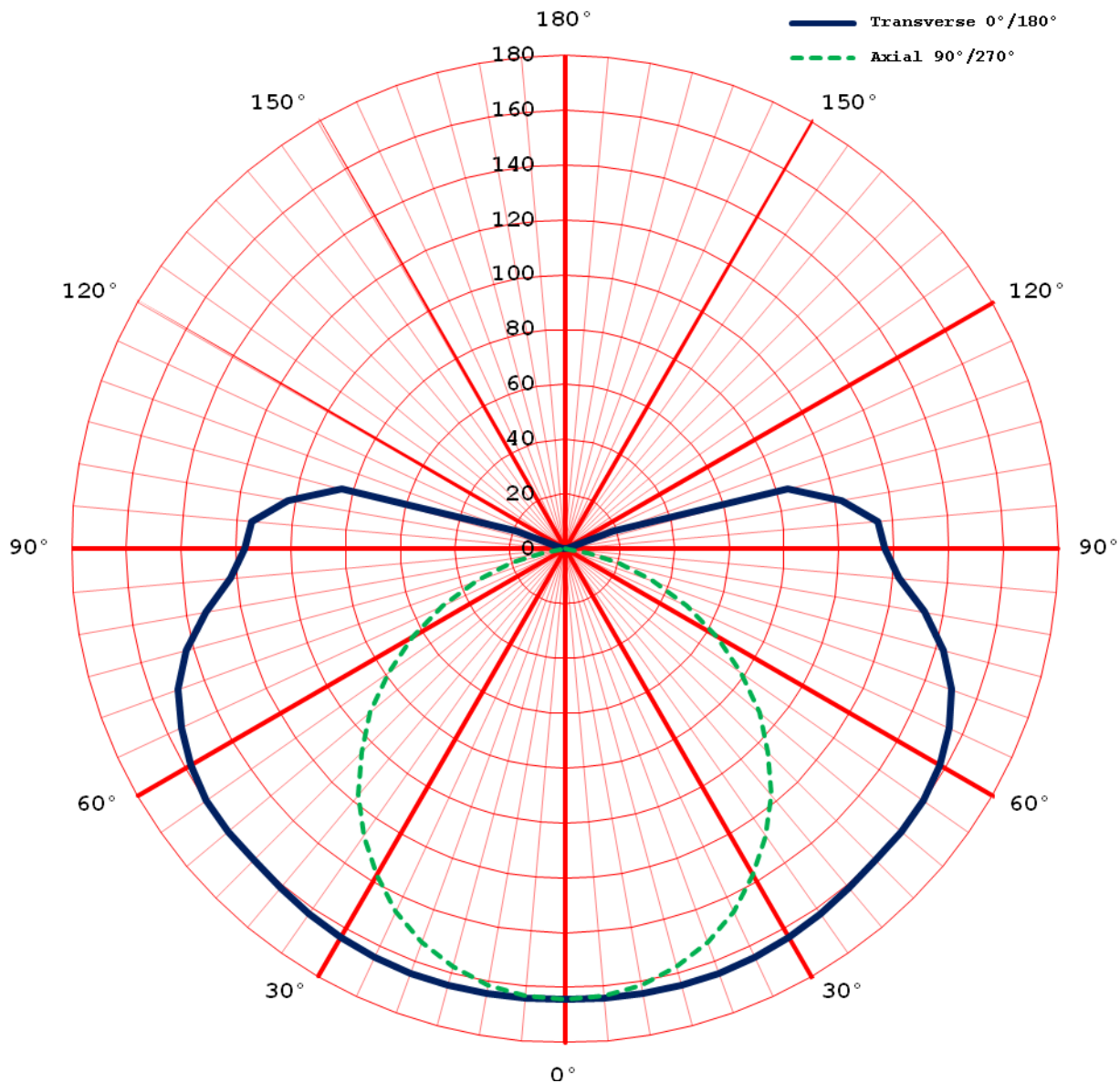
Lamp lumen output

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Lamp quantity

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Average Principal Axes Luminous Intensities (cd/klm)



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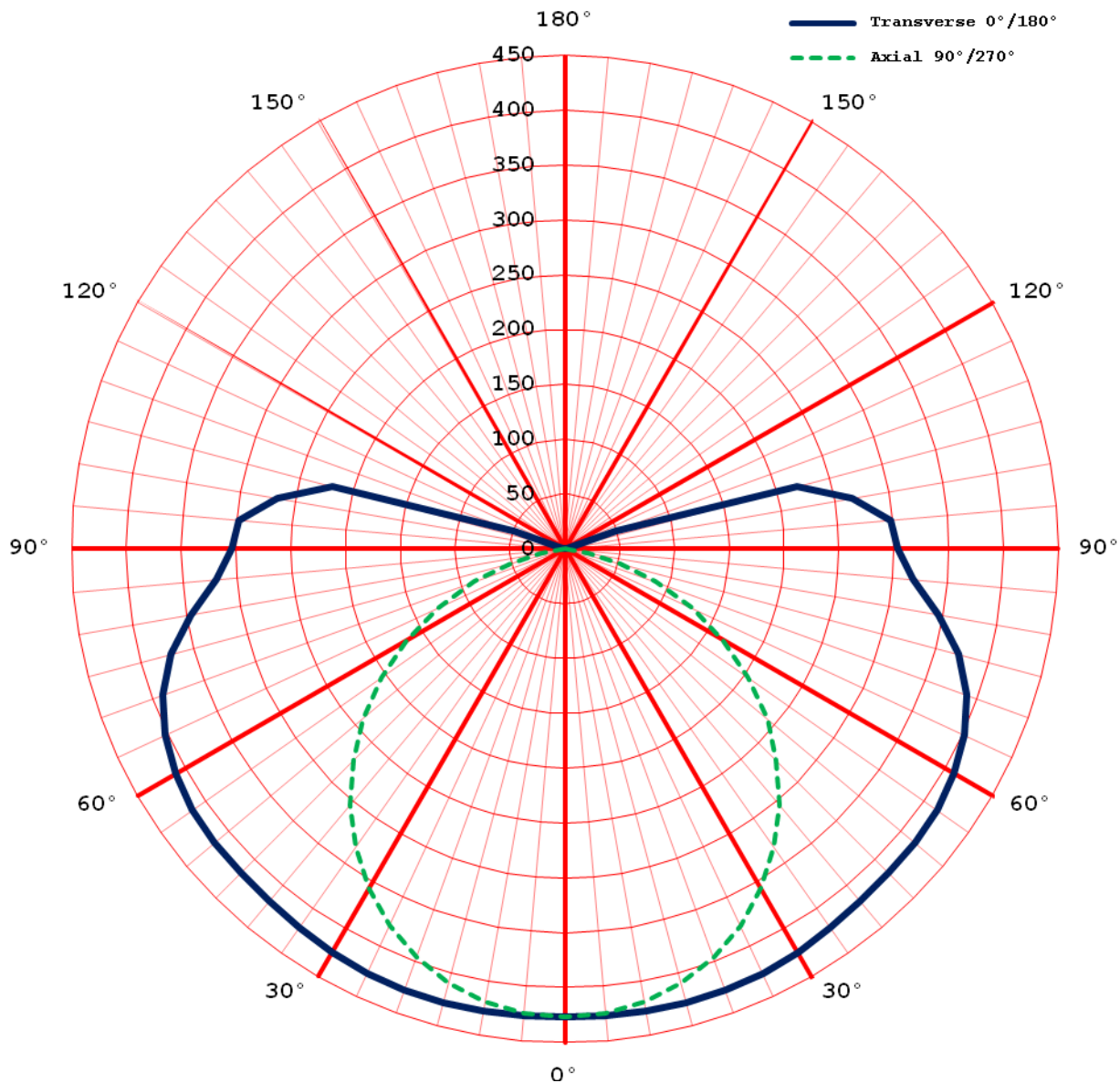
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Lamp quantity

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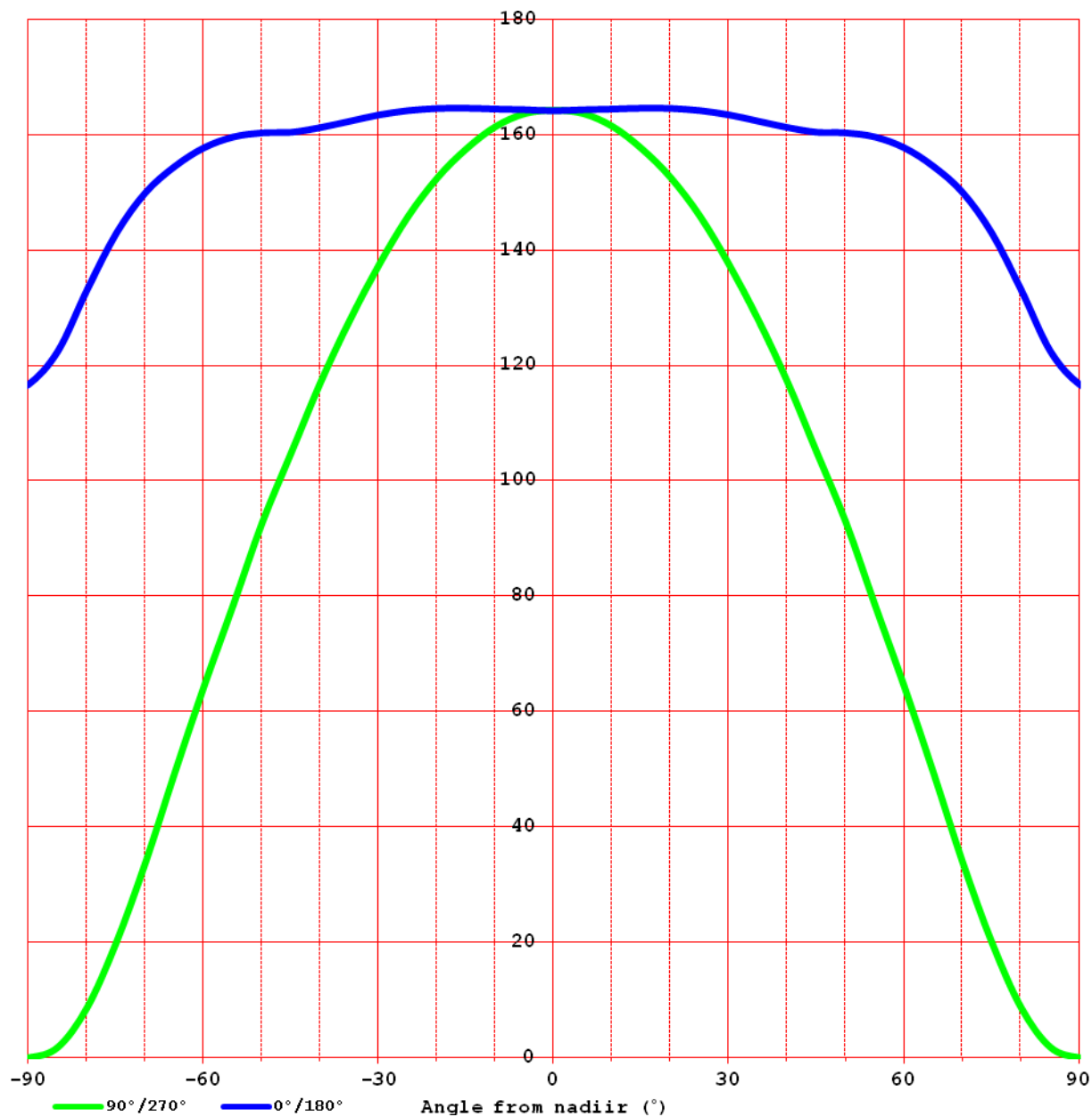
Lamp lumen output

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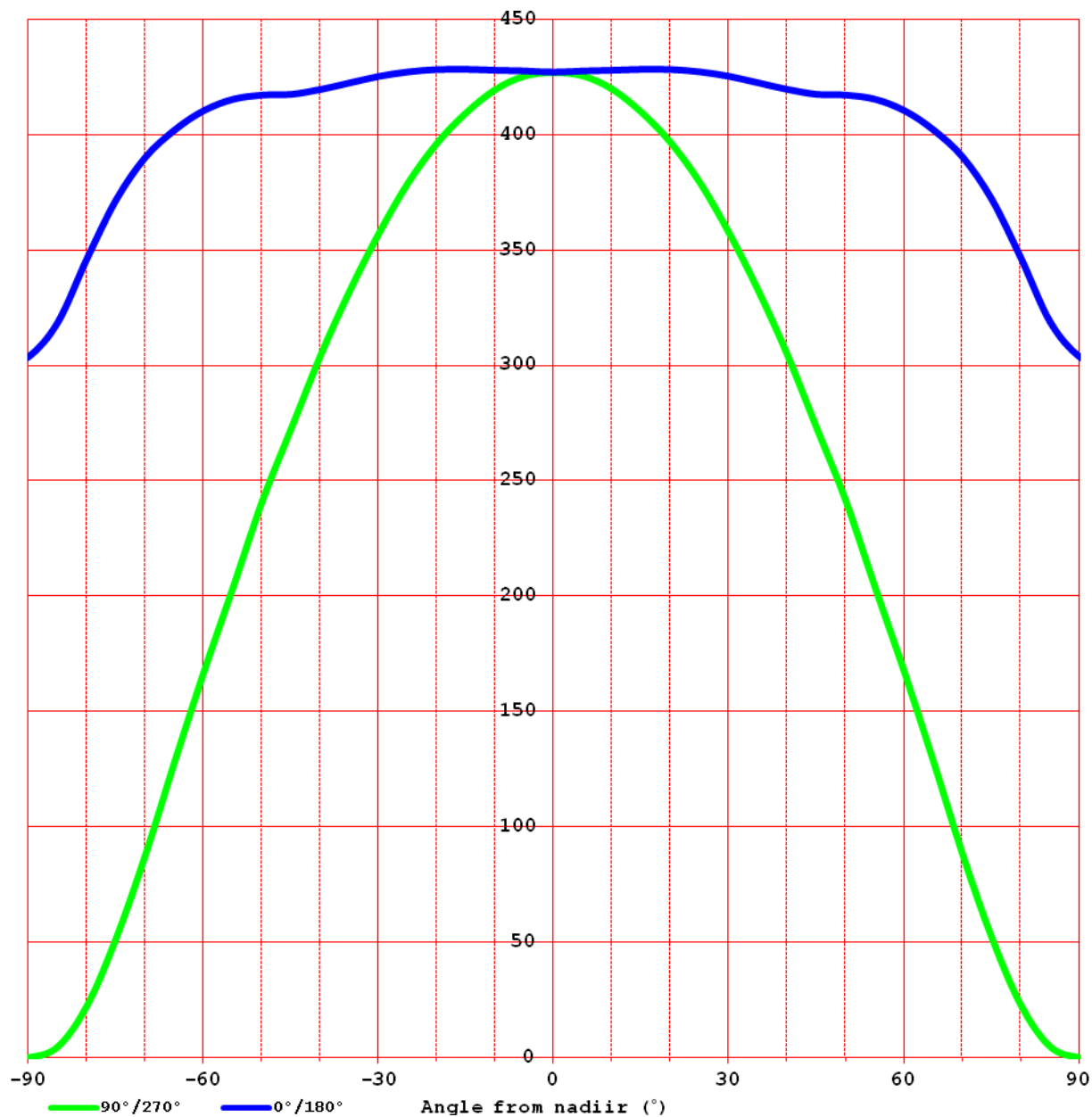
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Average Luminous Intensities (cd/Klm)

Angle	Transverse plane	Axial plane
0°	164.23	164.23
5°	164.42	163.66
10°	164.53	161.44
15°	164.68	157.59
20°	164.64	152.53
25°	164.26	145.85
30°	163.51	137.43
35°	162.42	127.85
40°	161.34	117.09
45°	160.51	104.94
50°	160.40	92.75
55°	159.68	78.37
60°	157.81	64.30
65°	154.58	49.35
70°	150.04	33.81
75°	142.98	19.95
80°	133.18	8.68
85°	122.56	1.81
90°	116.78	0.00
95°	114.82	0.00
100°	102.44	0.00
105°	84.35	0.00
110°	18.84	0.00
115°	0.71	0.00
120°	0.41	0.00
125°	0.00	0.00
130°	0.00	0.00
135°	0.00	0.00
140°	0.00	0.00
145°	0.00	0.00
150°	0.00	0.00
155°	0.00	0.00
160°	0.00	0.00
165°	0.00	0.00
170°	0.00	0.00
175°	0.00	0.00
180°	0.00	0.00

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Average Luminous Intensities (cd)

Angle	Transverse plane	Axial plane
0°	426.99	426.99
5°	427.48	425.52
10°	427.77	419.73
15°	428.16	409.72
20°	428.06	396.57
25°	427.09	379.21
30°	425.14	357.32
35°	422.30	332.41
40°	419.47	304.44
45°	417.33	272.84
50°	417.03	241.15
55°	415.18	203.77
60°	410.30	167.18
65°	401.91	128.32
70°	390.10	87.90
75°	371.75	51.88
80°	346.28	22.56
85°	318.65	4.71
90°	303.62	0.00
95°	298.54	0.00
100°	266.34	0.00
105°	219.31	0.00
110°	48.99	0.00
115°	1.85	0.00
120°	1.07	0.00
125°	0.00	0.00
130°	0.00	0.00
135°	0.00	0.00
140°	0.00	0.00
145°	0.00	0.00
150°	0.00	0.00
155°	0.00	0.00
160°	0.00	0.00
165°	0.00	0.00
170°	0.00	0.00
175°	0.00	0.00
180°	0.00	0.00

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Light Output Ratios Up 0.10
Down 0.72
Total 0.82

Spacing to Height Ratios SHR NOM 1.75
SHR MAX 1.83
SHR MAX TRANS 2.43

Utilisation Factors UF(F) Standard Presentation SHR NOM = 1.75

Room Reflectances			Room Index								
C	W	F	0.75	1.00	1.25	1.50	2.00	2.50	3.00	4.00	5.00
.70	.50	.20	N/A	.47	.52	.56	.62	.67	.70	.74	.77
	.30		N/A	.40	.45	.50	.56	.61	.64	.69	.73
	.10		N/A	.35	.40	.45	.51	.56	.60	.65	.69
.50	.50	.20	N/A	.44	.49	.53	.58	.62	.65	.69	.71
	.30		N/A	.38	.43	.47	.53	.57	.60	.65	.68
	.10		N/A	.33	.38	.42	.49	.53	.57	.62	.65
.30	.50	.20	N/A	.41	.46	.49	.54	.58	.60	.64	.66
	.30		N/A	.36	.41	.44	.50	.54	.57	.61	.64
	.10		N/A	.32	.37	.41	.46	.50	.54	.58	.61
.00	.00	.00	N/A	.29	.33	.36	.42	.45	.48	.52	.55
BZ Class			N/A	6	6	6	6	6	6	6	6

CIE Flux code 33 / 61 / 83 / 87 / 82

CIE Room Index 0.60 0.80 1.00 1.25 1.50 2.00 2.50 3.00 4.00 5.00 10.0 20.0
CIE DRR 0.21 0.28 0.34 0.41 0.46 0.54 0.60 0.65 0.70 0.74 0.81 0.85
CIE class 7 / 7 / 7 / 8 / 8 / 8 / 8 / 8 / 8 / 8 / 9 / -

Flux Fraction Ratio 0.14
DIN Class 0.82 B

Calculated in accordance with CIBSE Technical Memorandum No. 5 1980

In accordance with TM5, this UF table is valid for values of SHR from 0.5 below SHR NOM to 0.5 above SHR NOM. SHR MAX is a separate limitation.

Reflectances given in the UF table are the effective reflectances of the ceiling cavity, walls and floor cavity, and must be determined for the actual room in which the luminaire will be used.

UF(F), UF(W), and UF(C) for 0% reflectance of the room surfaces are equivalent to DF(F), DF(W) and DF(C) respectively.

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linear cylindrical luminaire
with clear cover

data derived from range test series

Lamp description

28W/840 HE FH Osram Lumilux

Lamp lumen output

2,600 lm

Lamp quantity

1

Angle

Aspect Factors

	Parallel plane	Perpendicular plane
0°	0.000	0.000
5°	0.087	0.004
10°	0.173	0.015
15°	0.255	0.033
20°	0.334	0.058
25°	0.407	0.089
30°	0.474	0.123
35°	0.533	0.161
40°	0.585	0.201
45°	0.628	0.241
50°	0.664	0.279
55°	0.692	0.315
60°	0.712	0.347
65°	0.726	0.374
70°	0.734	0.394
75°	0.739	0.408
80°	0.740	0.416
85°	0.741	0.418
90°	0.741	0.419

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Zonal Flux Calculations

Angles	Individual	Cumulative
0° - 5°	0.5%	0.5%
5° - 10°	1.4%	1.9%
10° - 15°	2.3%	4.2%
15° - 20°	3.2%	7.5%
20° - 25°	4.0%	11.5%
25° - 30°	4.7%	16.2%
30° - 35°	5.3%	21.5%
35° - 40°	5.8%	27.4%
40° - 45°	6.2%	33.6%
45° - 50°	6.5%	40.1%
50° - 55°	6.7%	46.7%
55° - 60°	6.7%	53.5%
60° - 65°	6.7%	60.1%
65° - 70°	6.5%	66.6%
70° - 75°	6.2%	72.8%
75° - 80°	5.7%	78.5%
80° - 85°	5.1%	83.5%
85° - 90°	4.6%	88.1%
90° - 95°	4.2%	92.3%
95° - 100°	3.6%	96.0%
100° - 105°	2.7%	98.7%
105° - 110°	1.2%	99.9%
110° - 115°	0.1%	100.0%
115° - 120°	0.0%	100.0%
120° - 125°	0.0%	100.0%
125° - 130°	0.0%	100.0%
130° - 135°	0.0%	100.0%
135° - 140°	0.0%	100.0%
140° - 145°	0.0%	100.0%
145° - 150°	0.0%	100.0%
150° - 155°	0.0%	100.0%
155° - 160°	0.0%	100.0%
160° - 165°	0.0%	100.0%
165° - 170°	0.0%	100.0%
170° - 175°	0.0%	100.0%
175° - 180°	0.0%	100.0%

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Averaged Luminance Values (cd/m²)

Elevation(°)

Azimuth(°)

	0.0°	30.0°	60.0°	90.0°	120.0°	150.0°	180.0°
45°	6697	6497	6128	6568	6128	6497	6697
50°	6920	6634	6032	6386	6032	6634	6920
55°	7188	6854	5975	6047	5975	6854	7188
60°	7485	7133	5942	5691	5942	7133	7485
65°	7811	7414	6041	5168	6041	7414	7811
70°	8179	7733	6180	4375	6180	7733	8179
75°	8530	8072	6325	3412	6325	8072	8530
80°	8849	8414	6386	2212	6386	8414	8849
85°	9268	8714	6445	919	6445	8714	9268
	180.0°	210.0°	240.0°	270.0°	300.0°	330.0°	0.0°
45°	6697	6497	6128	6568	6128	6497	6697
50°	6920	6634	6032	6386	6032	6634	6920
55°	7188	6854	5975	6047	5975	6854	7188
60°	7485	7133	5942	5691	5942	7133	7485
65°	7811	7414	6041	5168	6041	7414	7811
70°	8179	7733	6180	4375	6180	7733	8179
75°	8530	8072	6325	3412	6325	8072	8530
80°	8849	8414	6386	2212	6386	8414	8849
85°	9268	8714	6445	919	6445	8714	9268

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Non averaged Luminance Values (cd/m²)

Elevation(°)

Azimuth(°)

	0.0°	30.0°	60.0°	90.0°	120.0°	150.0°	180.0°
45°	6651	6499	6161	6624	6186	6554	6743
50°	6871	6631	6092	6480	6092	6696	6969
55°	7125	6843	6038	6121	6017	6922	7251
60°	7429	7127	6006	5753	6008	7199	7541
65°	7752	7406	6111	5290	6079	7501	7871
70°	8132	7740	6264	4468	6201	7813	8225
75°	8478	8084	6431	3696	6354	8143	8582
80°	8798	8489	6426	2276	6432	8463	8901
85°	9159	8906	6707	1067	6412	8758	9376
	180.0°	210.0°	240.0°	270.0°	300.0°	330.0°	0.0°
45°	6743	6515	6115	6512	6050	6418	6651
50°	6969	6641	6025	6291	5918	6567	6871
55°	7251	6875	5947	5973	5898	6777	7125
60°	7541	7141	5928	5629	5825	7063	7429
65°	7871	7434	6028	5046	5947	7314	7752
70°	8225	7743	6186	4281	6068	7636	8132
75°	8582	8093	6324	3127	6191	7969	8478
80°	8901	8432	6445	2147	6240	8273	8798
85°	9376	8749	6437	771	6222	8444	9159

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Averaged Luminance Values (cd/m²/klm)

Elevation(°)	Azimuth(°)						
	0.0°	30.0°	60.0°	90.0°	120.0°	150.0°	180.0°
45°	2576	2499	2357	2526	2357	2499	2576
50°	2661	2551	2320	2456	2320	2551	2661
55°	2765	2636	2298	2326	2298	2636	2765
60°	2879	2743	2285	2189	2285	2743	2879
65°	3004	2851	2324	1988	2324	2851	3004
70°	3146	2974	2377	1683	2377	2974	3146
75°	3281	3105	2433	1312	2433	3105	3281
80°	3404	3236	2456	851	2456	3236	3404
85°	3564	3352	2479	353	2479	3352	3564
	180.0°	210.0°	240.0°	270.0°	300.0°	330.0°	0.0°
45°	2576	2499	2357	2526	2357	2499	2576
50°	2661	2551	2320	2456	2320	2551	2661
55°	2765	2636	2298	2326	2298	2636	2765
60°	2879	2743	2285	2189	2285	2743	2879
65°	3004	2851	2324	1988	2324	2851	3004
70°	3146	2974	2377	1683	2377	2974	3146
75°	3281	3105	2433	1312	2433	3105	3281
80°	3404	3236	2456	851	2456	3236	3404
85°	3564	3352	2479	353	2479	3352	3564

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Customer

Encapsulite International Ltd.

Luminaire Range

MT50 IP68

Luminaire catalog No.

MT50 28W

Luminaire description

linear cylindrical luminaire
with clear cover

data derived from range test series

Lamp description

28W/840 HE FH Osram Lumilux

Lamp lumen output

2,600 lm

Lamp quantity

1

Non averaged Luminance Values (cd/m²/klm)

Elevation(°)

Azimuth(°)

	0.0°	30.0°	60.0°	90.0°	120.0°	150.0°	180.0°
45°	2558	2500	2370	2548	2379	2521	2593
50°	2643	2551	2343	2492	2343	2575	2680
55°	2740	2632	2322	2354	2314	2662	2789
60°	2857	2741	2310	2213	2311	2769	2900
65°	2981	2848	2350	2035	2338	2885	3027
70°	3128	2977	2409	1718	2385	3005	3164
75°	3261	3109	2474	1422	2444	3132	3301
80°	3384	3265	2472	876	2474	3255	3423
85°	3523	3425	2580	410	2466	3368	3606
	180.0°	210.0°	240.0°	270.0°	300.0°	330.0°	0.0°
45°	2593	2506	2352	2505	2327	2469	2558
50°	2680	2554	2317	2420	2276	2526	2643
55°	2789	2644	2287	2297	2268	2607	2740
60°	2900	2747	2280	2165	2240	2717	2857
65°	3027	2859	2318	1941	2287	2813	2981
70°	3164	2978	2379	1647	2334	2937	3128
75°	3301	3113	2432	1203	2381	3065	3261
80°	3423	3243	2479	826	2400	3182	3384
85°	3606	3365	2476	296	2393	3248	3523

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Customer Encapsulite International Ltd.
Luminaire Range MT50 IP68
Luminaire catalog No. MT50 28W
Luminaire description linear cylindrical luminaire
with clear cover
data derived from range test series
Lamp description 28W/840 HE FH Osram Lumilux
Lamp lumen output 2,600 lm
Lamp quantity 1

Maximum Non averaged Luminance Values (cd/m²)

Elevation(°)

Maximum Azimuth Angle

45°	6743	180°
50°	6969	180°
55°	7251	180°
60°	7541	180°
65°	7871	180°
70°	8225	180°
75°	8582	180°
80°	8901	180°
85°	9376	180°

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Lamp quantity 1

VDT Luminance Information

BS EN 12464 (2002) / CIBSE LG7 (2005) / CIBSE LG3 (2001)

Permitted Usage according to Screen Type and Luminance Limit Angle	Limiting luminance (cd/m ²)	Use permitted at Luminance Limit Angle(°)	
		55°	65°
Screen Type III (No screen treatment) used with some negative polarity software	200	NO	NO
Screen Type I and II (Good or moderate screen treatment) used with some negative polarity software	500	NO	NO
Screen Type III (No screen treatment) used with only positive polarity software	1000	NO	NO
Screen Type I and II (Good or moderate screen treatment) used with only positive polarity software	1500	NO	NO

VDT Luminance Information

BS EN 12464 (2011) / CIBSE LG7 (2012)

Permitted Usage according to Screen Type and Luminance Limit Angle	Limiting luminance (cd/m ²)	Use permitted at Luminance Limit Angle(°)	
		55°	65°
Medium luminance screen (L <= 200 cdm ²) Case B negative polarity and/or higher requirements	1000	-	NO
Medium luminance screen (L <= 200 cdm ²) Case A positive polarity and normal requirements	1500	-	NO
High luminance screen (L > 200 cd/m ²) Case B negative polarity and/or higher requirements	1500	-	NO
High luminance screen (L > 200 cd/m ²) Case A positive polarity and normal requirements	3000	-	NO

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 Lamp lumen output 2,600 lm
 Lamp quantity 1

Uncorrected Glare Indices

Reflectance of										
Ceiling	.70	.70	.50	.50	.30	.70	.70	.50	.50	.30
Wall	.50	.30	.50	.30	.30	.50	.30	.50	.30	.30
Floor Cavity	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20

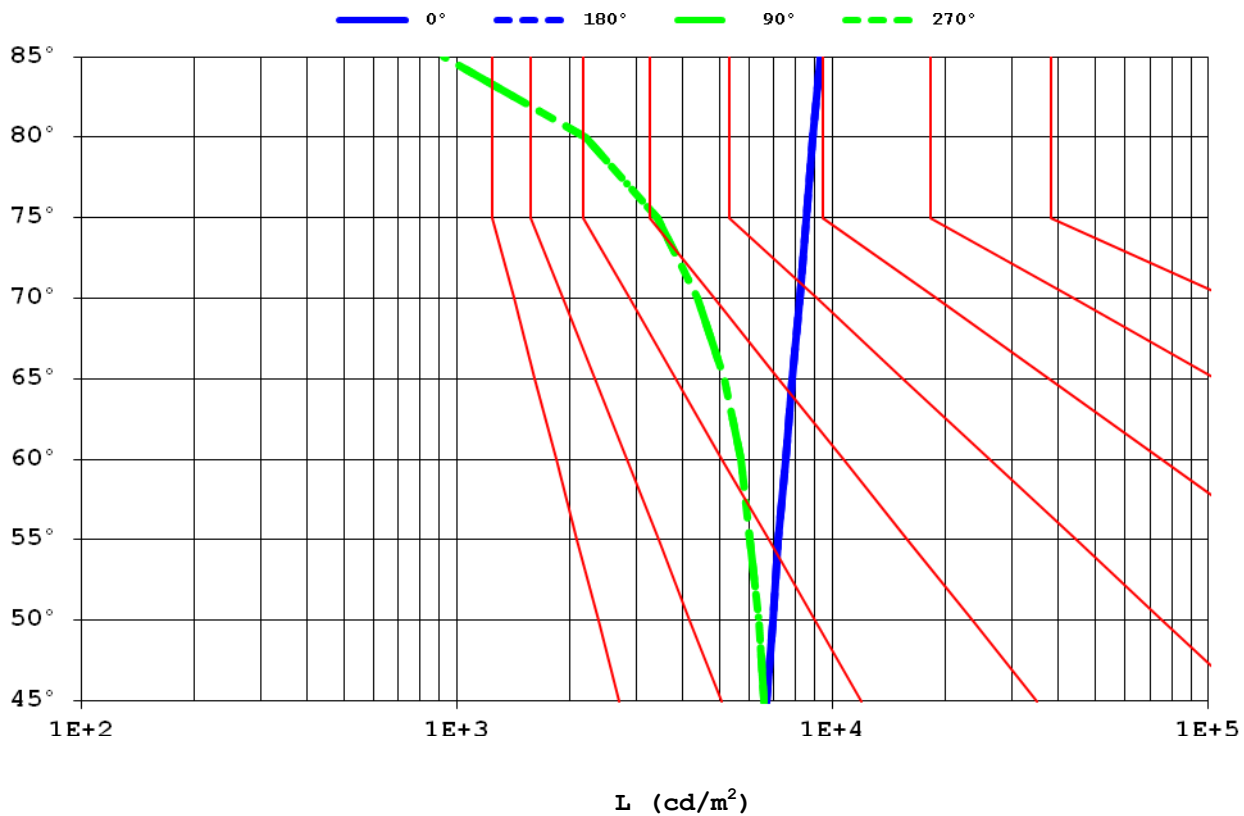
Room dimension		Viewed crosswise					Viewed endwise				
X Y		0°					90°				
2H 2H	15.1	17.0	15.7	17.7	18.4	11.5	13.4	12.2	14.1	14.8	
3H	18.5	20.3	19.2	21.0	21.8	13.4	15.2	14.1	15.9	16.7	
4H	20.2	21.9	20.9	22.6	23.4	14.1	15.8	14.8	16.5	17.3	
6H	22.0	23.6	22.7	24.3	25.1	14.5	16.1	15.3	16.8	17.7	
8H	22.8	24.4	23.6	25.1	26.0	14.6	16.1	15.3	16.9	17.7	
12H	23.7	25.2	24.5	26.0	26.8	14.6	16.1	15.4	16.9	17.7	
4H 2H	16.0	17.7	16.7	18.4	19.2	13.7	15.4	14.4	16.1	16.9	
3H	19.8	21.3	20.6	22.1	22.9	16.0	17.5	16.8	18.3	19.1	
4H	21.8	23.2	22.6	24.0	24.8	17.0	18.4	17.8	19.2	20.0	
6H	23.8	25.0	24.6	25.8	26.7	17.7	18.9	18.4	19.7	20.6	
8H	24.8	25.9	25.6	26.7	27.6	17.9	19.0	18.7	19.8	20.7	
12H	25.9	26.9	26.7	27.7	28.7	18.0	19.1	18.8	19.9	20.8	
8H 4H	22.5	23.7	23.3	24.5	25.4	19.2	20.3	20.0	21.1	22.1	
6H	24.8	25.8	25.6	26.6	27.5	20.2	21.2	21.0	22.0	23.0	
8H	26.1	27.0	26.9	27.8	28.7	20.7	21.6	21.5	22.4	23.4	
12H	27.4	28.1	28.2	29.0	30.0	21.0	21.8	21.8	22.7	23.6	
12H 4H	22.7	23.7	23.5	24.5	25.5	20.1	21.2	20.9	22.0	22.9	
6H	25.1	26.0	25.9	26.8	27.8	21.4	22.3	22.3	23.2	24.1	
8H	26.4	27.2	27.3	28.1	29.0	22.0	22.8	22.8	23.6	24.6	

Calculated in accordance with CIBSE Technical Memorandum No. 10 1985

Customer Encapsulite International Ltd.
Luminaire Range MT50 IP68
Luminaire catalog No. MT50 28W
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Lamp lumen output 2,600 lm
Lamp quantity 1

CIE Glare Limiting (Soellnor) Diagram

Glare Quality Rating Class		Service values of illuminance							
1.15	A	2000	1000	500	<300				
1.50	B		2000	1000	500	<300			
1.85	C			2000	1000	500	<300		
2.20	D				2000	1000	500	<300	
2.55	E					2000	1000	500	<300
		a	b	c	d	e	f	g	h



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Customer	Encapsulite International Ltd.
Luminaire Range	MT50 IP68
Luminaire catalog No.	MT50 28W
Luminaire description	linear cylindrical luminaire with clear cover data derived from range test series
Lamp description	28W/840 HE FH Osram Lumilux
Lamp lumen output	2,600 lm
Lamp quantity	1

Comments

It is recommended that point to point calculations are used when designing lighting schemes in order to accurately predict uniformity. Data files in various formats are available to allow easy transfer of this data to a computer. Please enquire for details.

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Luminaire catalog No. MT50 28W
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Lamp lumen output 2,600 lm
Lamp quantity 1

Quick Design Table

Based on: reflectances of Ceiling = 0.5
Wall = 0.5
Floor = 0.2
Room Index = 2.00
lamp output = 2600 lumens
ballast lumen factor = 1.00

To achieve an Illuminance of 100 lux

Surface Area (m ²)	20	30	40	50	80	100	200	300	500
No. of luminaires	1.3	2.0	2.6	3.3	5.3	6.6	13.2	19.9	33.1