



UL Solutions  
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610-774-1300



## Photometric Test Report

Relevant Standards  
IES LM-79-2008, ANSI C82.77-10-2014, UL 1598-2008  
CIE 13.3-1995, CIE 15-2004, ANSI C78.377-2017  
IES TM-30-2018

**Prepared For**  
**LDPI Inc**  
4404 Anderson Dr  
Eau Claire, WI 54703  
United States

**Catalog Number**  
**LE451-120-V1-A-D1-5**

Order Number  
14480670  
Test Number  
14480670.02

Test Date  
2022-11-17 - 2022-12-02

Prepared By

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Approved By

Tiffany Hamm, Engineering Project Handler

The results contained in this report pertain only to the tested sample.  
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Laboratory results may not be representative of field performance  
Ballast factors have not been applied

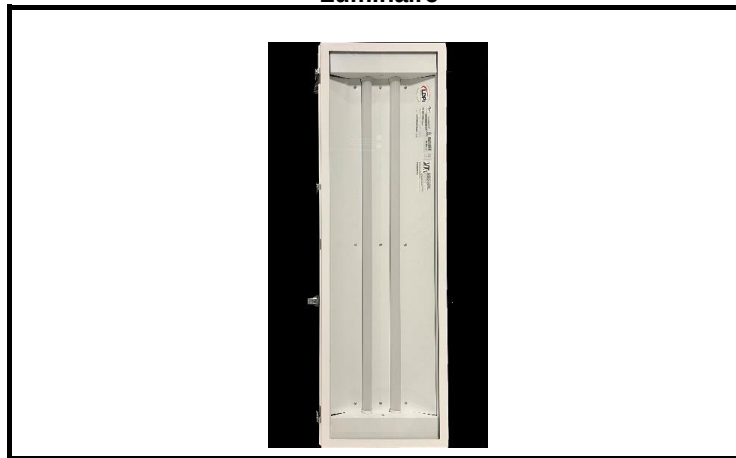
Testing was performed in a 3-meter integrating sphere using the  $4\pi$  geometry method.

Absorption correction was employed for Sphere measurement



**Luminaire Description:** White aluminum housing, clear glass lens enclosure  
**Lamp:** 360 LEDs  
**Mounting:** Recessed  
**Ballast/Driver:** 1 INVENTRONICS 150W 0-10V EUM-150S210DT-150S210DT

**Luminaire**



**Luminaire Characteristics**

Luminous Length: 44.00 in.  
Luminous Width: 9.500 in.

**Summary of Results**

**Integrating Sphere**

Luminous Flux: 13000 Lumens  
Efficacy: 112.53 lm/w  
CCT: 5159 K  
CRI (Ra): 84.1

**Distribution**

Total Luminaire Output: 12880 Lumens  
Luminaire Efficacy: 111.5 lm/w  
Maximum Candela: 4461 Candela

**Electrical Data at 120 VAC**

Test Temperature: 25.4 °C  
Voltage: 120.0 VAC  
Current: 0.9641 A  
Power: 115.5 W  
Power Factor: 0.999  
Frequency: 60 Hz  
Current THD: 4.36 %

**In-Situ**

LED Temperature: 59.4 °C  
Driver Temperature: 51.2 °C  
Measured LED Current: 0.01975 A

Temperature is offset to an ambient temperature of 25°C as described in UL1598-2008.

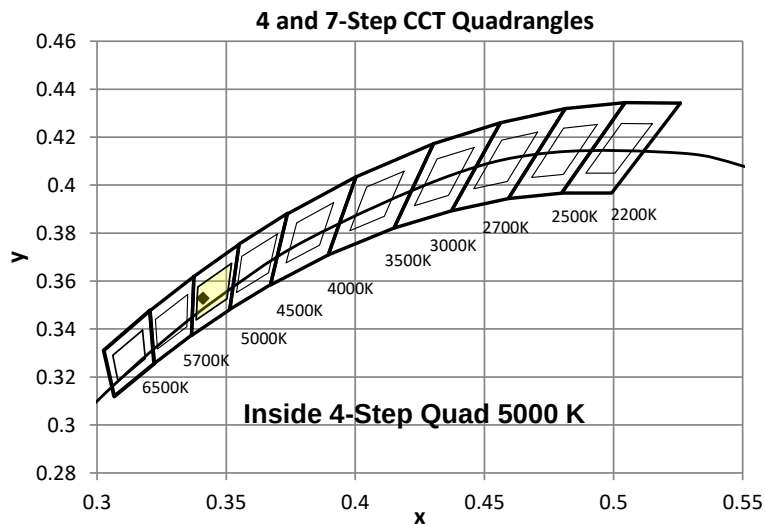
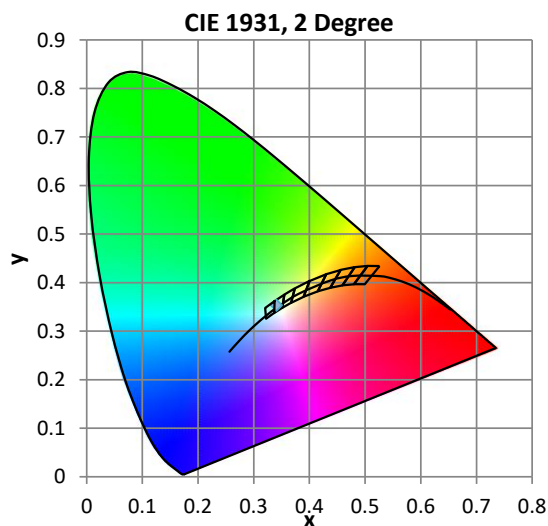
## Color Quality - Integrating Sphere

### Integrating Sphere Test Conditions

| Temperature | Voltage   | Current  | Power   | Power Factor | Frequency | Current THD |
|-------------|-----------|----------|---------|--------------|-----------|-------------|
| 25.4 °C     | 120.0 VAC | 0.9641 A | 115.5 W | 0.999        | 60 Hz     | 4.36 %      |

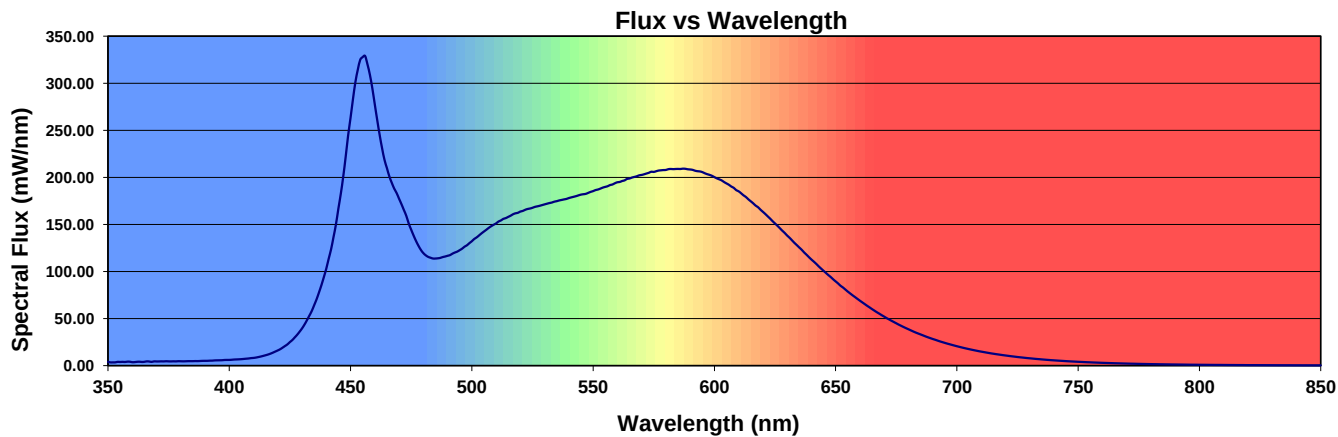
### Summary of Results

|                             |              |                           |        |
|-----------------------------|--------------|---------------------------|--------|
| <b>Total Output:</b>        | 13000 Lumens | <b>Chromaticity (x):</b>  | 0.3410 |
| <b>Efficacy:</b>            | 112.5 lm/w   | <b>Chromaticity (y):</b>  | 0.3529 |
| <b>CCT:</b>                 | 5159 K       | <b>Chromaticity (u'):</b> | 0.2081 |
| <b>CRI (Ra):</b>            | 84.1         | <b>Chromaticity (v'):</b> | 0.4847 |
| <b>CRI (R9):</b>            | 6.8          | <b>TM-30 Rf:</b>          | 84     |
| <b>Peak Wavelength:</b>     | 455 nm       | <b>TM-30 Rg:</b>          | 93     |
| <b>Dominant Wavelength:</b> | 555 nm       | <b>TM-30 Rcs,h1:</b>      | -13%   |
| <b>S/P Ratio:</b>           | 2.06         | <b>Duv:</b>               | 0.0023 |
| <b>M/P Ratio:</b>           | 0.89         | WELL Building Standard v2 |        |



### Color Rendering Index Detail

| Ra (CRI) | R1   | R2   | R3   | R4   | R5   | R6   | R7   | R8   | R9  | R10  | R11  | R12  | R13  | R14  | R15  |
|----------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|------|
| 84.1     | 82.8 | 92.7 | 94.7 | 80.9 | 83.2 | 88.3 | 84.9 | 65.1 | 6.8 | 81.9 | 80.3 | 65.7 | 86.2 | 97.7 | 76.9 |



## Distribution - Goniophotometer

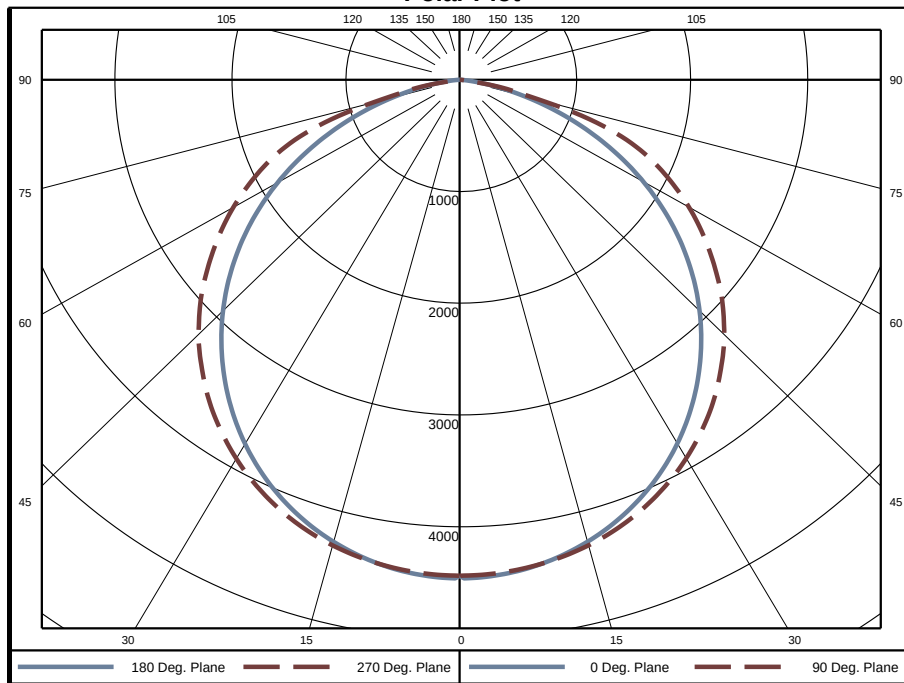
### Distribution Test Conditions

| Temperature | Voltage   | Current  | Power   | Power Factor | Frequency | Current THD |
|-------------|-----------|----------|---------|--------------|-----------|-------------|
| 25.2 °C     | 120.0 VAC | 0.9641 A | 115.6 W | 0.999        | 60 Hz     | 4.44 %      |

### Summary of Results

|                                                                                    |                            |              |
|------------------------------------------------------------------------------------|----------------------------|--------------|
| <b>Spacing Criteria</b>                                                            | <b>Total Lumen Output:</b> | 12880 Lumens |
| 0-180: 1.26                                                                        | <b>Luminaire Efficacy:</b> | 111.5 lm/w   |
| 90-270: 1.31                                                                       | <b>Maximum Candela:</b>    | 4461 Candela |
| <b>Corrected UGR (Room Dimension: X=4H, Y=8H, Reflectances: 70/50/20%, S/H: 1)</b> |                            |              |
| <b>Crosswise:</b> 24.8                                                             | <b>Endwise:</b> 26         |              |

### Polar Plot



### Zonal Lumen Summary

| Zone  | Lumens | % of Luminaire | Zone    | Lumens | % of Luminaire | Zone    | Lumens | % of Luminaire |
|-------|--------|----------------|---------|--------|----------------|---------|--------|----------------|
| 0-5   | 106    | 0.8%           | 60-65   | 912    | 7.1%           | 120-125 | 0      | 0.0%           |
| 5-10  | 315    | 2.4%           | 65-70   | 747    | 5.8%           | 125-130 | 0      | 0.0%           |
| 10-15 | 514    | 4.0%           | 70-75   | 536    | 4.2%           | 130-135 | 0      | 0.0%           |
| 15-20 | 697    | 5.4%           | 75-80   | 281    | 2.2%           | 135-140 | 0      | 0.0%           |
| 20-25 | 859    | 6.7%           | 80-85   | 83     | 0.6%           | 140-145 | 0      | 0.0%           |
| 25-30 | 995    | 7.7%           | 85-90   | 10     | 0.1%           | 145-150 | 0      | 0.0%           |
| 30-35 | 1098   | 8.5%           | 90-95   | 0      | 0.0%           | 150-155 | 0      | 0.0%           |
| 35-40 | 1166   | 9.1%           | 95-100  | 0      | 0.0%           | 155-160 | 0      | 0.0%           |
| 40-45 | 1195   | 9.3%           | 100-105 | 0      | 0.0%           | 160-165 | 0      | 0.0%           |
| 45-50 | 1186   | 9.2%           | 105-110 | 0      | 0.0%           | 165-170 | 0      | 0.0%           |
| 50-55 | 1134   | 8.8%           | 110-115 | 0      | 0.0%           | 170-175 | 0      | 0.0%           |
| 55-60 | 1042   | 8.1%           | 115-120 | 0      | 0.0%           | 175-180 | 0      | 0.0%           |

| Zone   | Lumens | % of Luminaire |
|--------|--------|----------------|
| 0-40   | 5750   | 44.6%          |
| 0-60   | 10307  | 80.0%          |
| 0-90   | 12876  | 100.0%         |
| 90-180 | 0      | 0.0%           |

**Candela Tabulation**  
Horizontal Angle (Degrees)

| Vertical Angle (Degrees) | 0   | 22.5 | 45   | 67.5 | 90   | 112.5 | 135  | 157.5 | 180  | 202.5 | 225  | 247.5 | 270  | 292.5 | 315  | 337.5 |
|--------------------------|-----|------|------|------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|
|                          | 0   | 4438 | 4438 | 4438 | 4438 | 4438  | 4438 | 4438  | 4438 | 4438  | 4438 | 4438  | 4438 | 4438  | 4438 | 4438  |
|                          | 5   | 4439 | 4422 | 4414 | 4420 | 4422  | 4420 | 4414  | 4422 | 4439  | 4422 | 4414  | 4420 | 4422  | 4420 | 4414  |
|                          | 10  | 4377 | 4366 | 4365 | 4375 | 4379  | 4375 | 4365  | 4366 | 4377  | 4366 | 4365  | 4375 | 4379  | 4375 | 4365  |
|                          | 15  | 4278 | 4275 | 4283 | 4302 | 4309  | 4302 | 4283  | 4275 | 4278  | 4275 | 4283  | 4302 | 4309  | 4302 | 4283  |
|                          | 20  | 4143 | 4147 | 4168 | 4198 | 4208  | 4198 | 4168  | 4147 | 4143  | 4147 | 4168  | 4198 | 4208  | 4198 | 4168  |
|                          | 25  | 3971 | 3983 | 4019 | 4060 | 4073  | 4060 | 4019  | 3983 | 3971  | 3983 | 4019  | 4060 | 4073  | 4060 | 4019  |
|                          | 30  | 3761 | 3786 | 3838 | 3889 | 3906  | 3889 | 3838  | 3786 | 3761  | 3786 | 3838  | 3889 | 3906  | 3889 | 3838  |
|                          | 35  | 3517 | 3552 | 3624 | 3685 | 3709  | 3685 | 3624  | 3552 | 3517  | 3552 | 3624  | 3685 | 3709  | 3685 | 3624  |
|                          | 40  | 3241 | 3286 | 3374 | 3453 | 3478  | 3453 | 3374  | 3286 | 3241  | 3286 | 3374  | 3453 | 3478  | 3453 | 3374  |
|                          | 45  | 2935 | 2991 | 3094 | 3190 | 3221  | 3190 | 3094  | 2991 | 2935  | 2991 | 3094  | 3190 | 3221  | 3190 | 3094  |
|                          | 50  | 2600 | 2667 | 2781 | 2896 | 2933  | 2896 | 2781  | 2667 | 2600  | 2667 | 2781  | 2896 | 2933  | 2896 | 2781  |
|                          | 55  | 2236 | 2313 | 2439 | 2568 | 2612  | 2568 | 2439  | 2313 | 2236  | 2313 | 2439  | 2568 | 2612  | 2568 | 2439  |
|                          | 60  | 1843 | 1930 | 2065 | 2223 | 2280  | 2223 | 2065  | 1930 | 1843  | 1930 | 2065  | 2223 | 2280  | 2223 | 2065  |
|                          | 65  | 1430 | 1523 | 1672 | 1853 | 1920  | 1853 | 1672  | 1523 | 1430  | 1523 | 1672  | 1853 | 1920  | 1853 | 1672  |
|                          | 70  | 1007 | 1095 | 1272 | 1447 | 1483  | 1447 | 1272  | 1095 | 1007  | 1095 | 1272  | 1447 | 1483  | 1447 | 1272  |
|                          | 75  | 601  | 685  | 860  | 844  | 777   | 844  | 860   | 685  | 601   | 685  | 860   | 844  | 777   | 844  | 860   |
|                          | 80  | 264  | 344  | 325  | 310  | 292   | 310  | 325   | 344  | 264   | 344  | 325   | 310  | 292   | 310  | 325   |
|                          | 85  | 58   | 70   | 36   | 32   | 32    | 32   | 36    | 70   | 58    | 70   | 36    | 32   | 32    | 32   | 36    |
|                          | 90  | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 95  | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 100 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 105 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 110 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 115 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 120 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 125 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 130 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 135 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 140 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 145 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 150 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 155 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 160 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 165 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 170 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 175 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 180 | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |

**Average Luminance (cd/m<sup>2</sup>)**  
Horizontal Angle (Degrees)

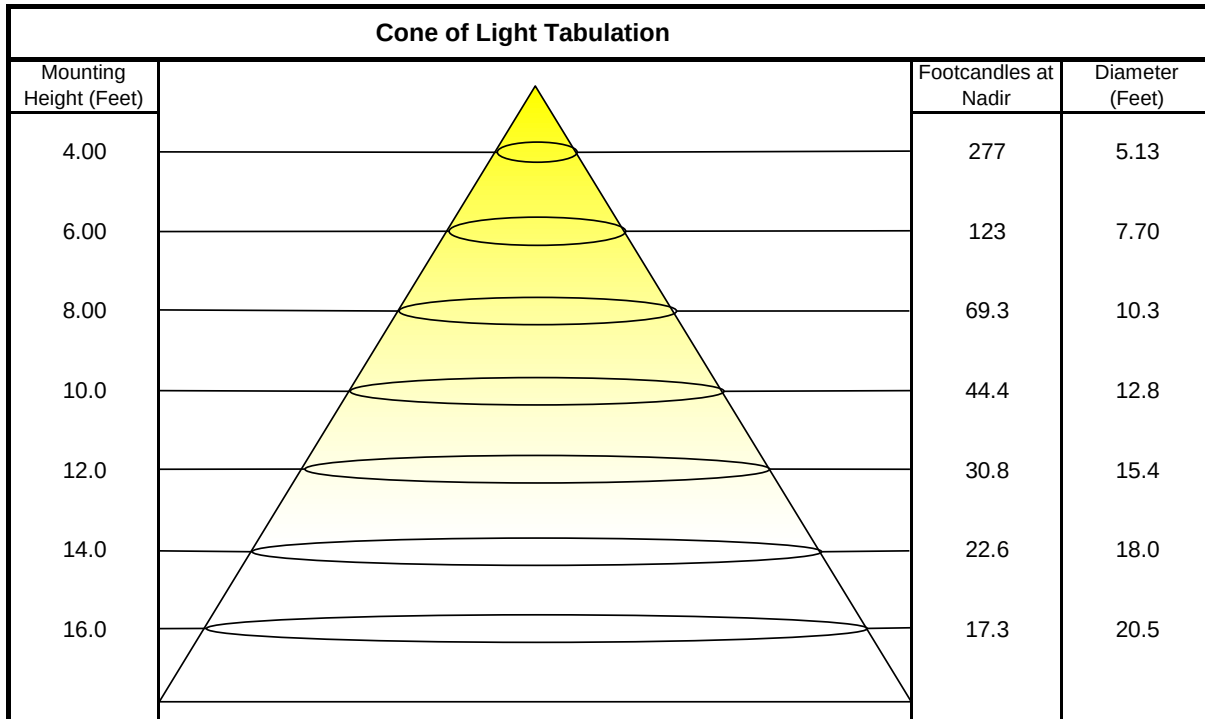
| Vertical Angle (Degrees) | 0  | 45    | 90    |
|--------------------------|----|-------|-------|
|                          | 0  | 16460 | 16460 |
|                          | 45 | 15390 | 16230 |
|                          | 55 | 14450 | 15770 |
|                          | 65 | 12540 | 14670 |
|                          | 75 | 8606  | 12320 |
|                          | 85 | 2457  | 1510  |



### Coefficients of Utilization - Zonal Cavity Method

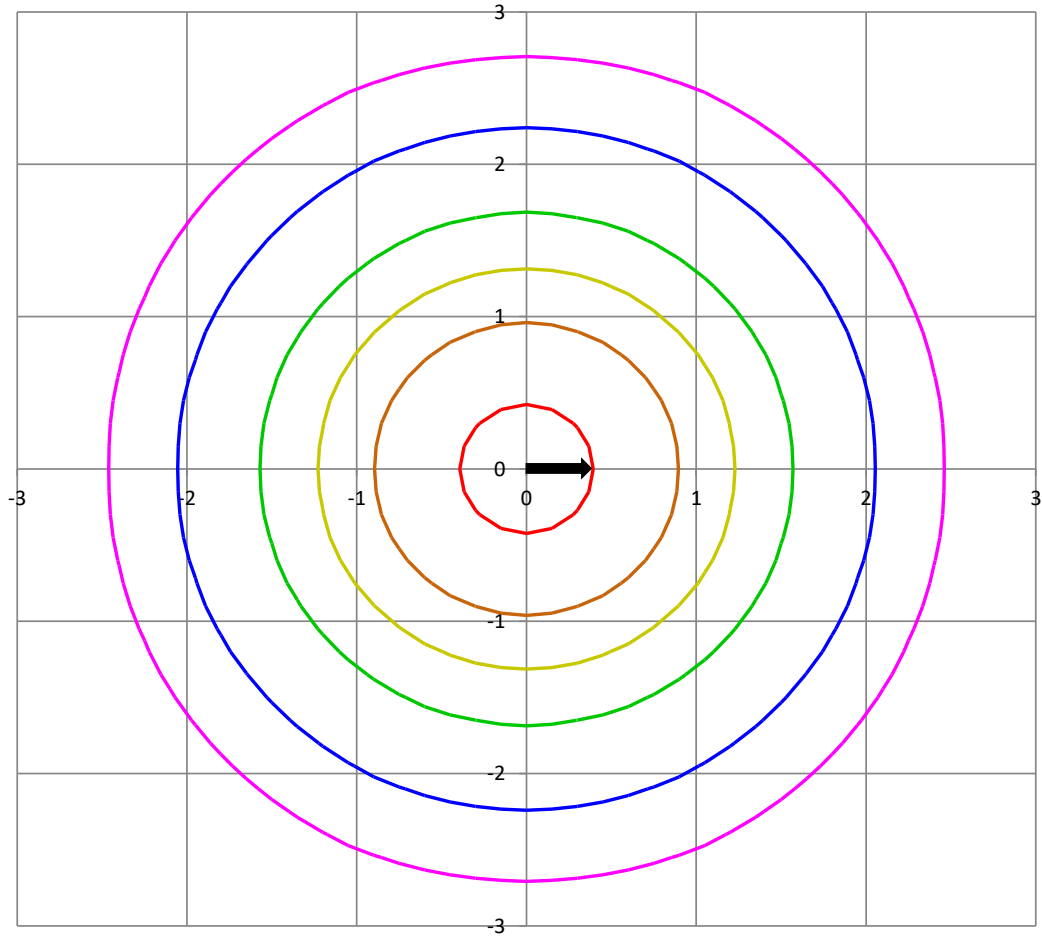
| Effective Floor Cavity Reflectance 20% |                                                                                           |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|----------------------------------------|-------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ceiling Cavity Reflectance             | 80                                                                                        |     |     |     | 70  |     |     |     | 50  |     |     | 30  |     |     | 10  |     |     | 0   |
| Wall Reflectance                       | 70                                                                                        | 50  | 30  | 10  | 70  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30  | 10  | 50  | 30  | 10  | 0   |
| Room Cavity Ratio (RCR)                | ** Values are expressed as percent of total lumen output delivered to the task surface ** |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 0                                      | 119                                                                                       | 119 | 119 | 119 | 116 | 116 | 116 | 116 | 111 | 111 | 111 | 106 | 106 | 106 | 102 | 102 | 102 | 100 |
| 1                                      | 109                                                                                       | 105 | 100 | 97  | 106 | 102 | 99  | 95  | 98  | 95  | 92  | 94  | 92  | 89  | 91  | 89  | 87  | 85  |
| 2                                      | 99                                                                                        | 91  | 84  | 79  | 97  | 89  | 83  | 78  | 86  | 80  | 76  | 82  | 78  | 74  | 79  | 76  | 73  | 70  |
| 3                                      | 90                                                                                        | 80  | 72  | 65  | 88  | 78  | 71  | 65  | 75  | 69  | 64  | 73  | 67  | 62  | 70  | 65  | 61  | 59  |
| 4                                      | 83                                                                                        | 71  | 62  | 55  | 80  | 69  | 61  | 55  | 67  | 60  | 54  | 64  | 58  | 53  | 62  | 57  | 53  | 50  |
| 5                                      | 76                                                                                        | 63  | 54  | 47  | 74  | 62  | 53  | 47  | 60  | 52  | 47  | 58  | 51  | 46  | 56  | 50  | 46  | 43  |
| 6                                      | 70                                                                                        | 57  | 48  | 41  | 68  | 56  | 47  | 41  | 54  | 46  | 41  | 52  | 45  | 40  | 51  | 45  | 40  | 38  |
| 7                                      | 65                                                                                        | 51  | 43  | 36  | 63  | 50  | 42  | 36  | 49  | 41  | 36  | 47  | 41  | 36  | 46  | 40  | 35  | 33  |
| 8                                      | 60                                                                                        | 47  | 38  | 32  | 59  | 46  | 38  | 32  | 45  | 37  | 32  | 43  | 37  | 32  | 42  | 36  | 32  | 30  |
| 9                                      | 56                                                                                        | 43  | 35  | 29  | 55  | 42  | 34  | 29  | 41  | 34  | 29  | 40  | 33  | 29  | 39  | 33  | 29  | 27  |
| 10                                     | 53                                                                                        | 40  | 32  | 26  | 52  | 39  | 31  | 26  | 38  | 31  | 26  | 37  | 31  | 26  | 36  | 30  | 26  | 24  |

| Beam and Field Information |               |
|----------------------------|---------------|
| CIE Type:                  | Direct        |
| Center Beam Intensity:     | 4438 Candela  |
| Central Cone Intensity:    | 4433 Candela  |
| Beam Flux:                 | 9934.9 Lumens |
| Beam Angle (0-180):        | 110.5 Degrees |
| Beam Angle (90-270):       | 121.8 Degrees |
| Field Angle (0-180):       | 154.3 Degrees |
| Field Angle (90-270):      | 156.3 Degrees |

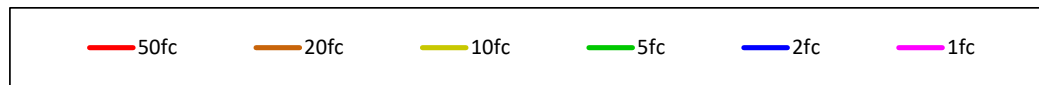


# ISOFootcandle Plot

Mounting Height - 8 Feet



Grid Lines in Units of Mounting Height





## In-Situ Test

### In-Situ Test Conditions

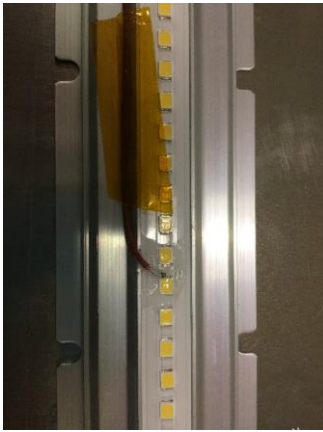
| Temperature | Voltage   | Current | Power | Power Factor | Frequency | Current THD |
|-------------|-----------|---------|-------|--------------|-----------|-------------|
| 24.2 °C     | 120.0 VAC | N/A     | N/A   | N/A          | 60 Hz     | N/A         |

### Summary of Results

LED Temperature: 59.4 °C  
 Driver Temperature: 51.2 °C  
 Measured LED Current: 0.01975 A

Temperatures are offset to an ambient temperature of 25°C as described in UL1598-2008

#### LED Temperature Location



#### Thermocouple Reference



#### Driver Temperature Location



# ANSI/IES TM-30-18 Color Rendition Report

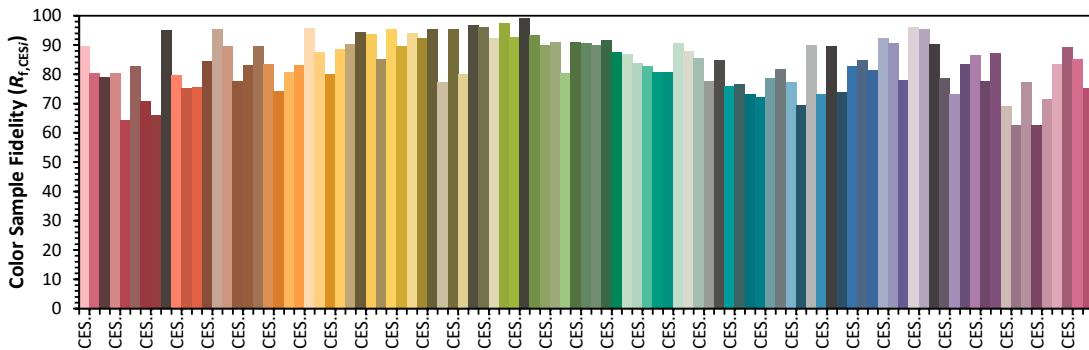
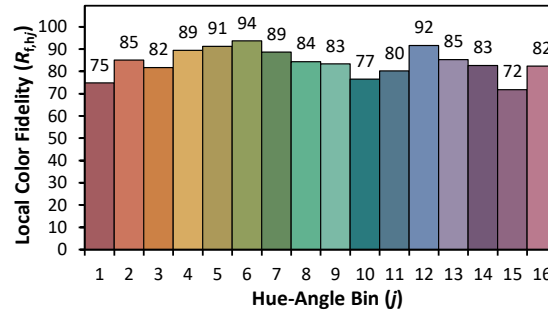
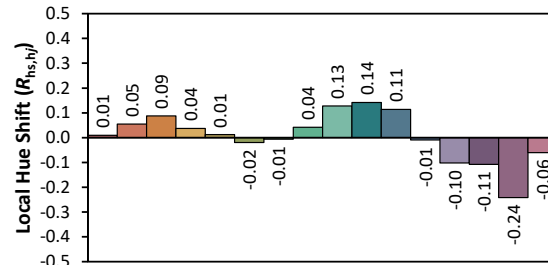
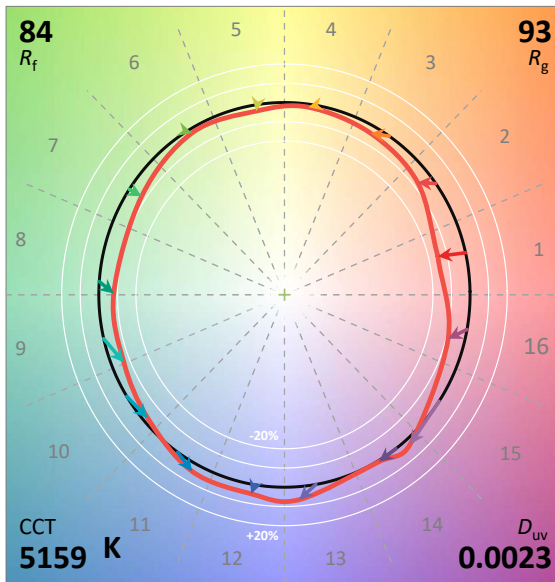
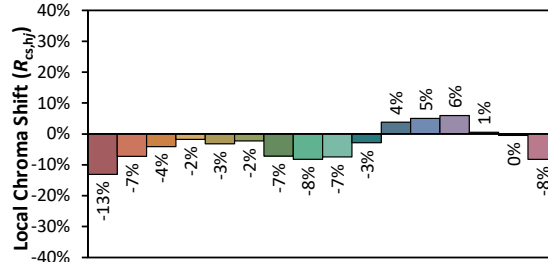
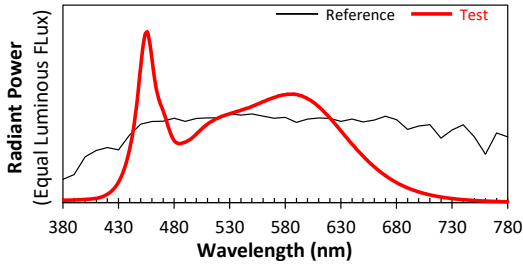
Date: 2022-11-17

Manufacturer:

LDPI Inc

Model:

LE451-120-V1-A-D1-5



Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x 0.3410  
y 0.3529  
u' 0.2081  
v' 0.4847

CIE 13.3-1995  
(CRI)

$R_a$  84

$R_g$  7

Colors are for visual orientation purposes only. Created with the IES TM-30-18 Calculator Version 2.00.