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Photometric Report

Job / Report / Date 42 / 10692 / 10692-11a / 2013.06.17

Customer	Encapsulite International Ltd.
Luminaire Range	MT70 IP68
Luminaire catalog No.	MT70 18W
Luminaire description	linear cylindrical luminaire with clear cover data derived from range test series
Lamp description	18W/840 L Osram SmartLux Pro
Lamp lumen output	1,350 lm
Lamp quantity	1

Photometric Report

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- Luminaire information
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- Principal Axes Intensities
- Light Output Ratios & CIBSE TM5 Results
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Job / Report / Date

42 / 10692 / 10692-11a / 2013.06.17

Customer

Encapsulite International Ltd.

Luminaire Range

MT70 IP68

Luminaire catalog No.

MT70 18W

Luminaire description

linear cylindrical luminaire
with clear cover

Lamp description

data derived from range test series

Lamp lumen output

18W/840 L Osram SmartLux Pro

Lamp quantity

1,350 lm

1



Helvar
www.helvar.com

ELECTRONIC BALLAST EL1x18s
220-240V 0/50-60Hz



T8: 18W 0.09-0.08A λ 0.98
 $t_a = -20...+50^{\circ}\text{C}$



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Luminaire physical characteristics

Overall Dimensions

Length	705mm
Width	70mm
Height	70mm

Visible Dimensions when installed

Length	705mm
Width	70mm
Height	70mm

Luminous Dimensions

Length	635mm
Width	70mm
Height 0°	35mm
Height 90°	0mm
Height 180°	35mm
Height 270°	0mm

Luminous Areas

Base	0.044445m ²
Sides	0.022225m 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 EL1x18s

Ballast Voltage Range 220-240V
Ballast Current Range 0.08-0.09A
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	82.5	0.969	18.4	19.0	1,043	77%	56.8
Lamp	230.0	83.9	0.971	18.7	19.3	1,227	91%	65.5

Electrical characteristics at 25°C

Ballast Nominal	230V	84.8mA	0.98PF	19.1W	19.5VA
Lamp Nominal	230V	78.3mA	1.00PF	18.0W	18.0VA
Luminaire	230V	82.5mA	0.97PF	18.4W	19.0VA
Lamp	230V	83.9mA	0.97PF	18.7W	19.3VA

Measured Electrical characteristics relative to Ballast Nominal

Luminaire	Current	97%	Power	96%	VA	97%
Lamp	Current	99%	Power	98%	VA	99%

Measured Electrical characteristics relative to Lamp Nominal

Luminaire	Current	105%	Power	102%	VA	105%
Lamp	Current	107%	Power	104%	VA	107%

Lumen Output figures used in this report (lumens)

Nominal Lamp Output	1,350
Measured Luminaire Output	1,043
Measured Lamp Output	1,227

Measured Lumen Output characteristics relative to Lamp Nominal Total

Luminaire	77%
Lamp	91%

Measured luminous efficacy at 25°C

Luminaire	56.8 lm/W
Lamp	65.5 lm/W

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The light output ratio of the luminaire was measured as 0.850 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 1,043 lumens at 25°C.
This figure can be related to the nominal lumen output of the lamp quoted by the manufacturer of 1,350 lumens, to give a nominal light output ratio of 0.773.

The measured lumen output of the lamp was 1,227 lumens at 25°C.
This figure can be related to the nominal lumen output of the lamp quoted by the manufacturer of 1,350 lumens, to give a nominal BLF of 0.909.

For lighting design calculations:

A light output ratio of 1 should be used in conjunction with the measured lumen output of the luminaire of 1,043 lumens.

or

The nominal light output ratio of 0.773 should be used in conjunction with the nominal lumen output of the lamp of 1,350 lumens.

or

The measured light output ratio of 0.850 should be used in conjunction with the measured lumen output of the lamp of 1,227 lumens.

or

The measured light output ratio of 0.850 should be used in conjunction with the nominal lumen output of the lamp of 1,350 lumens and the nominal BLF of 0.909.

This report is based on the following parameters:

The Light Output Ratio is the nominal value of 0.773.

The lamp output is the nominal value of 1,350 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 description

18W/840 L Osram SmartLux Pro

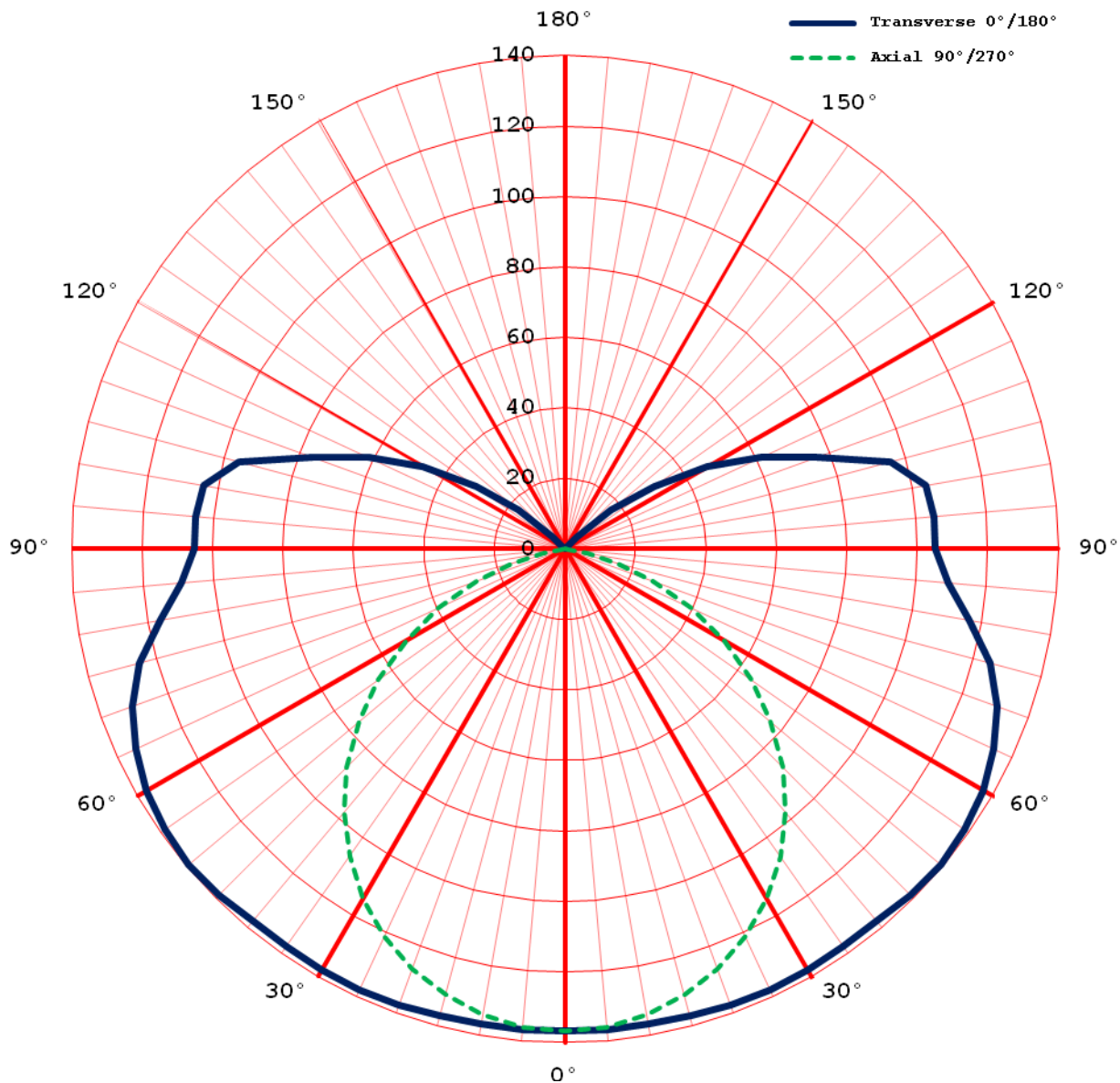
Lamp lumen output

1,350 lm

Lamp quantity

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Average Principal Axes Luminous Intensities (cd/klm)



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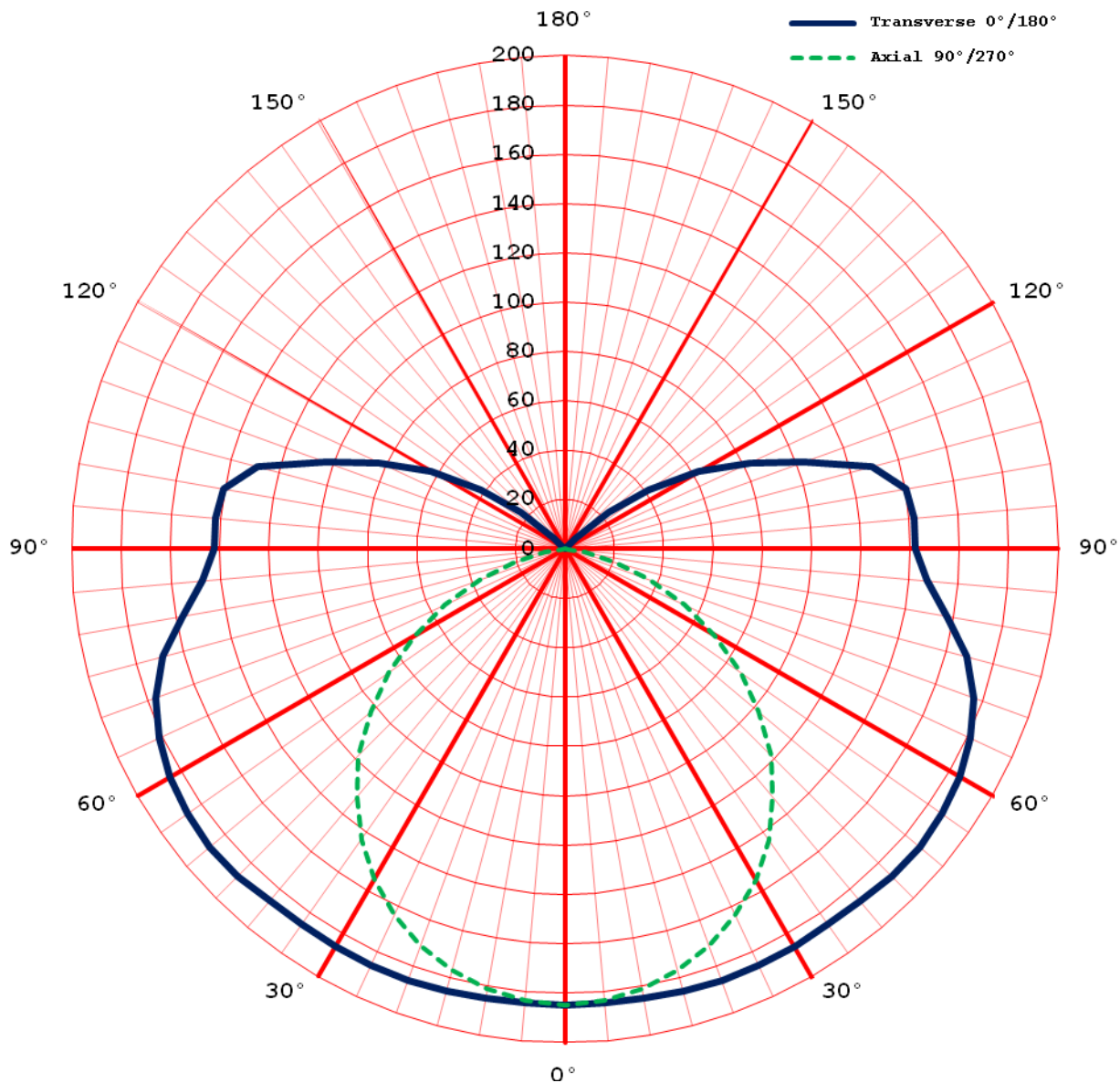
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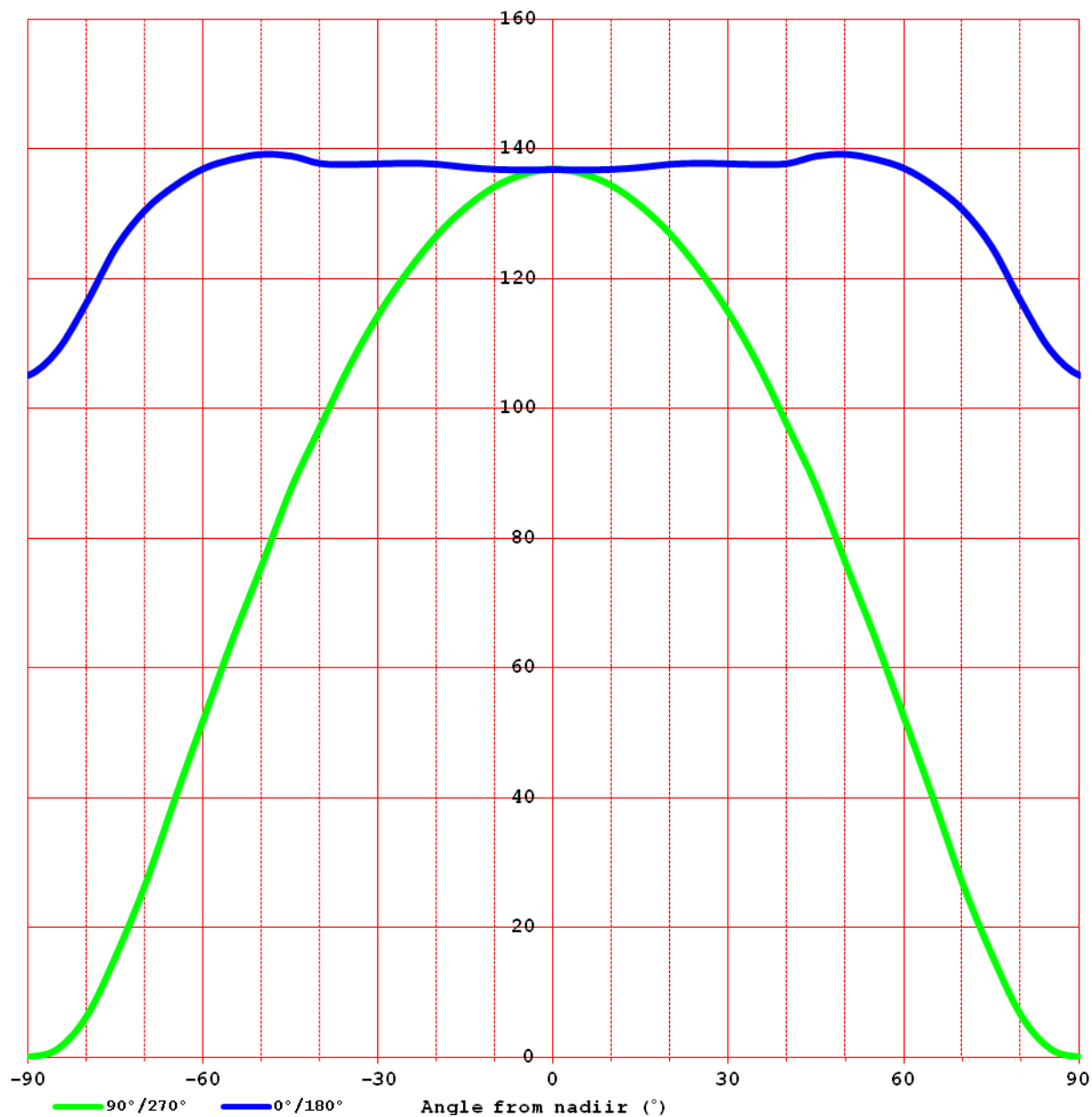
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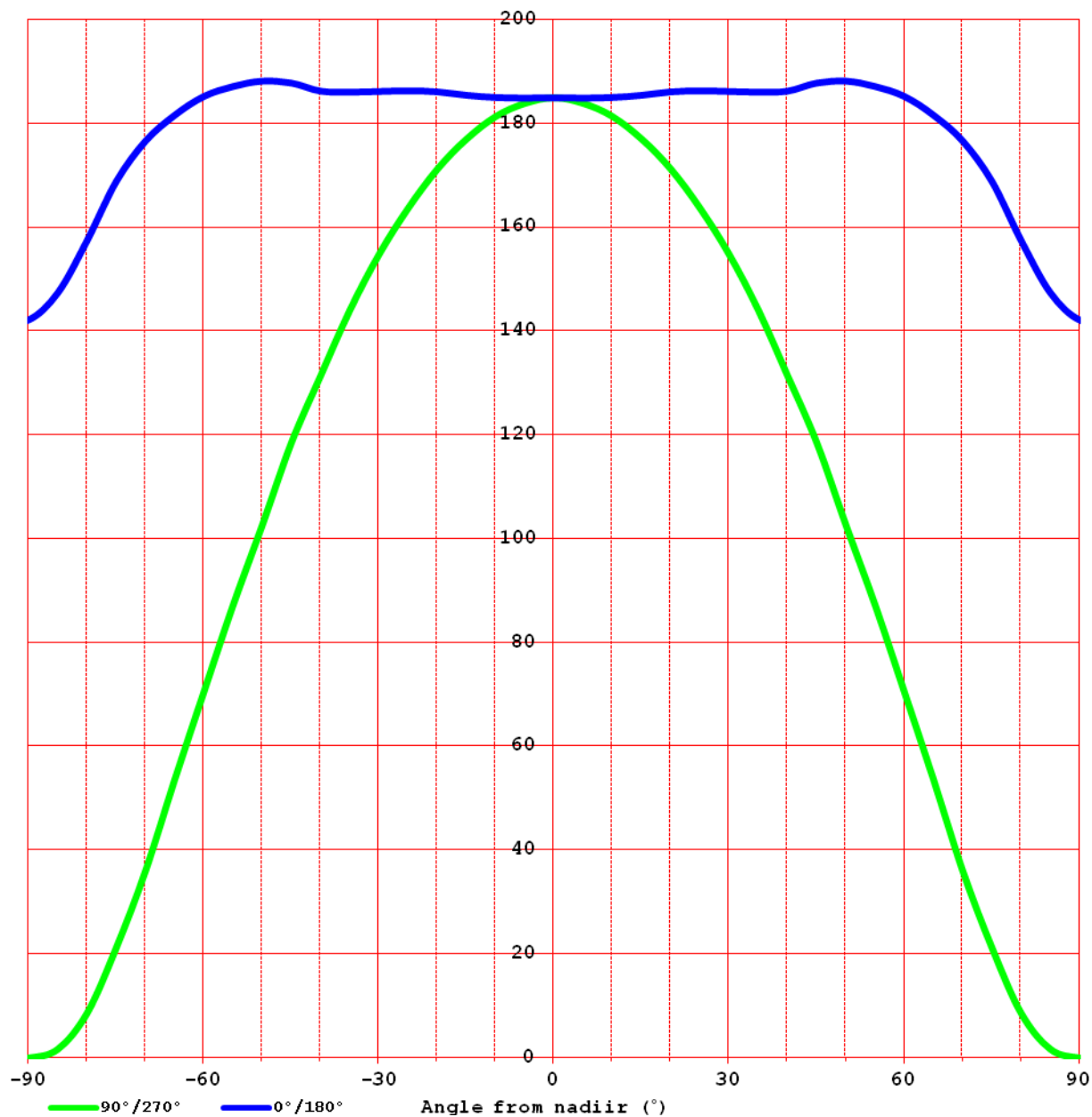
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Average Luminous Intensities (cd/Klm)

Angle	Transverse plane	Axial plane
0°	136.91	136.91
5°	136.87	136.11
10°	136.96	134.23
15°	137.27	131.02
20°	137.76	126.73
25°	137.90	121.15
30°	137.81	114.54
35°	137.72	106.60
40°	137.85	97.27
45°	139.01	87.72
50°	139.28	75.93
55°	138.53	64.55
60°	137.10	52.18
65°	134.43	39.68
70°	130.73	26.65
75°	124.98	15.71
80°	116.56	6.38
85°	109.11	1.25
90°	105.23	0.00
95°	105.32	0.00
100°	104.13	0.00
105°	95.64	0.00
110°	76.05	0.00
115°	61.35	0.00
120°	46.55	0.00
125°	30.81	0.00
130°	17.13	0.00
135°	4.86	0.00
140°	0.67	0.00
145°	0.53	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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Lamp quantity

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Average Luminous Intensities (cd)

Angle	Transverse plane	Axial plane
0°	184.83	184.83
5°	184.77	183.74
10°	184.89	181.21
15°	185.32	176.87
20°	185.98	171.09
25°	186.16	163.55
30°	186.04	154.64
35°	185.92	143.91
40°	186.10	131.31
45°	187.67	118.42
50°	188.03	102.51
55°	187.01	87.14
60°	185.09	70.45
65°	181.48	53.57
70°	176.49	35.98
75°	168.72	21.21
80°	157.35	8.62
85°	147.30	1.69
90°	142.06	0.00
95°	142.18	0.00
100°	140.57	0.00
105°	129.11	0.00
110°	102.67	0.00
115°	82.82	0.00
120°	62.85	0.00
125°	41.60	0.00
130°	23.12	0.00
135°	6.56	0.00
140°	0.90	0.00
145°	0.72	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 0.15
Down 0.62
Total 0.77

Spacing to Height Ratios SHR NOM 1.75
SHR MAX 1.86
SHR MAX TRANS 2.51

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	.43	.48	.52	.57	.61	.64	.68	.70	
	.30		N/A	.36	.41	.45	.51	.56	.59	.64	.67	
	.10		N/A	.31	.36	.41	.47	.51	.55	.60	.63	
.50	.50	.20	N/A	.39	.44	.47	.52	.56	.58	.62	.64	
	.30		N/A	.34	.38	.42	.48	.51	.54	.58	.61	
	.10		N/A	.30	.34	.38	.44	.48	.51	.55	.58	
.30	.50	.20	N/A	.36	.40	.43	.48	.51	.53	.56	.59	
	.30		N/A	.32	.36	.39	.44	.47	.50	.54	.56	
	.10		N/A	.28	.32	.36	.41	.44	.47	.51	.54	
.00	.00	.00	N/A	.24	.28	.31	.35	.39	.41	.45	.47	
BZ Class			N/A	6	6	6	6	6	6	6	6	

CIE Flux code 32 / 60 / 83 / 80 / 77

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 0.40 0.46 0.54 0.60 0.64 0.69 0.72 0.79 0.81
CIE class 8 / 8 / 8 / 8 / 8 / 8 / 8 / 8 / 8 / 8 / 9 / -

Flux Fraction Ratio 0.25
DIN Class 0.77 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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Lamp description

18W/840 L Osram SmartLux Pro

Lamp lumen output

1,350 lm

Lamp quantity

1

Angle

Aspect Factors

	Parallel plane	Perpendicular plane
0°	0.000	0.000
5°	0.087	0.004
10°	0.172	0.015
15°	0.255	0.033
20°	0.333	0.058
25°	0.406	0.088
30°	0.473	0.123
35°	0.532	0.161
40°	0.584	0.200
45°	0.627	0.240
50°	0.662	0.279
55°	0.690	0.314
60°	0.710	0.345
65°	0.723	0.371
70°	0.731	0.391
75°	0.735	0.404
80°	0.737	0.411
85°	0.737	0.413
90°	0.737	0.413

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Zonal Flux Calculations

Angles	Individual	Cumulative
0° - 5°	0.4%	0.4%
5° - 10°	1.3%	1.7%
10° - 15°	2.1%	3.8%
15° - 20°	2.9%	6.6%
20° - 25°	3.6%	10.2%
25° - 30°	4.2%	14.4%
30° - 35°	4.8%	19.2%
35° - 40°	5.2%	24.4%
40° - 45°	5.6%	30.0%
45° - 50°	5.9%	35.9%
50° - 55°	6.1%	42.0%
55° - 60°	6.2%	48.2%
60° - 65°	6.1%	54.3%
65° - 70°	6.0%	60.3%
70° - 75°	5.7%	66.0%
75° - 80°	5.3%	71.2%
80° - 85°	4.7%	75.9%
85° - 90°	4.3%	80.3%
90° - 95°	4.2%	84.5%
95° - 100°	4.0%	88.5%
100° - 105°	3.6%	92.1%
105° - 110°	2.8%	94.9%
110° - 115°	2.1%	97.0%
115° - 120°	1.4%	98.4%
120° - 125°	0.9%	99.3%
125° - 130°	0.5%	99.8%
130° - 135°	0.2%	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°	3981	3852	3562	3768	3562	3852	3981
50°	4124	3981	3520	3588	3520	3981	4124
55°	4279	4115	3499	3418	3499	4115	4279
60°	4463	4262	3534	3170	3534	4262	4463
65°	4662	4439	3623	2852	3623	4439	4662
70°	4891	4659	3668	2366	3668	4659	4891
75°	5117	4891	3751	1844	3751	4891	5117
80°	5315	5090	3774	1116	3774	5090	5315
85°	5662	5382	3823	436	3823	5382	5662
	180.0°	210.0°	240.0°	270.0°	300.0°	330.0°	0.0°
45°	3981	3852	3562	3768	3562	3852	3981
50°	4124	3981	3520	3588	3520	3981	4124
55°	4279	4115	3499	3418	3499	4115	4279
60°	4463	4262	3534	3170	3534	4262	4463
65°	4662	4439	3623	2852	3623	4439	4662
70°	4891	4659	3668	2366	3668	4659	4891
75°	5117	4891	3751	1844	3751	4891	5117
80°	5315	5090	3774	1116	3774	5090	5315
85°	5662	5382	3823	436	3823	5382	5662

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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°	3928	3789	3514	3782	3618	3899	4033
50°	4064	3909	3476	3612	3568	4035	4183
55°	4207	4036	3430	3410	3552	4174	4351
60°	4379	4155	3492	3174	3547	4341	4547
65°	4560	4355	3557	2875	3701	4519	4763
70°	4777	4548	3618	2403	3745	4732	5004
75°	4999	4763	3679	1886	3824	4989	5235
80°	5167	4950	3712	1140	3805	5179	5463
85°	5531	5254	3733	498	3901	5483	5794
	180.0°	210.0°	240.0°	270.0°	300.0°	330.0°	0.0°
45°	4033	3884	3569	3753	3547	3835	3928
50°	4183	4014	3519	3563	3515	3969	4064
55°	4351	4146	3508	3426	3503	4105	4207
60°	4547	4296	3551	3166	3545	4255	4379
65°	4763	4456	3608	2829	3625	4428	4560
70°	5004	4697	3611	2330	3700	4659	4777
75°	5235	4907	3711	1801	3791	4905	4999
80°	5463	5090	3734	1093	3847	5140	5167
85°	5794	5383	3740	373	3919	5409	5531

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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°	2949	2853	2639	2791	2639	2853	2949
50°	3055	2949	2607	2658	2607	2949	3055
55°	3170	3048	2591	2532	2591	3048	3170
60°	3306	3157	2618	2348	2618	3157	3306
65°	3453	3288	2684	2113	2684	3288	3453
70°	3623	3451	2717	1753	2717	3451	3623
75°	3790	3623	2778	1366	2778	3623	3790
80°	3937	3770	2796	827	2796	3770	3937
85°	4194	3987	2832	323	2832	3987	4194
	180.0°	210.0°	240.0°	270.0°	300.0°	330.0°	0.0°
45°	2949	2853	2639	2791	2639	2853	2949
50°	3055	2949	2607	2658	2607	2949	3055
55°	3170	3048	2591	2532	2591	3048	3170
60°	3306	3157	2618	2348	2618	3157	3306
65°	3453	3288	2684	2113	2684	3288	3453
70°	3623	3451	2717	1753	2717	3451	3623
75°	3790	3623	2778	1366	2778	3623	3790
80°	3937	3770	2796	827	2796	3770	3937
85°	4194	3987	2832	323	2832	3987	4194

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Customer

Encapsulite International Ltd.

Luminaire Range

MT70 IP68

Luminaire catalog No.

MT70 18W

Luminaire description

linear cylindrical luminaire
with clear cover

data derived from range test series

Lamp description

18W/840 L Osram SmartLux Pro

Lamp lumen output

1,350 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°	2910	2806	2603	2802	2680	2888	2988
50°	3010	2895	2575	2676	2643	2989	3099
55°	3117	2990	2541	2526	2631	3092	3223
60°	3243	3078	2587	2351	2628	3215	3368
65°	3378	3226	2635	2130	2742	3347	3528
70°	3538	3369	2680	1780	2774	3506	3707
75°	3703	3528	2725	1397	2832	3695	3878
80°	3828	3667	2750	845	2818	3836	4046
85°	4097	3892	2765	369	2890	4061	4292
	180.0°	210.0°	240.0°	270.0°	300.0°	330.0°	0.0°
45°	2988	2877	2643	2780	2628	2841	2910
50°	3099	2973	2607	2640	2604	2940	3010
55°	3223	3071	2599	2538	2595	3040	3117
60°	3368	3183	2631	2345	2626	3152	3243
65°	3528	3301	2672	2095	2686	3280	3378
70°	3707	3480	2674	1726	2741	3451	3538
75°	3878	3635	2749	1334	2808	3633	3703
80°	4046	3770	2766	809	2849	3808	3828
85°	4292	3987	2770	276	2903	4007	4097

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Customer Encapsulite International Ltd.
Luminaire Range MT70 IP68
Luminaire catalog No. MT70 18W
Luminaire description linear cylindrical luminaire
with clear cover
data derived from range test series
Lamp description 18W/840 L Osram SmartLux Pro
Lamp lumen output 1,350 lm
Lamp quantity 1

Maximum Non averaged Luminance Values (cd/m²)

Elevation(°)

Maximum Azimuth Angle

45°	4033	180°
50°	4183	180°
55°	4351	180°
60°	4547	180°
65°	4763	180°
70°	5004	180°
75°	5235	180°
80°	5463	180°
85°	5794	180°

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Lamp lumen output 1,350 lm
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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Customer

Encapsulite International Ltd.

Luminaire Range

MT70 IP68

Luminaire catalog No.

MT70 18W

Luminaire description

linear cylindrical luminaire
with clear cover

data derived from range test series

Lamp description

18W/840 L Osram SmartLux Pro

Lamp lumen output

1,350 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°

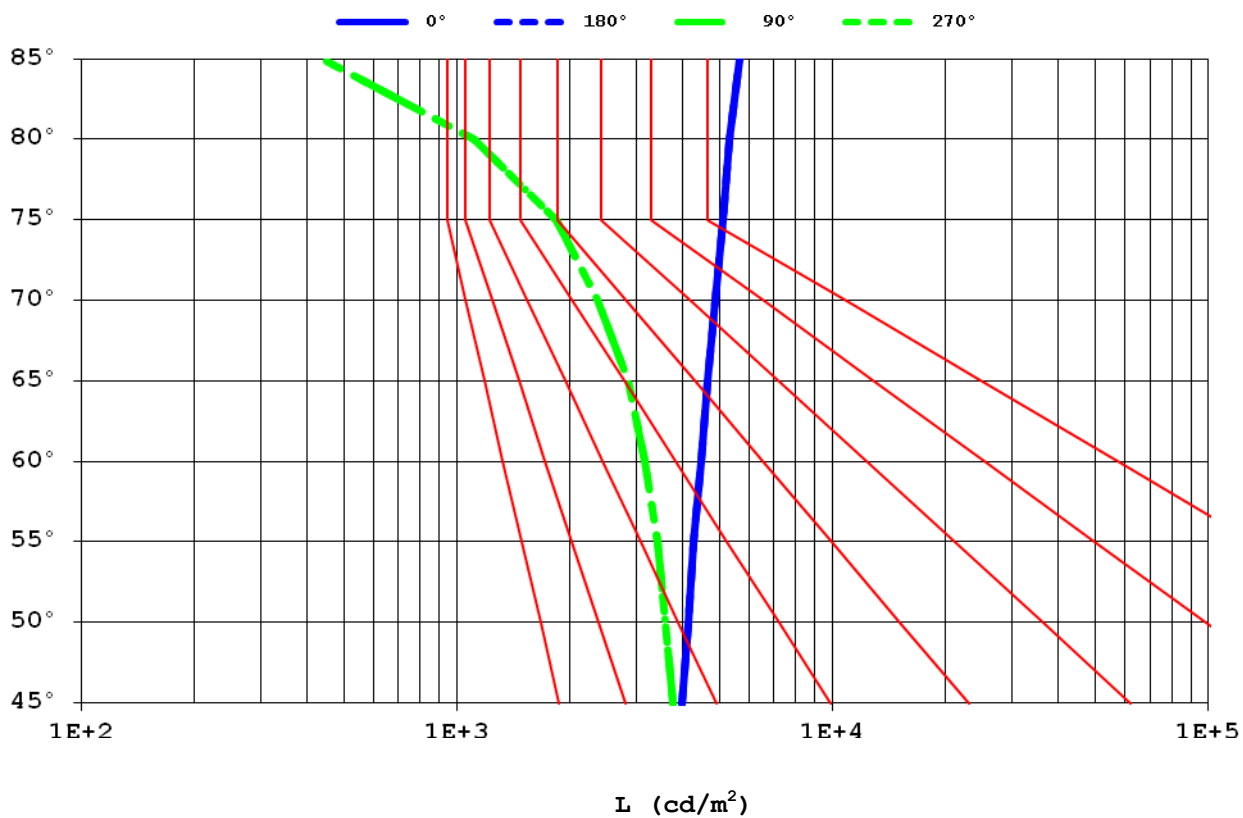
2H 2H	15.1	16.8	15.9	17.6	18.6	11.3	13.1	12.1	13.9	14.8
3H	18.6	20.2	19.4	21.0	22.0	13.2	14.8	14.0	15.7	16.6
4H	20.2	21.8	21.1	22.6	23.6	13.9	15.4	14.7	16.2	17.2
6H	22.0	23.5	22.9	24.3	25.3	14.3	15.7	15.1	16.6	17.6
8H	22.9	24.3	23.7	25.1	26.2	14.3	15.7	15.2	16.6	17.6
12H	23.8	25.2	24.6	26.0	27.1	14.3	15.7	15.2	16.6	17.6
4H 2H	16.0	17.6	16.9	18.4	19.4	13.6	15.1	14.4	16.0	17.0
3H	19.9	21.2	20.7	22.1	23.1	15.9	17.3	16.8	18.1	19.2
4H	21.9	23.1	22.7	24.0	25.0	16.9	18.1	17.7	19.0	20.1
6H	23.8	24.9	24.7	25.8	26.9	17.5	18.6	18.4	19.5	20.6
8H	24.8	25.9	25.7	26.8	27.9	17.7	18.8	18.6	19.7	20.8
12H	25.9	26.9	26.8	27.8	28.9	17.8	18.8	18.7	19.7	20.8
8H 4H	22.5	23.6	23.4	24.5	25.6	19.1	20.2	20.0	21.1	22.2
6H	24.8	25.7	25.7	26.6	27.7	20.1	21.0	21.0	21.9	23.1
8H	26.1	26.9	27.0	27.9	29.0	20.6	21.4	21.5	22.4	23.5
12H	27.4	28.1	28.4	29.1	30.2	20.9	21.6	21.8	22.6	23.7
12H 4H	22.7	23.6	23.6	24.6	25.7	20.0	21.0	20.9	21.9	23.0
6H	25.1	25.9	26.0	26.9	28.0	21.3	22.1	22.3	23.1	24.2
8H	26.5	27.2	27.4	28.1	29.3	21.9	22.6	22.9	23.6	24.7

Calculated in accordance with CIBSE Technical Memorandum No. 10 1985

Customer Encapsulite International Ltd.
Luminaire Range MT70 IP68
Luminaire catalog No. MT70 18W
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Lamp lumen output 1,350 lm
Lamp quantity 1

CIE Glare Limiting (Soellnor) Diagram

Glare Rating	Quality Class	Service values of illuminance							
		a	b	c	d	e	f	g	h
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



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Customer	Encapsulite International Ltd.
Luminaire Range	MT70 IP68
Luminaire catalog No.	MT70 18W
Luminaire description	linear cylindrical luminaire with clear cover data derived from range test series
Lamp description	18W/840 L Osram SmartLux Pro
Lamp lumen output	1,350 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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Customer Encapsulite International Ltd.
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Luminaire catalog No. MT70 18W
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Lamp description 18W/840 L Osram SmartLux Pro
Lamp lumen output 1,350 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 = 1350 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	2.8	4.2	5.7	7.1	11.3	14.2	28.3	42.5	70.8