



Sky High Rack

Photometric and Optical Testing Services Test Report POTS/DC14100

Meadowbank Business Park
Tweedale Way
Oldham
OL9 8EH

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0845 313 2752

PHOTOMETRIC TEST REPORT

Report Number: POTS/DC14100

Report Date: 02/05/2014

Prepared By: D CHAMBERS

Details of Product Tested

| | |
|--|---------------------------|
| Manufacturer: CONSTANT GROUP | Source Type: LED |
| Model: 180CM BATTEN | Luminaire Type: DOWNLIGHT |
| Power Supply Used: Uninterruptible AC power supply | |
| Voltage(AC V) = 230.0 | Current (mA)= 659 |
| Power (Watts)= 149 | Power factor= 0.982 |

Results

| | |
|---------------------------------|----------------------------------|
| Flux (lumens): 14401 | |
| CIE 1931 Chromaticity Cx:0.3735 | CIE 1931 Chromaticity Cy: 0.3643 |
| CRI (%):87.53 | CCT (K): 4107 |

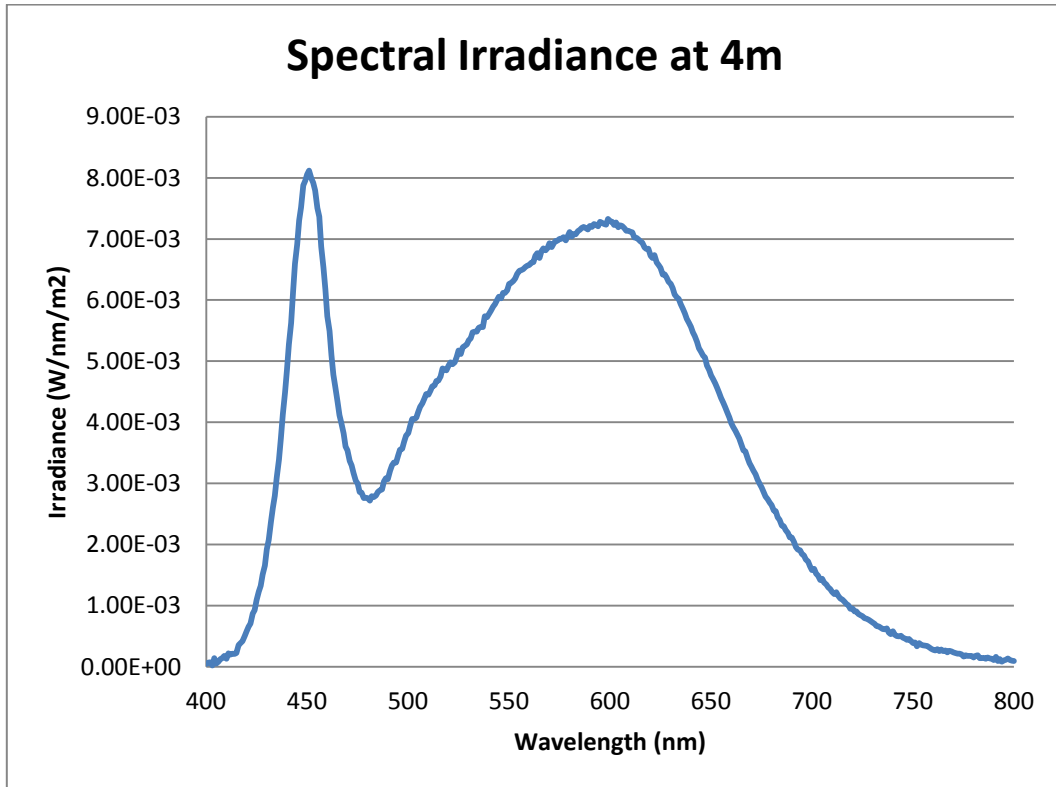


Figure 1: Spectral Irradiance

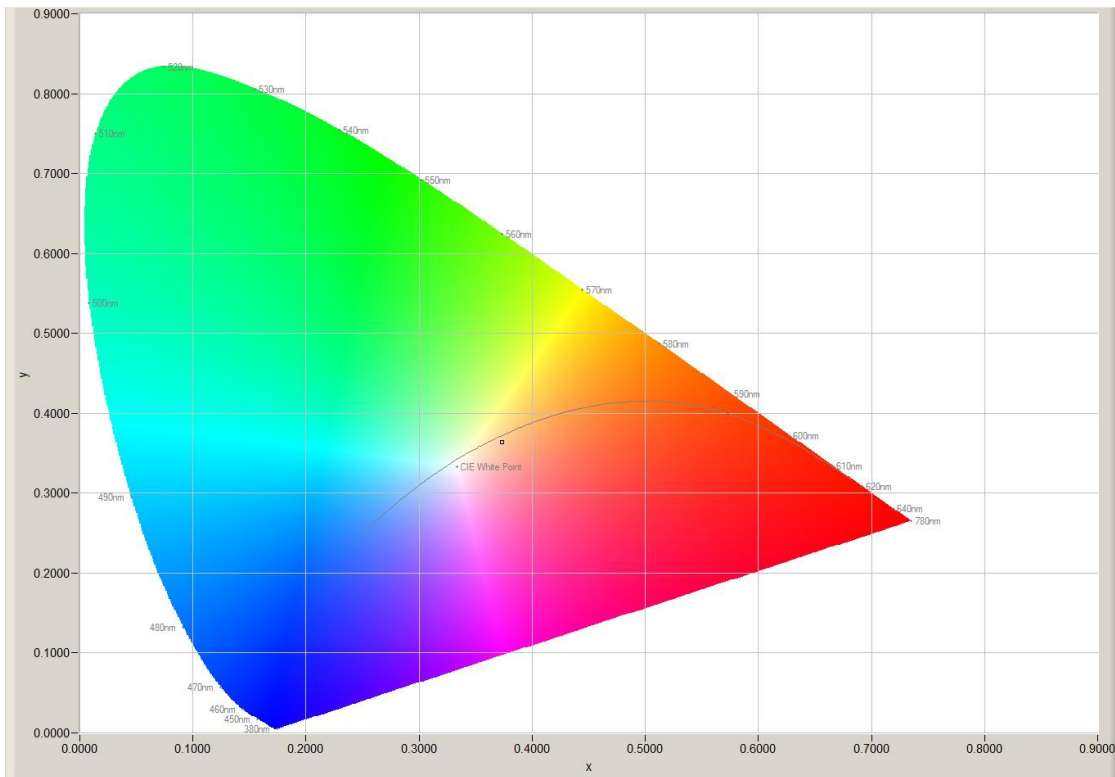


Figure 2: CIE 1931 diagram.

| GONIOPHOTOMETER TEST | | |
|--|--|--|
| Date of Test: 02/05/2014 | Ambient Temperature: 25°C | |
| Measurement Filename: 180CM BATTEN | | |
| Instrument Used: Radiant Imaging NFMS0800 Goniometer with ProMetric PM-1200N-1 Imaging Photometer | | |
| Photometer Working Distance: 4m | Measurement Geometry: Near-Field | |
| Comments: | | |
| Reference Photometer Used: Specbos1201 | Reference Photometer Serial Number: 2911670 | |
| Traceable: to NPL standards, UKAS Accredited | Calibration Certificate Number: 13201 | |
| Calibration Certificate Date: 15 th March 2013 | Sample Stabilisation Time (minutes): 45 | |
| Reference Photometer Calibration Uncertainty: $\pm 2.4\%$ ($k=2$, 20-200 lux, CIE illuminant A source) | | |
| Scan Set Up | | |
| Direction | Range | Increment |
| Inclination Zone 1 | 0-90° | 3° |
| Azimuth | 0-360° | 10° |
| Results | | |
| Integrated Luminous Flux (lumens):14401 | Peak Intensity (3° Spot, candelas): 6716 | Efficacy (lumens/Watt): 96.7 |
| Illuminance at beam centre at 10m (lux):65.9 | Illuminance at beam centre at 12m (lux):45.8 | Illuminance at beam centre at 15m (lux):29.3 |
| Beam Angle (50% of max intensity C0-180, degrees): 114.4 | | |
| Photometric Filename (IES LM-63-2002): 180CM BATTEN | | |
| IES File – Absolute or Relative Format? RELATIVE | | |
| Photometric Filename (EULUMDAT): 180CM BATTEN | | |
| EULUMDAT File – Absolute or Relative Format? RELATIVE | | |

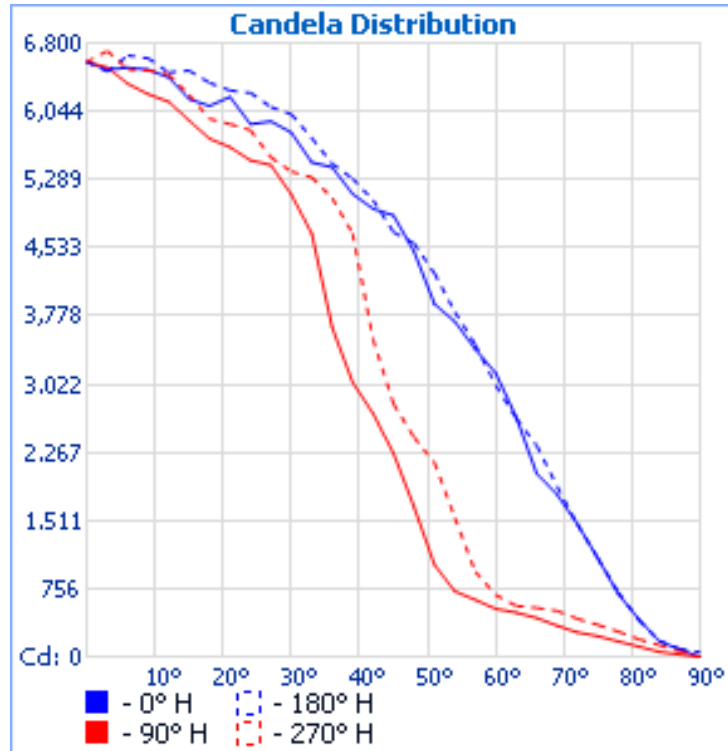


Figure 3: Far-Field Luminous Intensity (C0-180, Cartesian Coordinates)

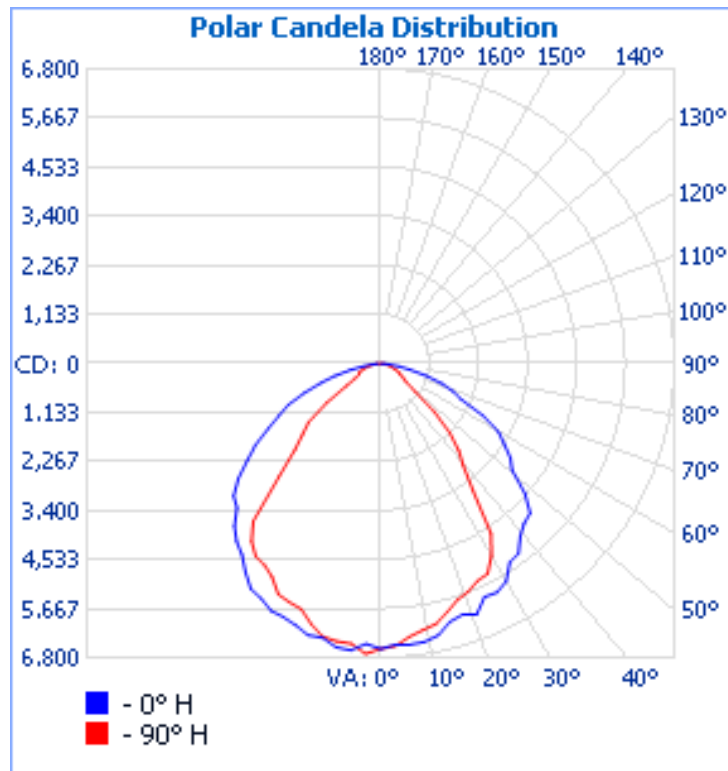


Figure 4: Far-Field Luminous Intensity (C0-180, C90-270, Polar Coordinates)

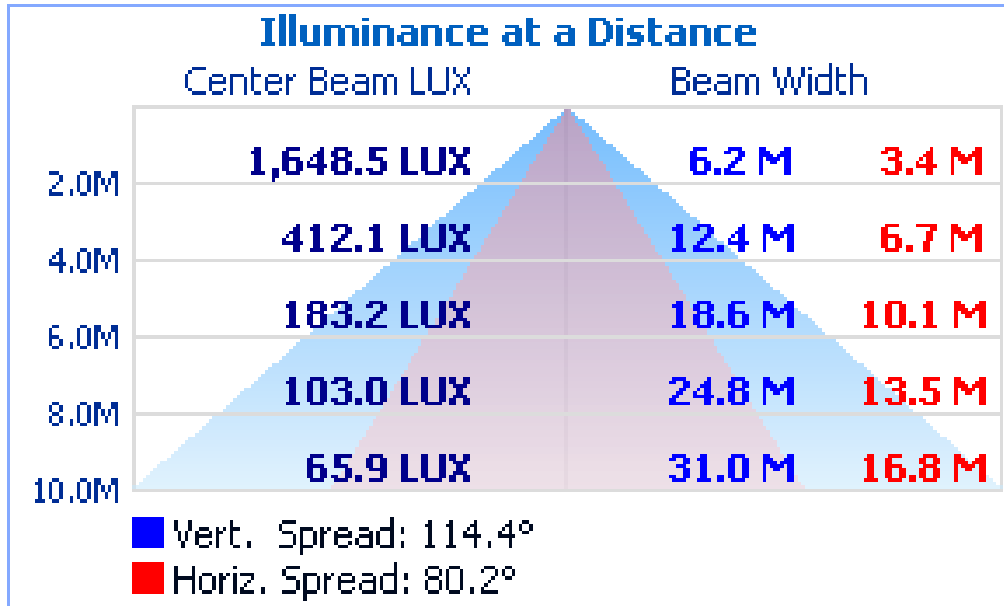


Figure 4. Cone diagram for mounting height of 10 metres.

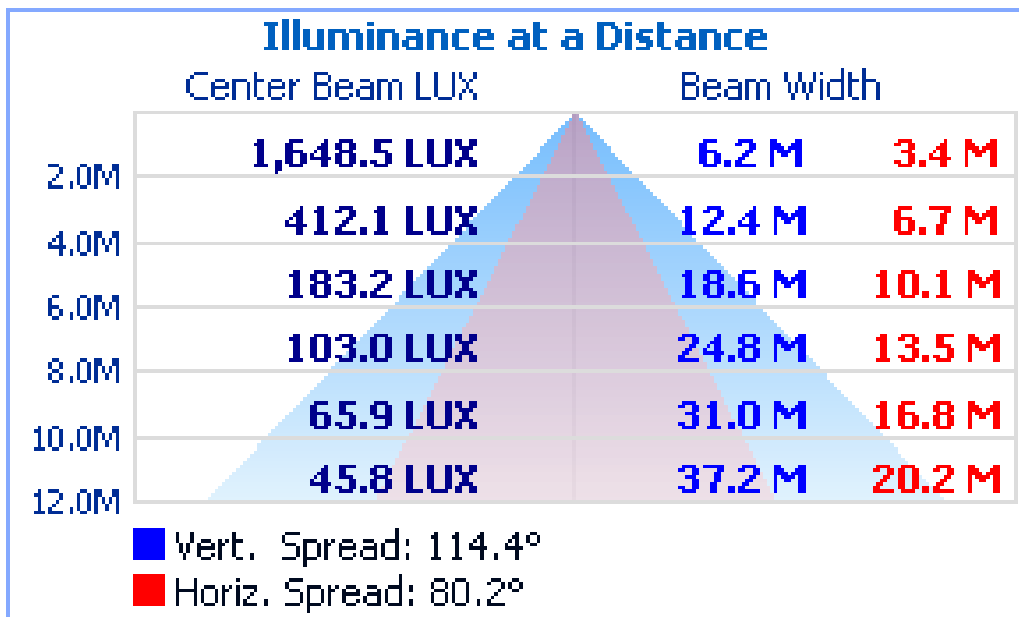


Figure 5. Cone diagram for mounting height of 12 metres.

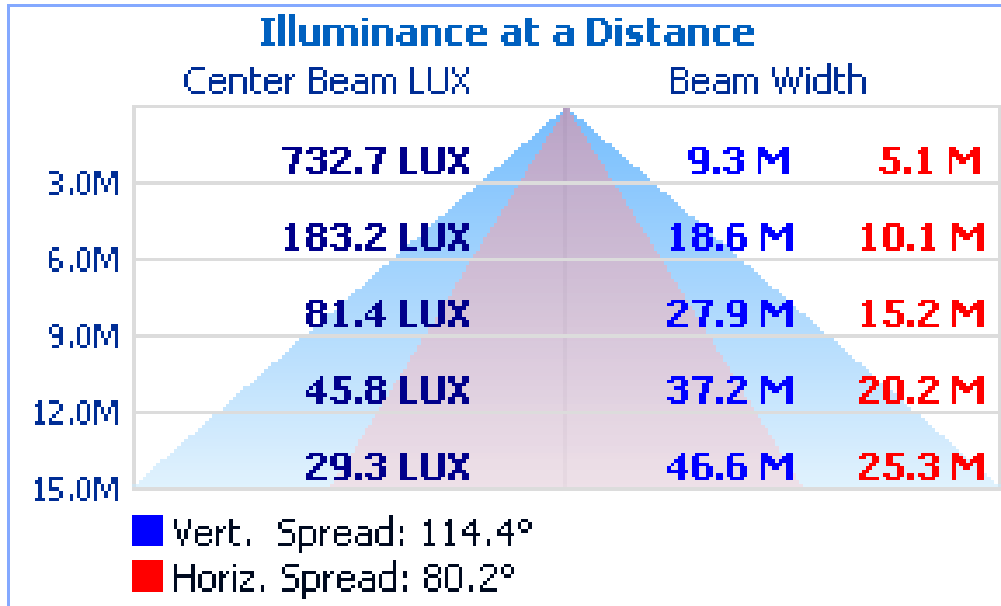


Figure 6. Cone diagram for for mounting height of 15 metres.

| Room dimension | | Viewed crosswise | | | | | Viewed endwise | | | | |
|----------------|------|------------------|------|------|------|------|----------------|------|------|------|------|
| x | y | | | | | | | | | | |
| 2H | 2H | 19.6 | 21.1 | 20.0 | 21.4 | 21.7 | 16.9 | 18.4 | 17.3 | 18.7 | 19.0 |
| | 3H | 20.6 | 21.9 | 21.0 | 22.3 | 22.6 | 17.2 | 18.6 | 17.6 | 18.9 | 19.2 |
| | 4H | 20.9 | 22.2 | 21.3 | 22.5 | 22.9 | 17.4 | 18.7 | 17.8 | 19.0 | 19.4 |
| | 6H | 21.0 | 22.2 | 21.5 | 22.6 | 23.0 | 17.6 | 18.7 | 18.0 | 19.1 | 19.5 |
| | 8H | 21.0 | 22.1 | 21.4 | 22.5 | 22.9 | 17.6 | 18.7 | 18.0 | 19.1 | 19.5 |
| 12H | 21.0 | 22.0 | 21.4 | 22.4 | 22.8 | 17.6 | 18.7 | 18.0 | 19.1 | 19.5 | |
| 4H | 2H | 19.6 | 20.9 | 20.0 | 21.2 | 21.6 | 17.4 | 18.6 | 17.7 | 19.0 | 19.3 |
| | 3H | 20.6 | 21.7 | 21.0 | 22.1 | 22.5 | 17.7 | 18.8 | 18.1 | 19.2 | 19.6 |
| | 4H | 21.0 | 21.9 | 21.4 | 22.4 | 22.8 | 18.0 | 18.9 | 18.4 | 19.3 | 19.8 |
| | 6H | 21.1 | 21.9 | 21.6 | 22.4 | 22.8 | 18.2 | 19.0 | 18.6 | 19.4 | 19.9 |
| | 8H | 21.1 | 21.9 | 21.6 | 22.3 | 22.8 | 18.2 | 19.0 | 18.7 | 19.4 | 19.9 |
| 12H | 21.1 | 21.8 | 21.6 | 22.3 | 22.8 | 18.3 | 19.0 | 18.8 | 19.4 | 20.0 | |
| 8H | 4H | 20.9 | 21.7 | 21.4 | 22.1 | 22.6 | 18.0 | 18.8 | 18.5 | 19.2 | 19.7 |
| | 6H | 21.0 | 21.7 | 21.5 | 22.1 | 22.6 | 18.2 | 18.9 | 18.7 | 19.3 | 19.8 |
| | 8H | 21.1 | 21.6 | 21.6 | 22.2 | 22.6 | 18.4 | 18.9 | 18.9 | 19.5 | 19.9 |
| | 12H | 21.1 | 21.5 | 21.6 | 22.1 | 22.6 | 18.5 | 18.9 | 19.0 | 19.4 | 20.0 |
| 12H | 4H | 20.9 | 21.6 | 21.4 | 22.0 | 22.5 | 18.0 | 18.7 | 18.5 | 19.1 | 19.6 |
| | 6H | 21.1 | 21.6 | 21.6 | 22.1 | 22.6 | 18.3 | 18.8 | 18.8 | 19.3 | 19.8 |
| | 8H | 21.1 | 21.5 | 21.6 | 22.0 | 22.6 | 18.4 | 18.9 | 18.9 | 19.4 | 19.9 |

Table 1. UGR values

| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 |
| 3 | 6508 | 6497 | 6499 | 6533 | 6543 | 6507 | 6451 | 6438 | 6473 | 6532 | 6559 | 6530 | 6477 | 6435 | 6416 | 6411 | 6423 | 6447 | 6486 |
| 6 | 6531 | 6586 | 6530 | 6443 | 6381 | 6341 | 6341 | 6403 | 6400 | 6352 | 6320 | 6332 | 6374 | 6481 | 6567 | 6579 | 6560 | 6578 | 6665 |
| 9 | 6508 | 6460 | 6385 | 6421 | 6325 | 6288 | 6255 | 6304 | 6189 | 6236 | 6281 | 6225 | 6255 | 6408 | 6387 | 6460 | 6287 | 6397 | 6634 |
| 12 | 6422 | 6461 | 6338 | 6354 | 6258 | 6236 | 6095 | 6092 | 6070 | 6153 | 6000 | 6110 | 6147 | 6092 | 6174 | 6339 | 6146 | 6265 | 6477 |
| 15 | 6183 | 6455 | 6278 | 6037 | 5991 | 6090 | 5967 | 5843 | 5873 | 5946 | 5939 | 5851 | 5965 | 5989 | 5977 | 6089 | 6267 | 6170 | 6498 |
| 18 | 6106 | 6337 | 6101 | 5980 | 5848 | 5845 | 5955 | 5855 | 5852 | 5744 | 5865 | 5816 | 5831 | 5968 | 5759 | 5984 | 6109 | 6010 | 6363 |
| 21 | 6208 | 6118 | 5904 | 5844 | 5651 | 5829 | 5572 | 5631 | 5745 | 5650 | 5642 | 5692 | 5559 | 5670 | 5883 | 5651 | 6008 | 5886 | 6277 |
| 24 | 5904 | 5973 | 5756 | 5658 | 5723 | 5515 | 5599 | 5510 | 5498 | 5503 | 5539 | 5384 | 5557 | 5450 | 5705 | 5468 | 5989 | 5660 | 6252 |
| 27 | 5936 | 5739 | 5550 | 5471 | 5328 | 5450 | 5310 | 5391 | 5327 | 5451 | 5361 | 5441 | 5427 | 5346 | 5480 | 5337 | 5737 | 5532 | 6095 |
| 30 | 5811 | 5560 | 5360 | 5287 | 5255 | 5188 | 5094 | 5198 | 5162 | 5123 | 5161 | 5287 | 5193 | 5153 | 5152 | 5281 | 5387 | 5344 | 6015 |
| 33 | 5481 | 5406 | 5139 | 5064 | 5128 | 4981 | 4958 | 4869 | 4618 | 4692 | 4579 | 4834 | 4919 | 4964 | 4906 | 5111 | 5115 | 5139 | 5750 |
| 36 | 5427 | 5173 | 4926 | 4933 | 4844 | 4782 | 4569 | 4075 | 3584 | 3649 | 3508 | 3848 | 4541 | 4924 | 4700 | 5030 | 4920 | 4983 | 5466 |
| 39 | 5131 | 4882 | 4679 | 4564 | 4762 | 4363 | 3884 | 3365 | 3111 | 3043 | 3025 | 3107 | 3569 | 4298 | 4427 | 4724 | 4529 | 4809 | 5300 |
| 42 | 4967 | 4486 | 4409 | 4403 | 4210 | 3885 | 3180 | 2850 | 2551 | 2697 | 2741 | 2858 | 3067 | 3305 | 4235 | 4515 | 4243 | 4461 | 5063 |
| 45 | 4894 | 4337 | 4134 | 4178 | 3816 | 3138 | 2745 | 2357 | 2219 | 2256 | 2245 | 2543 | 2739 | 2713 | 3454 | 4082 | 3924 | 4191 | 4708 |
| 48 | 4493 | 4058 | 3987 | 3602 | 3481 | 2749 | 2253 | 2008 | 1607 | 1663 | 1596 | 2025 | 2355 | 2551 | 2799 | 3565 | 3602 | 4060 | 4584 |
| 51 | 3912 | 3727 | 3732 | 3352 | 2715 | 2191 | 1890 | 1278 | 1062 | 1021 | 982 | 1276 | 1788 | 2179 | 2545 | 2976 | 3372 | 3671 | 4252 |
| 54 | 3716 | 3383 | 3422 | 2632 | 2070 | 1752 | 1334 | 933 | 771 | 728 | 804 | 918 | 1070 | 1553 | 2138 | 2384 | 3035 | 3439 | 3823 |
| 57 | 3410 | 3094 | 2785 | 2138 | 1737 | 1299 | 913 | 662 | 575 | 633 | 656 | 697 | 788 | 992 | 1675 | 2000 | 2559 | 3122 | 3462 |
| 60 | 3146 | 2829 | 2325 | 1707 | 1345 | 875 | 624 | 565 | 577 | 533 | 568 | 596 | 609 | 806 | 1076 | 1527 | 2139 | 2689 | 3010 |
| 63 | 2658 | 2364 | 1915 | 1431 | 871 | 596 | 545 | 494 | 501 | 493 | 508 | 497 | 536 | 668 | 913 | 1139 | 1627 | 2373 | 2644 |
| 66 | 2034 | 1962 | 1510 | 1129 | 623 | 493 | 460 | 469 | 404 | 433 | 427 | 479 | 479 | 513 | 680 | 708 | 1249 | 1984 | 2343 |
| 69 | 1799 | 1533 | 1116 | 680 | 470 | 431 | 426 | 418 | 382 | 348 | 358 | 376 | 396 | 402 | 519 | 569 | 979 | 1522 | 1889 |
| 72 | 1470 | 1261 | 694 | 420 | 396 | 369 | 354 | 306 | 327 | 272 | 338 | 296 | 347 | 395 | 385 | 440 | 593 | 1270 | 1466 |
| 75 | 1091 | 908 | 415 | 285 | 325 | 288 | 309 | 250 | 217 | 231 | 245 | 239 | 260 | 285 | 324 | 327 | 393 | 886 | 1091 |
| 78 | 695 | 570 | 265 | 234 | 259 | 229 | 199 | 188 | 156 | 171 | 173 | 179 | 176 | 234 | 218 | 223 | 244 | 524 | 715 |
| 81 | 419 | 304 | 196 | 183 | 154 | 173 | 136 | 135 | 115 | 116 | 114 | 138 | 155 | 152 | 155 | 146 | 175 | 294 | 408 |
| 84 | 173 | 158 | 133 | 108 | 113 | 92 | 80 | 76 | 60 | 57 | 75 | 67 | 91 | 109 | 115 | 116 | 95 | 123 | 180 |
| 87 | 84 | 91 | 82 | 58 | 70 | 64 | 41 | 42 | 37 | 29 | 39 | 57 | 52 | 58 | 65 | 72 | 70 | 98 | 89 |
| 90 | 0 | 74 | 68 | 56 | 67 | 48 | 34 | 0 | 32 | 0 | 0 | 0 | 53 | 39 | 63 | 57 | 53 | 52 | 53 |

Table 2a. Luminous intensity values, azimuth 0-180°

| | 190 | 200 | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 | 300 | 310 | 320 | 330 | 340 | 350 |
|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 | 6594 |
| 3 | 6530 | 6563 | 6569 | 6568 | 6545 | 6561 | 6624 | 6695 | 6716 | 6670 | 6586 | 6524 | 6513 | 6539 | 6542 | 6543 | 6527 |
| 6 | 6633 | 6590 | 6525 | 6480 | 6484 | 6557 | 6628 | 6577 | 6510 | 6545 | 6585 | 6595 | 6573 | 6582 | 6560 | 6481 | 6448 |
| 9 | 6434 | 6515 | 6626 | 6498 | 6556 | 6460 | 6495 | 6499 | 6499 | 6491 | 6571 | 6619 | 6505 | 6473 | 6573 | 6644 | 6541 |
| 12 | 6382 | 6399 | 6463 | 6391 | 6307 | 6359 | 6325 | 6420 | 6454 | 6423 | 6302 | 6311 | 6427 | 6506 | 6507 | 6403 | 6513 |
| 15 | 6292 | 6379 | 6339 | 6234 | 6345 | 6208 | 6246 | 6088 | 6232 | 6186 | 6112 | 6337 | 6321 | 6312 | 6379 | 6387 | 6463 |
| 18 | 6133 | 6346 | 6275 | 6176 | 6282 | 6050 | 5955 | 6087 | 5963 | 6044 | 6027 | 6209 | 5969 | 6264 | 6236 | 6246 | 6310 |
| 21 | 5951 | 6334 | 5970 | 6085 | 5903 | 5938 | 5958 | 5907 | 5906 | 5950 | 5864 | 5938 | 5934 | 6015 | 6153 | 6117 | 6107 |
| 24 | 5860 | 6183 | 5781 | 6020 | 5675 | 5806 | 5606 | 5798 | 5837 | 5671 | 5782 | 5895 | 5773 | 5970 | 5859 | 6023 | 6123 |
| 27 | 5598 | 6046 | 5751 | 5795 | 5541 | 5669 | 5567 | 5601 | 5537 | 5569 | 5709 | 5549 | 5691 | 5702 | 5681 | 5856 | 6038 |
| 30 | 5510 | 5775 | 5511 | 5437 | 5481 | 5420 | 5523 | 5452 | 5378 | 5438 | 5494 | 5418 | 5335 | 5433 | 5472 | 5699 | 5784 |
| 33 | 5249 | 5511 | 5452 | 5126 | 5363 | 5267 | 5214 | 5284 | 5315 | 5275 | 5311 | 5256 | 5232 | 5234 | 5330 | 5360 | 5656 |
| 36 | 5154 | 5277 | 5282 | 4992 | 5133 | 5034 | 5152 | 5062 | 5085 | 4985 | 5137 | 5103 | 5038 | 5111 | 5143 | 5147 | 5263 |
| 39 | 4938 | 4932 | 5089 | 4688 | 4962 | 4776 | 4598 | 4619 | 4691 | 4594 | 4636 | 4890 | 4829 | 4881 | 4786 | 4974 | 5119 |
| 42 | 4733 | 4392 | 4793 | 4640 | 4471 | 4287 | 3992 | 3687 | 3518 | 3624 | 3872 | 4398 | 4706 | 4617 | 4653 | 4779 | 4819 |
| 45 | 4401 | 4292 | 4520 | 4320 | 4036 | 3628 | 3312 | 2936 | 2802 | 2839 | 3051 | 3487 | 4219 | 4430 | 4494 | 4340 | 4409 |
| 48 | 4128 | 3946 | 4101 | 3967 | 3328 | 3113 | 2613 | 2497 | 2434 | 2582 | 2709 | 2885 | 3373 | 3977 | 4149 | 4162 | 4239 |
| 51 | 3983 | 3571 | 3779 | 3577 | 2877 | 2344 | 2383 | 2280 | 2154 | 2358 | 2393 | 2536 | 2745 | 3271 | 3686 | 3942 | 3899 |
| 54 | 3609 | 3353 | 3300 | 3200 | 2364 | 2032 | 1940 | 1762 | 1543 | 1569 | 1786 | 2107 | 2499 | 2505 | 3302 | 3678 | 3582 |
| 57 | 3295 | 2898 | 2781 | 2599 | 1869 | 1618 | 1293 | 1039 | 945 | 1027 | 1103 | 1377 | 2018 | 2354 | 2629 | 3193 | 3177 |
| 60 | 2973 | 2511 | 2205 | 1989 | 1440 | 1136 | 905 | 748 | 687 | 727 | 825 | 977 | 1307 | 1967 | 1956 | 2763 | 2900 |
| 63 | 2509 | 2236 | 1828 | 1522 | 1103 | 793 | 636 | 606 | 566 | 614 | 676 | 829 | 889 | 1251 | 1791 | 2424 | 2475 |
| 66 | 2122 | 1778 | 1434 | 1082 | 741 | 586 | 543 | 572 | 544 | 576 | 581 | 642 | 773 | 805 | 1532 | 1892 | 2043 |
| 69 | 1757 | 1228 | 897 | 772 | 574 | 506 | 511 | 534 | 511 | 500 | 519 | 489 | 601 | 611 | 955 | 1372 | 1675 |
| 72 | 1388 | 895 | 589 | 545 | 468 | 465 | 404 | 414 | 424 | 437 | 405 | 462 | 511 | 518 | 552 | 972 | 1445 |
| 75 | 1013 | 584 | 375 | 416 | 399 | 367 | 353 | 373 | 355 | 344 | 359 | 393 | 414 | 410 | 401 | 681 | 999 |
| 78 | 611 | 306 | 294 | 320 | 314 | 270 | 293 | 293 | 281 | 306 | 280 | 281 | 334 | 322 | 296 | 362 | 637 |
| 81 | 306 | 231 | 227 | 262 | 248 | 230 | 213 | 210 | 196 | 209 | 221 | 219 | 244 | 256 | 234 | 225 | 350 |
| 84 | 175 | 117 | 163 | 174 | 176 | 144 | 160 | 160 | 130 | 145 | 143 | 174 | 200 | 184 | 152 | 145 | 189 |
| 87 | 84 | 75 | 110 | 111 | 101 | 102 | 104 | 98 | 62 | 89 | 90 | 95 | 102 | 113 | 87 | 102 | 117 |
| 90 | 50 | 58 | 68 | 70 | 90 | 56 | 42 | 58 | 0 | 53 | 65 | 65 | 79 | 55 | 58 | 73 | 49 |

Table 2b. Luminous intensity values, azimuth 190-350°

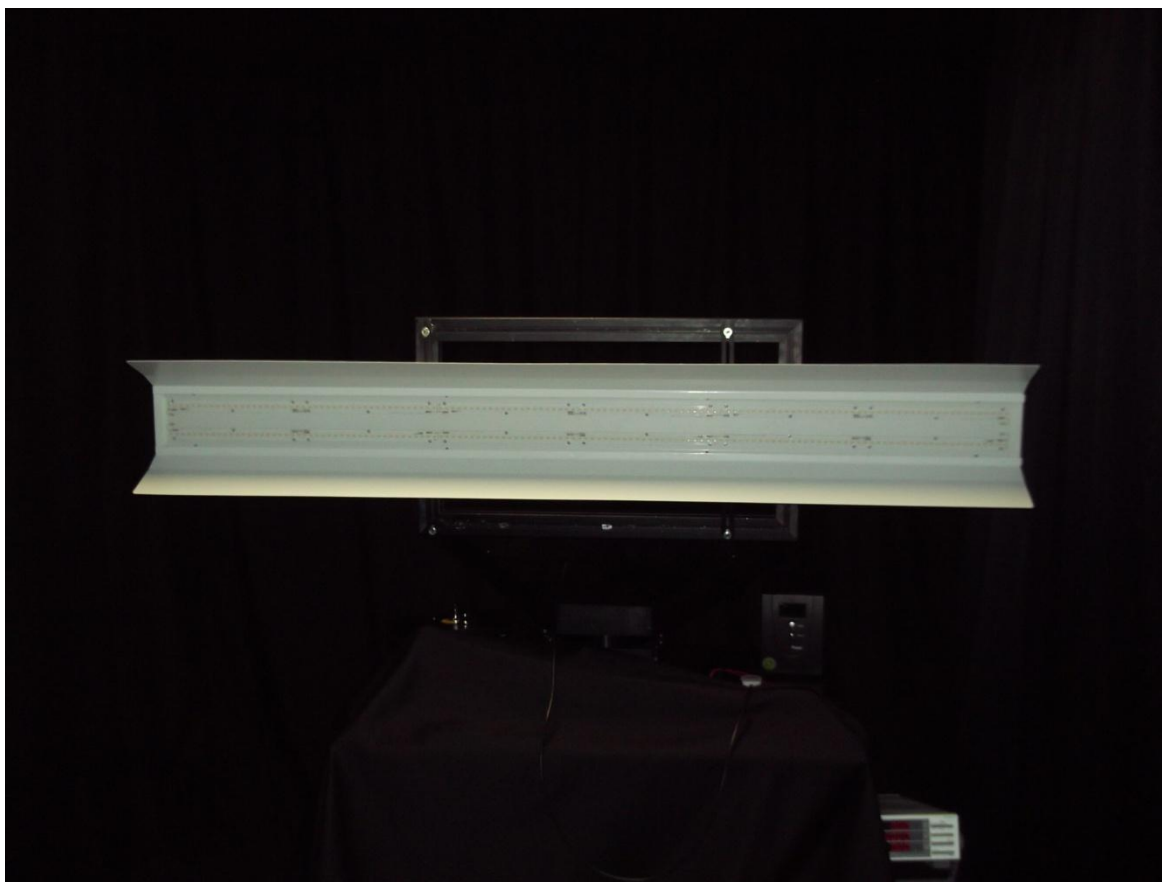


Photo 1: Luminaire on goniometer mount

Tested by:

Signature:

Print Name: D CHAMBERS

Date: 02/05/2014

Test Engineer

Checked by:

Signature:

Print Name: GH JOHN

Date: 06-05-2014

Partner / Director