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## Photometric Test Report

### Relevant Standards

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

### Prepared For

#### **H E Williams Inc**

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PO Box 837  
Carthage, MO 64836-0837  
United States

### Catalog Number

**MX2UD-4-L8/835U/L8/835D-F/R**

Order Number

13052732

Test Number

13052732.17

### Test Date

2019-10-04 - 2019-10-09

### Prepared By

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### Approved By

Alexa Lambert, 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 2-meter integrating sphere using the  $4\pi$  geometry method.  
Absorption correction was employed for Sphere measurement



**Luminaire Description:** Formed White aluminum housing, frosted/specular lens enclosure  
**Lamp:** 288 White LEDs  
**Mounting:** Pendant  
**Ballast/Driver:** Two Philips XI040C110V054BST1 Drivers

**Luminaire**



**Luminaire Characteristics**

Luminous Length: 48.00 in.  
Luminous Width: 2.000 in.  
Luminous Height: 5.00 in.

**Summary of Results**

**Integrating Sphere**

Luminous Flux: 6065 Lumens  
Efficacy: 119.49 lm/w  
CCT: 3458 K  
CRI (Ra): 82.7

**Distribution**

Total Luminaire Output: 6004 Lumens  
Luminaire Efficacy: 117.9 lm/w  
Maximum Candela: 1444 Candela

**Electrical Data at 120 VAC**

Test Temperature: 25.8 °C  
Voltage: 120.0 VAC  
Current: 0.4260 A  
Power: 50.76 W  
Power Factor: 0.993  
Frequency: 60 Hz  
Current THD: 9.93 %



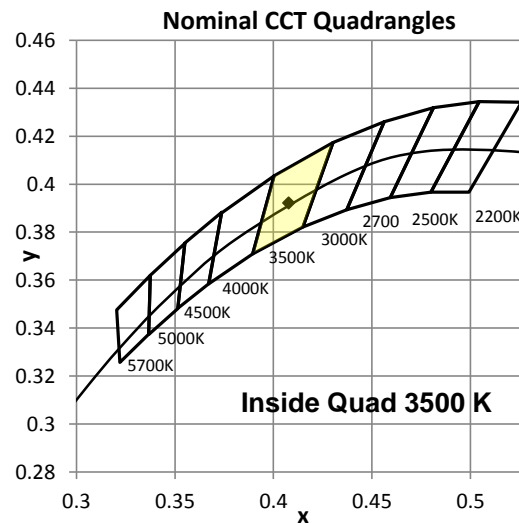
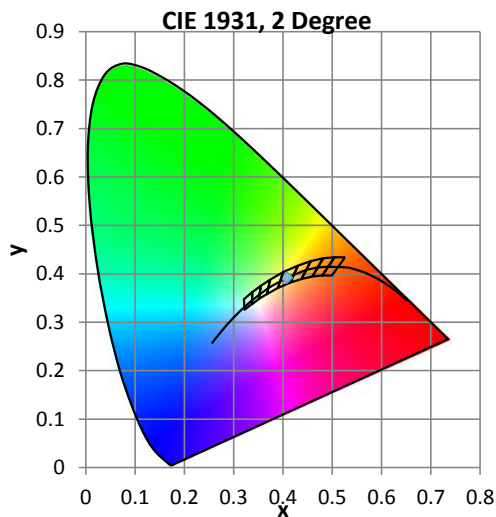
## Color Quality - Integrating Sphere

### Integrating Sphere Test Conditions

| Temperature | Voltage   | Current  | Power   | Power Factor | Frequency | Current THD |
|-------------|-----------|----------|---------|--------------|-----------|-------------|
| 25.8 °C     | 120.0 VAC | 0.4260 A | 50.76 W | 0.993        | 60 Hz     | 9.93 %      |

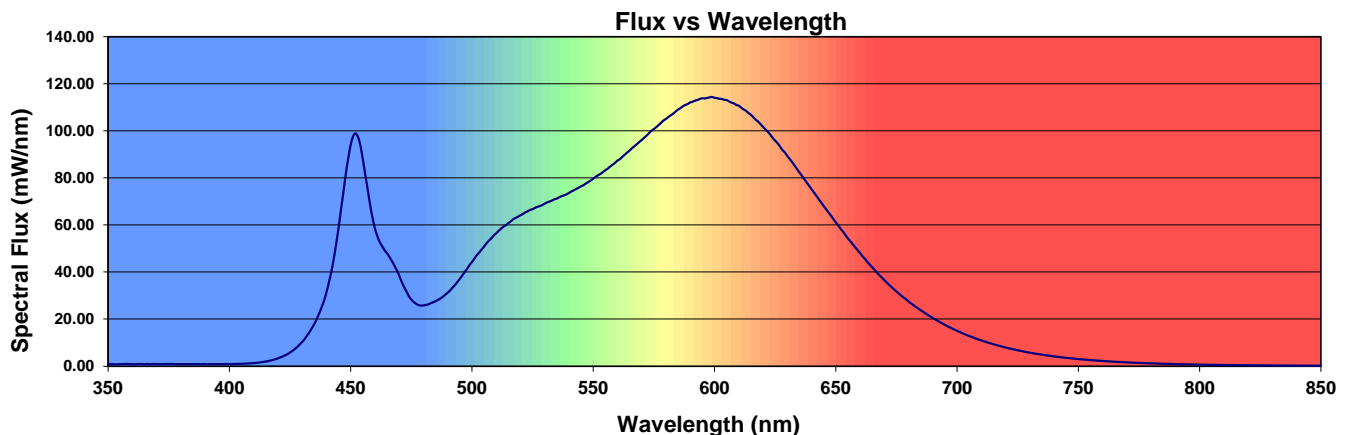
### Summary of Results

|                      |             |                    |        |
|----------------------|-------------|--------------------|--------|
| Total Output:        | 6065 Lumens | Chromaticity (x):  | 0.4077 |
| Efficacy:            | 119.5 lm/w  | Chromaticity (y):  | 0.3922 |
| CCT:                 | 3458 K      | Chromaticity (u'): | 0.2367 |
| CRI (Ra):            | 82.7        | Chromaticity (v'): | 0.5122 |
| CRI (R9):            | 6.2         | TM-30 Rf:          | 84.2   |
| Peak Wavelength:     | 599 nm      | TM-30 Rg:          | 95.2   |
| Dominant Wavelength: | 581 nm      | Duv:               | 0.0002 |
| S/P Ratio:           | 1.52        |                    |        |



### Color Rendering Index Detail

| Ra (CRI) | R1   | R2   | R3   | R4   | R5   | R6   | R7   | R8   | R9  | R10  | R11  | R12  | R13  | R14  | R15  |
|----------|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|------|
| 82.7     | 81.1 | 90.2 | 96.3 | 81.0 | 81.2 | 87.1 | 84.1 | 61.0 | 6.2 | 77.2 | 80.3 | 64.9 | 83.4 | 98.4 | 73.8 |





## Distribution - Goniophotometer

### Distribution Test Conditions

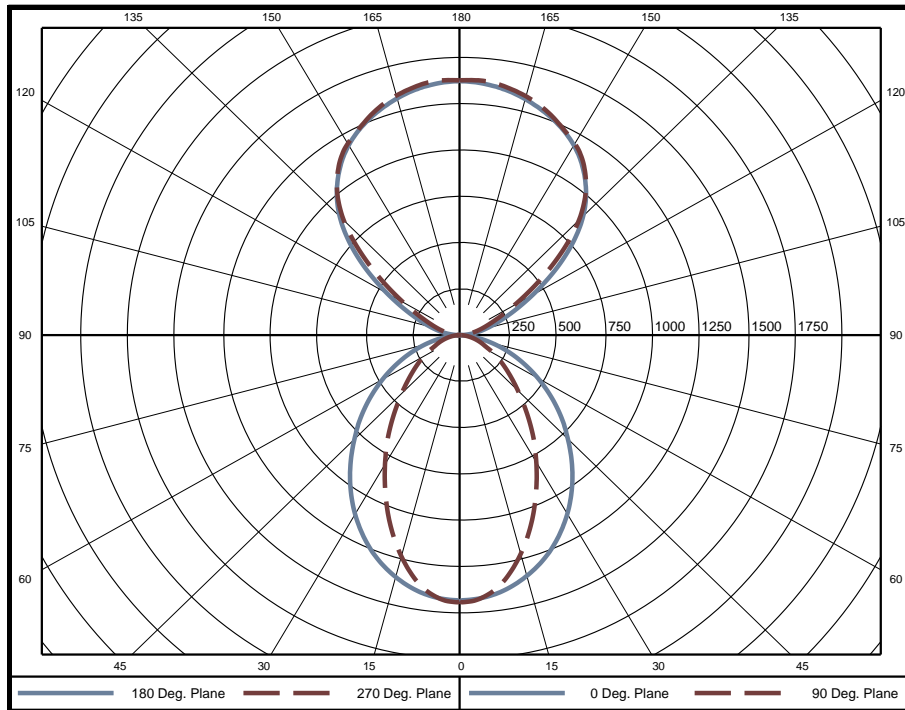
| Temperature | Voltage   | Current  | Power   | Power Factor | Frequency | Current THD |
|-------------|-----------|----------|---------|--------------|-----------|-------------|
| 24.8 °C     | 120.0 VAC | 0.4274 A | 50.94 W | 0.993        | 60 Hz     | 9.91 %      |

### Summary of Results

**Spacing Criteria**  
 0-180: 1.16  
 90-270: 0.90

**Total Lumen Output:** 6004 Lumens  
**Luminaire Efficacy:** 117.9 lm/w  
**Maximum Candela:** 1444 Candela

### Polar Plot



### Zonal Lumen Summary

| Zone  | Lumens | % of Luminaire | Zone    | Lumens | % of Luminaire | Zone    | Lumens | % of Luminaire |
|-------|--------|----------------|---------|--------|----------------|---------|--------|----------------|
| 0-5   | 34.3   | 0.6%           | 60-65   | 125.6  | 2.1%           | 120-125 | 212.7  | 3.5%           |
| 5-10  | 99.9   | 1.7%           | 65-70   | 95.6   | 1.6%           | 125-130 | 273.6  | 4.6%           |
| 10-15 | 157.4  | 2.6%           | 70-75   | 68.6   | 1.1%           | 130-135 | 324.3  | 5.4%           |
| 15-20 | 202.9  | 3.4%           | 75-80   | 44.4   | 0.7%           | 135-140 | 352.4  | 5.9%           |
| 20-25 | 234.4  | 3.9%           | 80-85   | 23.5   | 0.4%           | 140-145 | 355.6  | 5.9%           |
| 25-30 | 252.0  | 4.2%           | 85-90   | 6.6    | 0.1%           | 145-150 | 339.0  | 5.6%           |
| 30-35 | 256.4  | 4.3%           | 90-95   | 7.7    | 0.1%           | 150-155 | 307.4  | 5.1%           |
| 35-40 | 249.1  | 4.1%           | 95-100  | 28.5   | 0.5%           | 155-160 | 265.8  | 4.4%           |
| 40-45 | 232.5  | 3.9%           | 100-105 | 51.8   | 0.9%           | 160-165 | 216.2  | 3.6%           |
| 45-50 | 210.3  | 3.5%           | 105-110 | 78.0   | 1.3%           | 165-170 | 159.5  | 2.7%           |
| 50-55 | 184.3  | 3.1%           | 110-115 | 111.5  | 1.9%           | 170-175 | 97.7   | 1.6%           |
| 55-60 | 155.8  | 2.6%           | 115-120 | 156.3  | 2.6%           | 175-180 | 32.9   | 0.5%           |

| Zone   | Lumens | % of Luminaire |
|--------|--------|----------------|
| 0-40   | 1486   | 24.8%          |
| 0-60   | 2269   | 37.8%          |
| 0-90   | 2634   | 43.9%          |
| 90-180 | 3371   | 56.1%          |



### 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   | 1441 | 1441 | 1441 | 1441 | 1441  | 1441 | 1441  | 1441 | 1441  | 1441 | 1441  | 1441 | 1441  | 1441 | 1441  |
|                          | 5   | 1423 | 1433 | 1420 | 1420 | 1420  | 1420 | 1433  | 1423 | 1433  | 1420 | 1420  | 1420 | 1420  | 1420 | 1433  |
|                          | 10  | 1394 | 1395 | 1367 | 1350 | 1342  | 1350 | 1367  | 1395 | 1394  | 1395 | 1367  | 1350 | 1342  | 1350 | 1367  |
|                          | 15  | 1345 | 1336 | 1280 | 1240 | 1220  | 1240 | 1280  | 1336 | 1345  | 1336 | 1280  | 1240 | 1220  | 1240 | 1280  |
|                          | 20  | 1281 | 1258 | 1170 | 1106 | 1079  | 1106 | 1170  | 1258 | 1281  | 1258 | 1170  | 1106 | 1079  | 1106 | 1170  |
|                          | 25  | 1202 | 1161 | 1046 | 964  | 930   | 964  | 1046  | 1161 | 1202  | 1161 | 1046  | 964  | 930   | 964  | 1046  |
|                          | 30  | 1110 | 1051 | 916  | 823  | 788   | 823  | 916   | 1051 | 1110  | 1051 | 916   | 823  | 788   | 823  | 916   |
|                          | 35  | 1006 | 932  | 785  | 690  | 655   | 690  | 785   | 932  | 1006  | 932  | 785   | 690  | 655   | 690  | 785   |
|                          | 40  | 897  | 809  | 662  | 562  | 529   | 562  | 662   | 809  | 897   | 809  | 662   | 562  | 529   | 562  | 662   |
|                          | 45  | 785  | 694  | 543  | 452  | 423   | 452  | 543   | 694  | 785   | 694  | 543   | 452  | 423   | 452  | 543   |
|                          | 50  | 678  | 579  | 438  | 359  | 338   | 359  | 438   | 579  | 678   | 579  | 438   | 359  | 338   | 359  | 438   |
|                          | 55  | 569  | 471  | 345  | 283  | 268   | 283  | 345   | 471  | 569   | 471  | 345   | 283  | 268   | 283  | 345   |
|                          | 60  | 464  | 369  | 263  | 219  | 208   | 219  | 263   | 369  | 464   | 369  | 263   | 219  | 208   | 219  | 263   |
|                          | 65  | 364  | 277  | 193  | 160  | 150   | 160  | 193   | 277  | 364   | 277  | 193   | 160  | 150   | 160  | 193   |
|                          | 70  | 270  | 194  | 132  | 117  | 114   | 117  | 132   | 194  | 270   | 194  | 132   | 117  | 114   | 117  | 132   |
|                          | 75  | 181  | 122  | 89   | 83   | 81    | 83   | 89    | 122  | 181   | 122  | 89    | 83   | 81    | 83   | 89    |
|                          | 80  | 103  | 62   | 54   | 52   | 50    | 52   | 54    | 62   | 103   | 62   | 54    | 52   | 50    | 52   | 54    |
|                          | 85  | 41   | 26   | 24   | 23   | 23    | 23   | 24    | 26   | 41    | 26   | 24    | 23   | 23    | 23   | 24    |
|                          | 90  | 0    | 0    | 0    | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                          | 95  | 45   | 37   | 30   | 24   | 22    | 24   | 30    | 37   | 45    | 37   | 30    | 24   | 22    | 24   | 30    |
|                          | 100 | 95   | 87   | 70   | 63   | 60    | 63   | 70    | 87   | 95    | 87   | 70    | 63   | 60    | 63   | 70    |
|                          | 105 | 148  | 141  | 115  | 103  | 100   | 103  | 115   | 141  | 148   | 141  | 115   | 103  | 100   | 103  | 115   |
|                          | 110 | 216  | 209  | 177  | 154  | 149   | 154  | 177   | 209  | 216   | 209  | 177   | 154  | 149   | 154  | 177   |
|                          | 115 | 309  | 301  | 265  | 230  | 220   | 230  | 265   | 301  | 309   | 301  | 265   | 230  | 220   | 230  | 265   |
|                          | 120 | 433  | 425  | 389  | 346  | 328   | 346  | 389   | 425  | 433   | 425  | 389   | 346  | 328   | 346  | 389   |
|                          | 125 | 585  | 580  | 550  | 506  | 482   | 506  | 550   | 580  | 585   | 580  | 550   | 506  | 482   | 506  | 550   |
|                          | 130 | 747  | 748  | 724  | 693  | 670   | 693  | 724   | 748  | 747   | 748  | 724   | 693  | 670   | 693  | 724   |
|                          | 135 | 894  | 899  | 887  | 871  | 861   | 871  | 887   | 899  | 894   | 899  | 887   | 871  | 861   | 871  | 887   |
|                          | 140 | 1011 | 1021 | 1019 | 1011 | 1007  | 1011 | 1019  | 1021 | 1011  | 1019 | 1011  | 1007 | 1011  | 1019 | 1021  |
|                          | 145 | 1103 | 1117 | 1113 | 1115 | 1115  | 1115 | 1113  | 1117 | 1103  | 1117 | 1113  | 1115 | 1115  | 1113 | 1117  |
|                          | 150 | 1179 | 1190 | 1183 | 1188 | 1189  | 1188 | 1183  | 1190 | 1179  | 1190 | 1183  | 1188 | 1189  | 1188 | 1183  |
|                          | 155 | 1236 | 1247 | 1243 | 1243 | 1241  | 1243 | 1243  | 1247 | 1236  | 1247 | 1243  | 1243 | 1241  | 1243 | 1247  |
|                          | 160 | 1281 | 1292 | 1291 | 1297 | 1293  | 1297 | 1291  | 1292 | 1281  | 1292 | 1291  | 1297 | 1293  | 1297 | 1291  |
|                          | 165 | 1318 | 1331 | 1331 | 1336 | 1334  | 1336 | 1331  | 1331 | 1318  | 1331 | 1331  | 1336 | 1334  | 1336 | 1331  |
|                          | 170 | 1347 | 1357 | 1356 | 1363 | 1362  | 1363 | 1356  | 1357 | 1347  | 1357 | 1356  | 1363 | 1362  | 1363 | 1356  |
|                          | 175 | 1365 | 1373 | 1369 | 1378 | 1379  | 1378 | 1369  | 1373 | 1365  | 1373 | 1369  | 1378 | 1379  | 1378 | 1369  |
|                          | 180 | 1376 | 1376 | 1376 | 1376 | 1376  | 1376 | 1376  | 1376 | 1376  | 1376 | 1376  | 1376 | 1376  | 1376 | 1376  |

### Average Luminance (cd/m<sup>2</sup>)

Horizontal Angle (Degrees)

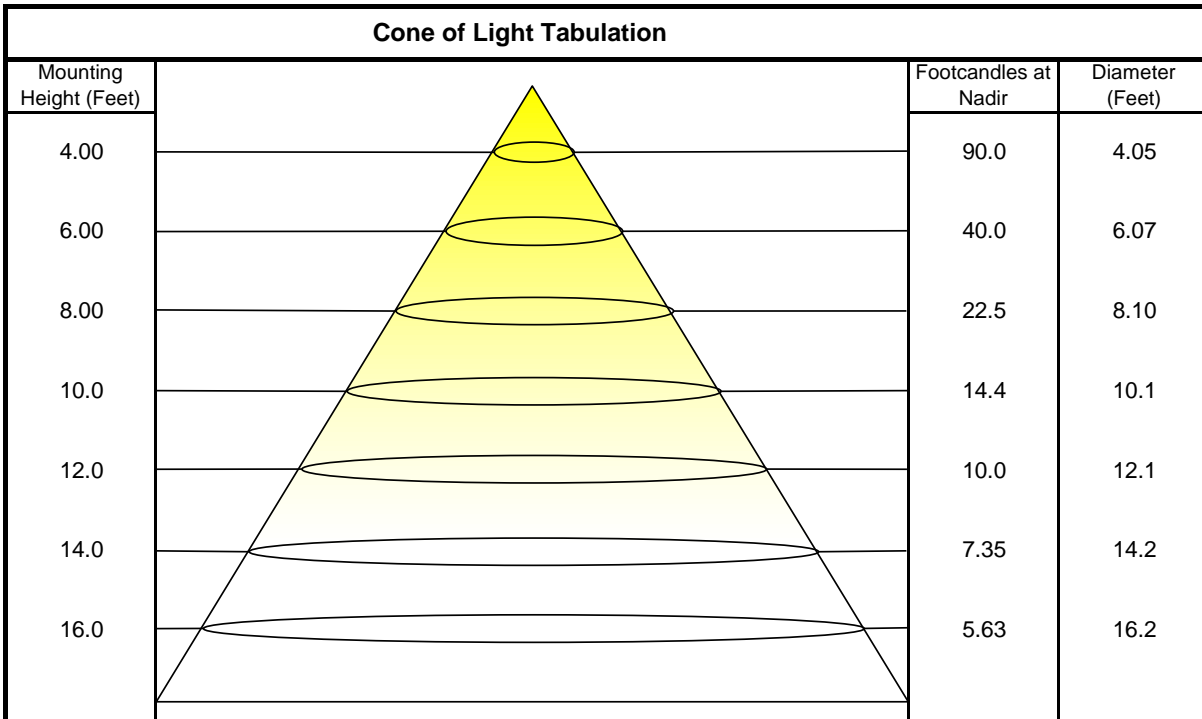
| Vertical Angle (Degrees) | 0  | 45    | 90    |
|--------------------------|----|-------|-------|
|                          | 0  | 23260 | 23260 |
|                          | 45 | 16220 | 2762  |
|                          | 55 | 13950 | 1652  |
|                          | 65 | 11350 | 899   |
|                          | 75 | 8146  | 490   |
|                          | 85 | 3472  | 141   |



### 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                                      | 106   | 106 | 106 | 106 | 97 | 97 | 97 | 97 | 80 | 80 | 80 | 65 | 65 | 65 | 50 | 50 | 50 | 44 |
| 1                                      | 97  | 93  | 89  | 86  | 89 | 85 | 82 | 79 | 71 | 69 | 67 | 58 | 56 | 55 | 45 | 45 | 44 | 38 |
| 2                                      | 89  | 82  | 76  | 71  | 81 | 75 | 70 | 66 | 63 | 59 | 56 | 51 | 49 | 47 | 41 | 39 | 38 | 33 |
| 3                                      | 81  | 72  | 65  | 60  | 74 | 67 | 61 | 56 | 56 | 51 | 48 | 46 | 43 | 40 | 37 | 34 | 33 | 28 |
| 4                                      | 75  | 64  | 57  | 51  | 68 | 59 | 53 | 48 | 50 | 45 | 41 | 41 | 38 | 35 | 33 | 31 | 29 | 25 |
| 5                                      | 69  | 58  | 50  | 44  | 63 | 53 | 46 | 41 | 45 | 40 | 36 | 37 | 34 | 31 | 30 | 27 | 25 | 22 |
| 6                                      | 63  | 52  | 44  | 39  | 58 | 48 | 41 | 36 | 41 | 36 | 32 | 34 | 30 | 27 | 28 | 25 | 23 | 20 |
| 7                                      | 59  | 47  | 39  | 34  | 54 | 44 | 37 | 32 | 37 | 32 | 28 | 31 | 27 | 24 | 25 | 23 | 20 | 18 |
| 8                                      | 55  | 43  | 35  | 30  | 50 | 40 | 33 | 29 | 34 | 29 | 25 | 29 | 25 | 22 | 23 | 21 | 18 | 16 |
| 9                                      | 51  | 39  | 32  | 27  | 47 | 37 | 30 | 26 | 31 | 26 | 23 | 26 | 23 | 20 | 22 | 19 | 17 | 15 |
| 10                                     | 48  | 36  | 29  | 24  | 44 | 34 | 27 | 23 | 29 | 24 | 21 | 24 | 21 | 18 | 20 | 17 | 15 | 13 |

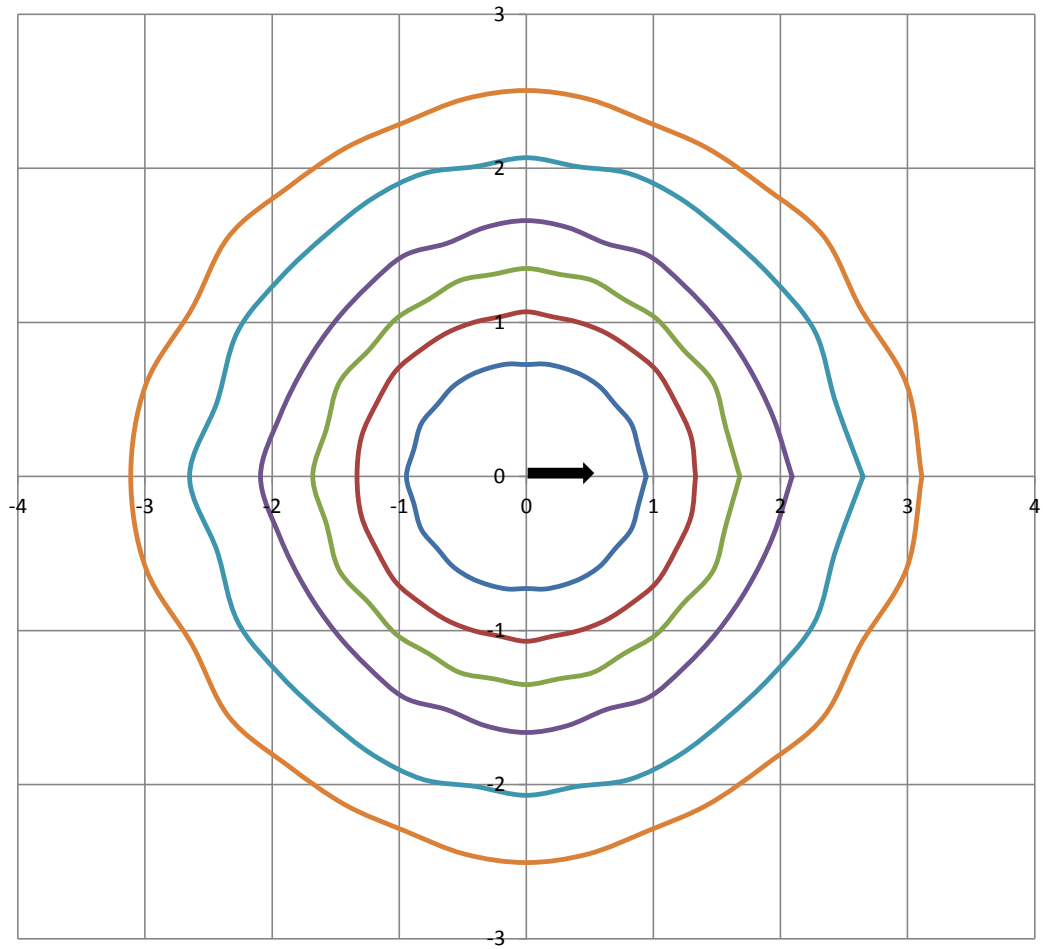
| Beam and Field Information |                 |
|----------------------------|-----------------|
| CIE Type:                  | Direct/Indirect |
| Center Beam Intensity:     | 1441 Candela    |
| Central Cone Intensity:    | 1435 Candela    |
| Beam Flux:                 | 3924.1 Lumens   |
| Beam Angle (0-180):        | 96.1 Degrees    |
| Beam Angle (90-270):       | 65.2 Degrees    |
| Field Angle (0-180):       | 154.6 Degrees   |
| Field Angle (90-270):      | 131.2 Degrees   |





## ISOFootcandle Plot

Mounting Height - 8 Feet



Grid Lines in Units of Mounting Height

— 5 fc    — 2 fc    — 1 fc    — 0.5 fc    — 0.2 fc    — 0.1 fc