LightLab INTERNATIONAL ALLENTOWN LLC

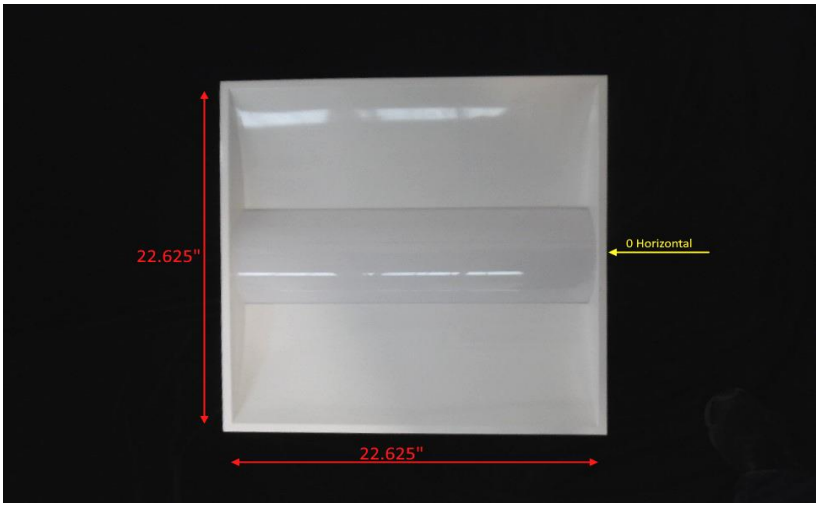
NVLAP TESTING Lab Code: 201079-0

# Report of Test

## LLIA001457-002

Indoor Distribution Photometry Test Report

Catalog Number: F-VTC22/40/PCTS/D86 - 30W/4000K Setting
Recessed mounted, formed steel housing, translucent white linear ribbed plastic enclosure.
228 LEDs, 4 LED boards with 28 cool white and 28 warm white LEDs each.
One WSP-Z45AD-0420900 LED driver




Prepared For:
Topaz Lighting Corp
925 Waverly Avenue
Holtsville, NY 11742, USA

| Performance Summary | | | | | |
|---|---|---|---|---|---|
| Input Voltage | 120.0 | V | Luminous Flux | 3962.1 | Lumens |
| Input Current | 0.2375 | A | Total Efficacy | 144.0 | Lm/W |
| Input Power | 27.51 | W | Downward Flux | 3962.1 | Lumens |
| Frequency | 60.00 | Hz | Downward Flux | 100.0 | % of Total |
| Power Factor | 0.965 | | | | |
| Current THD | 8.7 | % | | | |

This test report was issued by LightLab International Allentown, LLC without alterations or erasures.

Test date: 05/05/2021
Report date: 05/05/2021

Signed: Michael L. Grather

*USA west coast* LightLab International, LLC, 24825 N. 16th Avenue, Suite 125, Phoenix, AZ, 85085, Ph : +1 623-434-1499, Fx : +1 623-434-1492, www.lightlabint.com
*USA east coast* LightLab Int'l Allentown LLC, 905 Harrison Street, Suite 135, Allentown, PA 18103, Ph: +1 484-273-0705, www.lightlaballentown.com (issuing laboratory)
*Australasia & S.E. Asia* LightLab International, 50 Redcliffe Gardens Drive, Clontarf, Queensland, 4019, Australia, Ph : +61 7 3283 7862, Fx : +61 7 3283 8751, www.lightlabint.com

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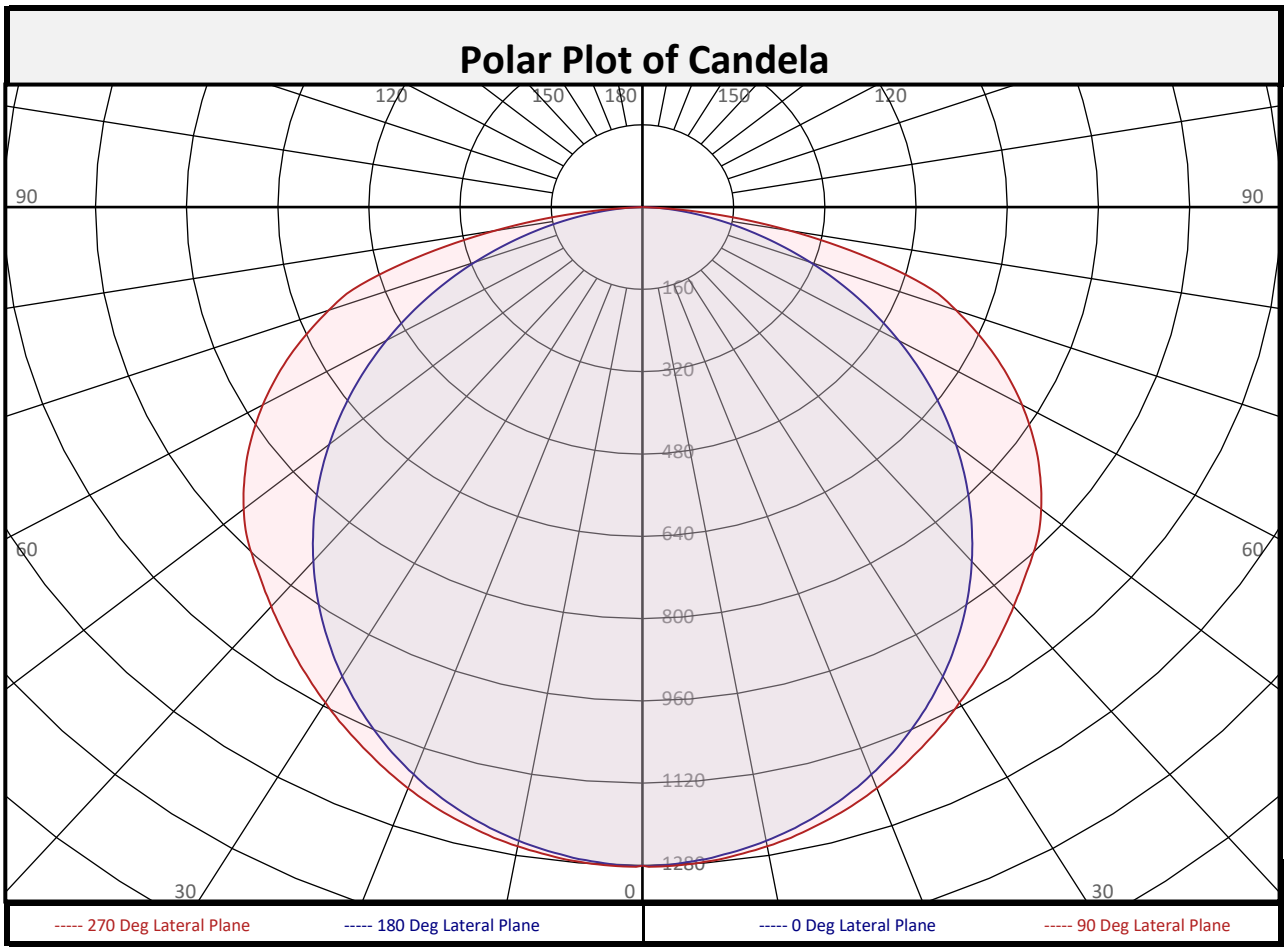
## LLIA001457-002




| Zonal Flux Summary | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Zone (Deg Vert) | Flux (Lumens) | Percent of Total | Zone (Deg Vert) | Flux (Lumens) | Percent of Total | Zone (Deg Vert) | Flux (Lumens) | Percent of Total |
| 0-10 | 121.2 | 3.1% | 90-100 | 0.0 | 0.0% | 0-20 | 467.6 | 11.8% |
| 10-20 | 346.4 | 8.7% | 100-110 | 0.0 | 0.0% | 0-30 | 992.4 | 25.0% |
| 20-30 | 524.8 | 13.2% | 110-120 | 0.0 | 0.0% | 0-40 | 1630 | 41.1% |
| 30-40 | 637.1 | 16.1% | 120-130 | 0.0 | 0.0% | 0-60 | 2960 | 74.7% |
| 40-50 | 678.9 | 17.1% | 130-140 | 0.0 | 0.0% | 0-80 | 3870 | 97.7% |
| 50-60 | 651.1 | 16.4% | 140-150 | 0.0 | 0.0% | 10-90 | 3841 | 96.9% |
| 60-70 | 547.6 | 13.8% | 150-160 | 0.0 | 0.0% | 20-50 | 1841 | 46.5% |
| 70-80 | 363.3 | 9.2% | 160-170 | 0.0 | 0.0% | 40-90 | 2333 | 58.9% |
| 80-90 | 91.7 | 2.3% | 170-180 | 0.0 | 0.0% | 60-90 | 1003 | 25.3% |
| 0-90 | 3962 | 100.0% | 90-180 | 0.0 | 0.0% | 0-180 | 3962 | 100.0% |

# Report of Test

## LLIA001457-002

Luminous Intensity (Candela) Table

| | Lateral (C-Plane) Angles | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Vertical (Gamma) Angles | | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 |
| | 0 | 1281 | 1281 | 1281 | 1281 | 1281 | 1281 | 1281 | 1281 | 1281 |
| | 2.5 | 1279 | 1278 | 1278 | 1280 | 1282 | 1280 | 1278 | 1278 | 1279 |
| | 5 | 1273 | 1273 | 1274 | 1276 | 1278 | 1276 | 1274 | 1273 | 1273 |
| | 7.5 | 1263 | 1265 | 1266 | 1270 | 1271 | 1270 | 1266 | 1265 | 1263 |
| | 10 | 1251 | 1253 | 1256 | 1260 | 1262 | 1260 | 1256 | 1253 | 1251 |
| | 12.5 | 1237 | 1239 | 1243 | 1249 | 1251 | 1249 | 1243 | 1239 | 1237 |
| | 15 | 1219 | 1221 | 1228 | 1234 | 1237 | 1234 | 1228 | 1221 | 1219 |
| | 17.5 | 1198 | 1201 | 1209 | 1217 | 1221 | 1217 | 1209 | 1201 | 1198 |
| | 20 | 1174 | 1178 | 1188 | 1198 | 1203 | 1198 | 1188 | 1178 | 1174 |
| | 22.5 | 1148 | 1152 | 1165 | 1176 | 1182 | 1176 | 1165 | 1152 | 1148 |
| | 25 | 1119 | 1124 | 1138 | 1153 | 1160 | 1153 | 1138 | 1124 | 1119 |
| | 27.5 | 1087 | 1094 | 1109 | 1128 | 1137 | 1128 | 1109 | 1094 | 1087 |
| | 30 | 1054 | 1060 | 1079 | 1102 | 1112 | 1102 | 1079 | 1060 | 1054 |
| | 32.5 | 1018 | 1025 | 1046 | 1075 | 1088 | 1075 | 1046 | 1025 | 1018 |
| | 35 | 980 | 988 | 1013 | 1048 | 1064 | 1048 | 1013 | 988 | 980 |
| | 37.5 | 940 | 949 | 979 | 1020 | 1038 | 1020 | 979 | 949 | 940 |
| | 40 | 898 | 908 | 944 | 991 | 1013 | 991 | 944 | 908 | 898 |
| | 42.5 | 855 | 866 | 907 | 962 | 989 | 962 | 907 | 866 | 855 |
| | 45 | 811 | 822 | 871 | 935 | 966 | 935 | 871 | 822 | 811 |
| | 47.5 | 765 | 778 | 834 | 908 | 942 | 908 | 834 | 778 | 765 |
| | 50 | 718 | 732 | 797 | 881 | 913 | 881 | 797 | 732 | 718 |
| | 52.5 | 669 | 686 | 761 | 848 | 881 | 848 | 761 | 686 | 669 |
| | 55 | 620 | 640 | 728 | 812 | 847 | 812 | 728 | 640 | 620 |
| | 57.5 | 570 | 594 | 694 | 774 | 809 | 774 | 694 | 594 | 570 |
| | 60 | 519 | 548 | 654 | 733 | 769 | 733 | 654 | 548 | 519 |
| | 62.5 | 467 | 502 | 611 | 689 | 727 | 689 | 611 | 502 | 467 |
| | 65 | 416 | 457 | 566 | 643 | 682 | 643 | 566 | 457 | 416 |
| | 67.5 | 364 | 413 | 518 | 595 | 634 | 595 | 518 | 413 | 364 |
| | 70 | 313 | 371 | 468 | 544 | 585 | 544 | 468 | 371 | 313 |
| | 72.5 | 262 | 328 | 416 | 493 | 532 | 493 | 416 | 328 | 262 |
| | 75 | 214 | 278 | 361 | 426 | 448 | 426 | 361 | 278 | 214 |
| | 77.5 | 168 | 226 | 304 | 341 | 355 | 341 | 304 | 226 | 168 |
| | 80 | 124 | 174 | 232 | 252 | 261 | 252 | 232 | 174 | 124 |
| | 82.5 | 84 | 121 | 155 | 167 | 172 | 167 | 155 | 121 | 84 |
| | 85 | 49 | 66 | 82 | 85 | 86 | 85 | 82 | 66 | 49 |
| | 87.5 | 19 | 21 | 22 | 14 | 10 | 14 | 22 | 21 | 19 |
| | 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# Report of Test

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Luminous Intensity (Candela) Table

| Vertical (Gamma) Angles | Lateral (C-Plane) Angles | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 |
| | 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 92.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 95 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 97.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 102.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 105 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 107.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 110 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 112.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 115 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 117.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 120 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 122.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 127.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 130 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 132.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 135 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 137.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 140 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 142.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 145 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 147.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 150 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 152.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 155 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 157.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 160 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 162.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 165 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 167.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 170 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 172.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 175 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 177.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 180 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# Report of Test

## LLIA001457-002

### Coefficients of Utilization/Room Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

| RC | 80 | | | | | 70 | | | | | 50 | | | | 30 | | | | 10 | | | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RW | 70 | 50 | 30 | 10 | | 70 | 50 | 30 | 10 | | 50 | 30 | 10 | | 50 | 30 | 10 | | 50 | 30 | 10 | 0 |
| RCR | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 119 | 119 | 119 | 119 | | 116 | 116 | 116 | 116 | | 111 | 111 | 111 | | 106 | 106 | 106 | | 102 | 102 | 102 | 100 |
| 1 | 108 | 103 | 98 | 94 | | 105 | 101 | 96 | 93 | | 96 | 93 | 90 | | 92 | 89 | 87 | | 89 | 86 | 84 | 82 |
| 2 | 98 | 89 | 82 | 75 | | 95 | 87 | 80 | 75 | | 83 | 78 | 73 | | 80 | 75 | 71 | | 77 | 73 | 69 | 67 |
| 3 | 89 | 77 | 69 | 62 | | 86 | 76 | 68 | 61 | | 73 | 66 | 60 | | 70 | 64 | 59 | | 67 | 62 | 58 | 56 |
| 4 | 81 | 68 | 59 | 52 | | 78 | 67 | 58 | 52 | | 64 | 57 | 51 | | 62 | 55 | 50 | | 60 | 54 | 49 | 47 |
| 5 | 74 | 61 | 51 | 44 | | 72 | 60 | 51 | 44 | | 57 | 50 | 44 | | 55 | 49 | 43 | | 54 | 48 | 43 | 41 |
| 6 | 68 | 55 | 45 | 39 | | 66 | 54 | 45 | 38 | | 52 | 44 | 38 | | 50 | 43 | 38 | | 48 | 42 | 37 | 35 |
| 7 | 63 | 49 | 40 | 34 | | 62 | 49 | 40 | 34 | | 47 | 39 | 34 | | 45 | 39 | 33 | | 44 | 38 | 33 | 31 |
| 8 | 59 | 45 | 36 | 30 | | 57 | 44 | 36 | 30 | | 43 | 35 | 30 | | 42 | 35 | 30 | | 40 | 34 | 30 | 28 |
| 9 | 55 | 41 | 33 | 27 | | 54 | 41 | 33 | 27 | | 39 | 32 | 27 | | 38 | 32 | 27 | | 37 | 31 | 27 | 25 |
| 10 | 52 | 38 | 30 | 25 | | 50 | 37 | 30 | 24 | | 36 | 29 | 24 | | 36 | 29 | 24 | | 35 | 29 | 24 | 22 |

For absolute test reports, RUs are expressed as a percentage of total lumen output. For relative test reports, CUs are expressed as a percentage of total lamp output. Calculations were based on published IES procedures, and are based on the zonal cavity method. Basic assumptions: 1) Room surfaces are lambertian reflectors. 2) Incident flux on each surface is uniformly distributed. 3) The room is spectrally neutral. When luminaires are not evenly distributed throughout the room, or do not exhibit lateral symmetry, CU values may differ from actual performance.

### Circle of Light Plot

| Height(ft) | Illuminance at Nadir (fc) | Ground-level distance to half-of-nadir illuminance (ft) 0-180 deg | 90-270 deg |
|---|---|---|---|
| 6.0 | 35.6 | 7.35 | 7.78 |
| 8.0 | 20.0 | 9.80 | 10.37 |
| 10.0 | 12.8 | 12.25 | 12.96 |
| 12.0 | 8.9 | 14.70 | 15.56 |
| 14.0 | 6.5 | 17.15 | 18.15 |
| 16.0 | 5.0 | 19.60 | 20.74 |

### Average Luminance ($cd/m^2$)

| | 0 deg Plane | 45 deg Plane | 90 deg Plane |
|---|---|---|---|
| 0 | 3878 | 3878 | 3878 |
| 45 | 3472 | 3730 | 4136 |
| 55 | 3273 | 3841 | 4470 |
| 65 | 2978 | 4056 | 4887 |
| 75 | 2499 | 4222 | 5243 |
| 85 | 1689 | 2845 | 2995 |

### Spacing Criterion

| | |
|---|---|
| 0 degree plane: | 1.2 |
| 90 degree plane: | 1.3 |
| 180 degree plane: | 1.2 |
| 270 degree plane: | 1.3 |

# Report of Test

## LLIA001457-002

### UGR TABLE - CORRECTED

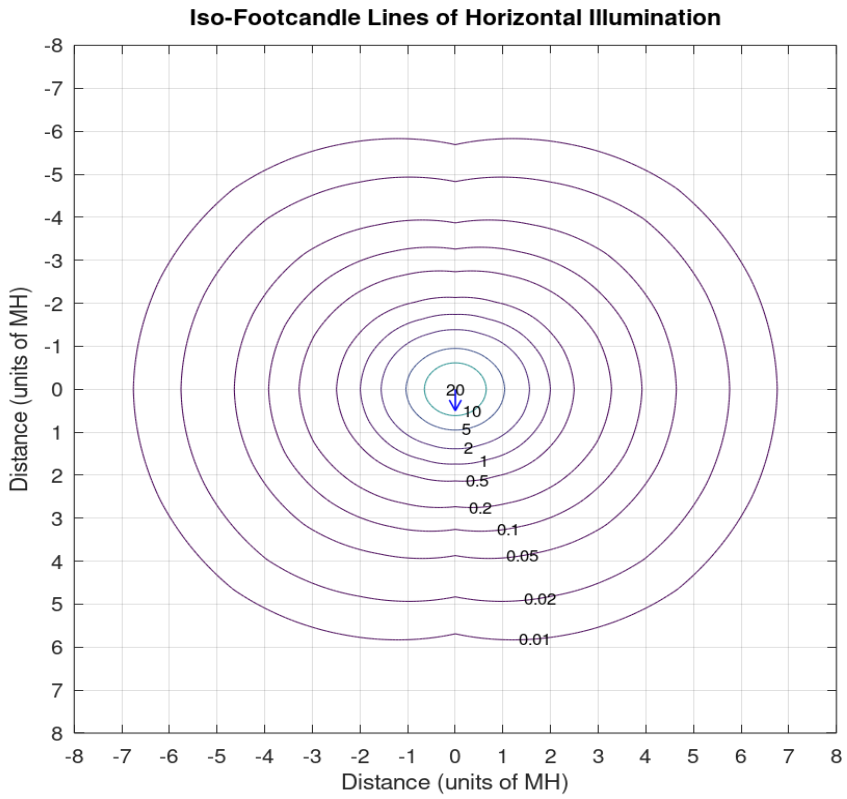
| Reflectances | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ceiling Cavity | | 70 | 70 | 50 | 50 | 30 | 70 | 70 | 50 | 50 | 30 |
| Walls | | 50 | 30 | 50 | 30 | 30 | 50 | 30 | 50 | 30 | 30 |
| Floor Cavity | | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Room Size | | UGR Viewed Crosswise | | | | | UGR Viewed Endwise | | | | |
| X=2H | Y=2H | 15.9 | 17.6 | 16.3 | 17.9 | 18.2 | 17.9 | 19.6 | 18.2 | 19.9 | 20.2 |
| | 3H | 17.8 | 19.3 | 18.1 | 19.6 | 20.0 | 20.4 | 21.9 | 20.7 | 22.2 | 22.6 |
| | 4H | 18.4 | 19.9 | 18.8 | 20.2 | 20.6 | 21.4 | 22.9 | 21.8 | 23.2 | 23.6 |
| | 6H | 18.9 | 20.3 | 19.3 | 20.6 | 21.0 | 22.2 | 23.5 | 22.6 | 23.9 | 24.3 |
| | 8H | 19.0 | 20.3 | 19.5 | 20.7 | 21.1 | 22.3 | 23.6 | 22.8 | 24.0 | 24.4 |
| | 12H | 19.1 | 20.4 | 19.5 | 20.7 | 21.2 | 22.5 | 23.7 | 22.9 | 24.1 | 24.5 |
| 4H | 2H | 17.0 | 18.5 | 17.4 | 18.8 | 19.2 | 18.5 | 19.9 | 18.9 | 20.3 | 20.6 |
| | 3H | 19.1 | 20.3 | 19.5 | 20.7 | 21.1 | 21.2 | 22.4 | 21.6 | 22.8 | 23.2 |
| | 4H | 19.9 | 21.0 | 20.3 | 21.4 | 21.9 | 22.4 | 23.6 | 22.9 | 24.0 | 24.4 |
| | 6H | 20.5 | 21.5 | 21.0 | 21.9 | 22.4 | 23.3 | 24.3 | 23.8 | 24.7 | 25.2 |
| | 8H | 20.7 | 21.6 | 21.1 | 22.0 | 22.5 | 23.6 | 24.5 | 24.0 | 24.9 | 25.4 |
| | 12H | 20.8 | 21.6 | 21.3 | 22.1 | 22.6 | 23.7 | 24.5 | 24.2 | 25.0 | 25.5 |
| 8H | 4H | 20.6 | 21.5 | 21.1 | 22.0 | 22.4 | 22.8 | 23.7 | 23.2 | 24.1 | 24.6 |
| | 6H | 21.4 | 22.1 | 21.9 | 22.6 | 23.1 | 23.8 | 24.5 | 24.3 | 25.0 | 25.5 |
| | 8H | 21.6 | 22.3 | 22.1 | 22.8 | 23.3 | 24.1 | 24.8 | 24.6 | 25.3 | 25.8 |
| | 12H | 21.8 | 22.4 | 22.3 | 22.9 | 23.5 | 24.3 | 24.9 | 24.8 | 25.4 | 26.0 |
| 12H | 4H | 20.7 | 21.6 | 21.2 | 22.0 | 22.5 | 22.8 | 23.6 | 23.3 | 24.1 | 24.6 |
| | 6H | 21.6 | 22.3 | 22.1 | 22.7 | 23.3 | 23.8 | 24.5 | 24.4 | 25.0 | 25.5 |
| | 8H | 21.9 | 22.5 | 22.4 | 23.0 | 23.5 | 24.2 | 24.8 | 24.7 | 25.3 | 25.9 |

Maximum UGR = 26.0

# Report of Test

## LLIA001457-002

## Iso-Illuminance Plot




The isofootcandle values shown in the plot above are based on a mounting height of h = 8.0 feet. Grid values show multiples of mounting height. The isoilluminance contour lines are expressed in units of footcandles. The values expressed are based on the direct light from a single unit without the contribution of room reflections.

# Report of Test

## LLIA001457-002

| | |
|---|---|
| Test Distance | 9.5 m |
| Ambient Temperature | 25.1 °C |

Notes

The laboratory has not participated in the selection of samples to be tested. All testing is performed on the understanding that the significance of the report is limited to the extent that the test sample is representative of production units.

Tested in accordance with the applicable sections of IES LM-79-19. Format of reports and angular increments based on IES LM-41-14 and LM-46-04.

The luminous intensity values, and other derived quantities, contained in this report are based on the absolute data, as measured.

Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), or for use in different environmental conditions than that tested, may produce erroneous results.

This report is free of erasures and corrections.

Photometric intensity values are reported using the CIE C-Gamma coordinate system as defined in CIE publication number 121.

This report may contain data that are not covered by the NVLAP accreditation. Quantities marked with ‡ are not covered.

This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.