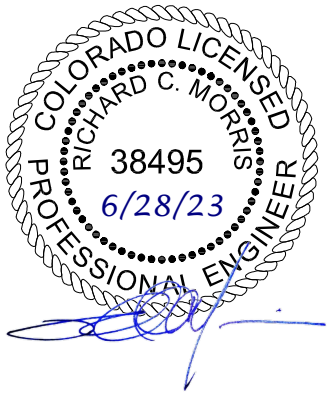
# Lighting Mitigation Plan

# For




## Kerr McGee Oil & Gas Onshore LP

## ROAN ANGEL PAD

**Project Number: 21010-28**

| | | | |
|---|---|---|---|
| Originators: | E. Olagoke | Date | 06-28-23 |
| Project Engineer Approval: | R. Morris | Date | 06-28-23 |
| Project Manager Approval: | B. Primeaux | Date | 06-28-23 |
| Client Review: | Justin Nelson | Date | |

| Rev. No. | By | Revisions | Approval | Date |
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## 1.0 EXECUTIVE SUMMARY

Kerr McGee Oil & Gas Onshore LP (KMOG) commissioned Samuel Engineering to develop a lighting mitigation plan for the Roan Angel pad site. The purpose of this report is to demonstrate compliance with the State and Local lighting regulations, predict lighting impacts for the different development phases, and to detail the various lighting mitigation techniques used to limit the amount of light leaving the location.

Site specific three-dimensional lighting models were developed for each of the phases to determine their associated lighting impacts. The lighting fixtures used in the models were selected based on currently operated representative sites and research conducted into available vendor lighting systems.

Table 1.0 summarizes the modeled maximum values and shows that all values are within the regulatory limits:

| Modeled Lighting Values and Regulatory Limits Summary | | | | |
|---|---|---|---|---|
| **Phase** | **Sub Phase** | **Max Modeled Value** | **Allowance Limit** | **Regulating Agency** |
| All | All | N/A | ≤ 4.0 lux | COGCC |
| Construction | Drilling | 2.13 lm/ft$^2$ | ≤ 12 lm/ft$^2$ | Weld County |
| | Completions | 1.70 lm/ft$^2$ | ≤ 12 lm/ft$^2$ | Weld County |
| Production | Production | 0.02 lm/ft$^2$ | ≤ 1.25 lm/ft$^2$ | Weld County |

*Table 1.0 - Modeled Lighting Values and Regulatory Limits*

## 2.0 INTRODUCTION AND DEFINITION OF TECHNICAL TERMS

### 2.1 INTRODUCTION

Light mitigation plans seek to quantify and prescribe methods to address the effects of multiple forms of light. Effective lighting mitigation plans address light impacts by limiting the impacts on the surrounding areas, preserving the overall night-sky aesthetics, and maintaining existing ecosystems, all while maintaining a safe work environment.

There are a number of standards, best practices, and regulations which are used as guidelines when developing lighting plans for reducing the effects of artificial lighting. The applicable regulations used for this report are COGCC Rule 424 and Weld County Ordinance ORD2021-17.

### 2.2 DEFINITION OF TECHNICAL TERMS

A number of technical terms are used throughout this report and, as an aid to the reader, are defined below.

Illuminance (lx)

Illuminance is defined as the amount of light falling on a surface area. It is measured in Lux (lx) or foot-candles (fc). One lux is equal to one lumen per square meter. One foot-candle is equal to one lumen per square foot, or 10.7639 lux.

It should be noted that the measured value is dependent on angle, sensitivity, and optics. As an example, the photo in Figure 2.2 shows the lux levels decreasing on the sidewalk, as the distance from the light source increases.

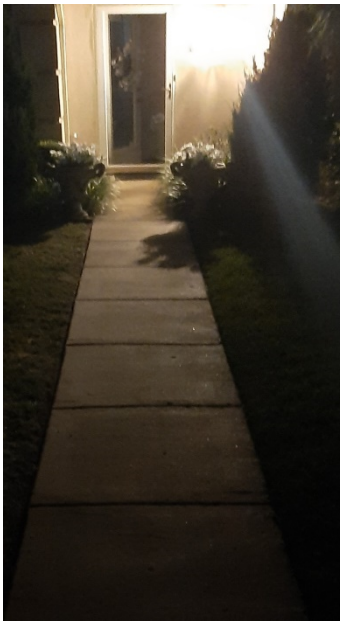


*Figure 2.2–Illuminance (lx) level decreasing with distance from light source.*

Table 2.2 provides examples of typical Lux values.

| Typical Lux Values | |
|---|---|
| Clear night, no moon: | 0.002 lx |
| Clear night, full Moon: | 0.27 to 1 lx |
| Family Living Room | 50 lx |
| Sunrise/sunset | 300-500 lx |
| Overcast day: | 1000 lx |
| Daylight: | 10,000-25,000 lx |
| Direct sunlight: | 32,000-130,000 lx |

*Table 2.2 – Typical Lux Values*

Luminous Flux (lm)

Luminous Flux is defined as the amount of light energy produced per unit time and is measured in Lumens (lm). It is a physical property of light and, in general terms, is a measurement of the total amount of light power emanating from a source.

It is important to note that the luminous flux value of a given source is independent of where a measurement is taken. For example, a 60-watt incandescent light bulb produces approximately 800 lumens, regardless of if the measurement is taken at 1 foot, 10 miles, or 10,000 miles away from the source.

## 3.0 MODEL AND ANALYSIS DEVELOPMENT

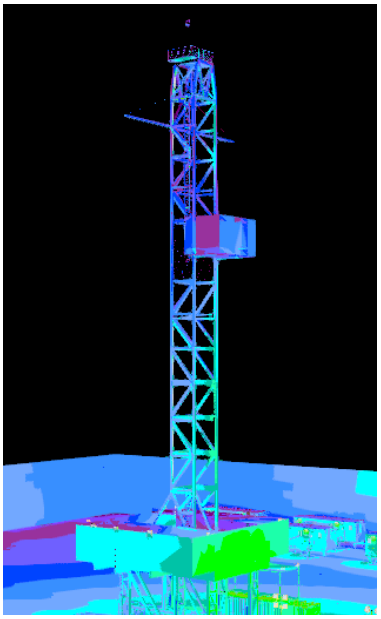


*Figure 3.0 – Screenshot from a representative 3-D model showing a false color rendering*

Site-specific three-dimensional models were developed for each of the major project development phases. These phases being Drilling, Completions, and Production. The following elements were incorporated into the models: the local site topographical information, major lighting obstructions (sound walls, large equipment, etc…), individual luminaire lighting qualities, lighting mounting characteristics and surrounding building units.

Geographical information was obtained using USGS topography data to model the surrounding landscape.

To determine the lighting impacts on local building units, 25-foot vertical walls were modeled at the units' locations, at the USGS identified elevations.

Modeling of site-specific information (including large equipment, type of luminaire, and any sound wall locations) is based on inspections of operational representative sites, provided vendor information, and research into various available lighting systems. The major pieces of equipment modeled included:

- Drilling: Drill rig floor, derrick, substructure, temporary lighting, sound barriers, backyard, and trailers.
- Completions: Temporary lighting, sound barriers, completion fleet equipment, and trailers.
- Production: LACT skids, separators, large tanks, and associated equipment.

Once site-specific topographical information and equipment are modeled, lighting characteristics are placed within the model. These characteristics are obtained from the various manufacturers and are specific to the make/model of the light to be used. The following information is included in the model: the luminaire type, quantity, mounting height, orientation, and tilt angle.

Models for each of the phases were developed and the resulting lighting impacts were tabulated. A spreadsheet was used to total the site lumens for each fixture and compare it to the site working pad surface or hardscape area.

During Pre-Production, temporary lighting fixtures were based on currently available rental units and on observations from representative sites. The temporary lighting system that will be used may vary based on rental availability, but should be similar to the lumen values used in this analysis.

## 4.0 COGCC LIGHTING ANALYSIS RESULTS

### 4.1 CUMULATIVE LIGHTING IMPACTS

For modeling purposes, buildings were grouped into clusters and a representative "wall" location was selected for analysis. These analyzed "wall" locations were selected to determine an upper cumulative light impact limit for that clustered group, considering the local topography, orientation, and distance to the site.

For the Roan Angel Pad site, there are no building units within 1 mile of the location boundaries, therefore there is no light impact. See Figure 4.1.

Figure 4.1 shows the building units that are located within a 1-mile radius of the Roan Angel pad site.

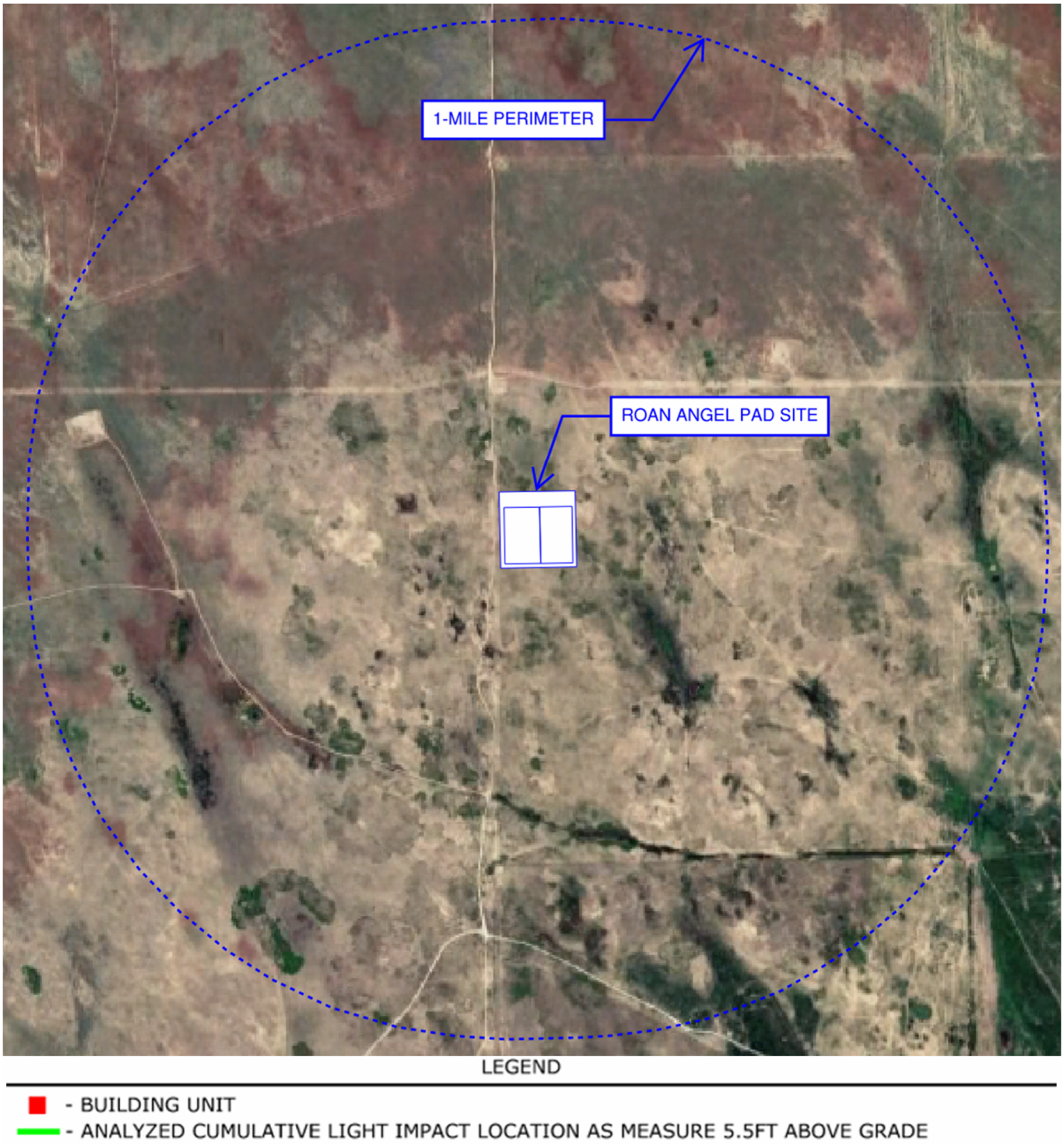
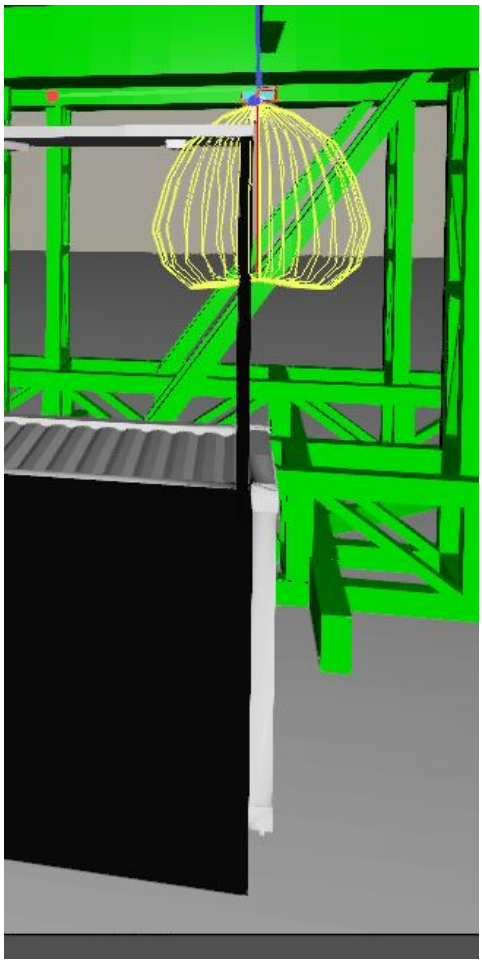



*Figure 4.1 –Building Units Within a 1-Mile Radius of Roan Angel Pad*

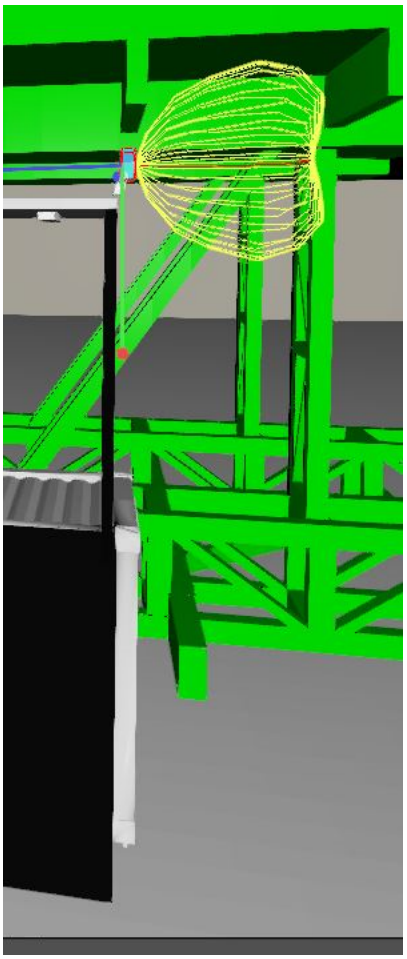
## 4.2 SITE LIGHTING POSITIONS AND ORIENTATIONS

The following figures and tables in this section show the lighting location, mounting, height, and orientations for the Drilling, Completions, and Production Operations, in accordance with COGCC Rule 424(a)(2)(A)(ii). The following notes apply:

1) Stated tilt at zero (0) degrees represents a luminaire facing directly downward.



*Example 0 degrees*



*Example 90 degrees*

2) Intermittent sources of lights such as glow from on-site combustor and alarm lights are not included in this analysis.
3) Temporary lighting, where necessary for safety reasons per COGCC 424.a.2.A.iii, have not been modeled or accounted for in this analysis.
4) The quantity of lights and calculated values shown represents an estimated upper limit to the actual values that will be present on-site.
5) Refer to Attachment B for further lighting fixture information.

## 5.0 WELD COUNTY LIGHTING ANALYSIS RESULTS

### 5.1 HARDSCAPE AND LUMEN LEVEL RESULTS

Lumens per Hardscape calculations were performed based on the number of exterior fixtures, light output (lumens), and the working pad surface (hardscape). These values were then compared to the allowed site lumens per square foot to demonstrate compliance. The hardscape exceeds 12 acres, so the maximum value of 12 acres was used for the calculations.

Table 5.1 summarizes the lumen values and compares them to typical lighting limits.

| **Lumens Per Hardscape Area** | | | |
|---|---|---|---|
| Phase: | Construction Phase: Drilling | Construction Phase: Completions | Production Phase |
| Hardscape Area: | 12 acres / 522,720 $ft^2$ | 12 acres / 522,720 $ft^2$ | 7.98 acres / 347,609 $ft^2$ |
| Total Lumens: | 1,113,558 lm | 888,240 lm | 6,940 lm |
| Calculated Lumens/$ft^2$: | 2.13 $lm/ft^2$ | 1.70 $lm/ft^2$ | 0.02 $lm/ft^2$ |
| Allowable Limit: | ≤ 12 $lm/ft^2$ | ≤ 12 $lm/ft^2$ | ≤ 1.25 $lm/ft^2$ |

*Table 5.1 – Lighting Compliance with Typical Lighting Limits*

## 6.0 SITE PLANS & FIXTURE SCHEDULES

### 6.1 DRILLING PHASE

Refer to:
Drawing 21010-EE-386 for Drilling Phase Photometric
Drawing 21010-EE-389 for Drilling Phase Shaded View

| Fixture Schedule - Drilling Phase | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Luminaire ID | Manufacturer | Catalog No. | Description | Power (W) | Luminous Flux (lm) | Luminaire No. | Luminaire Height (ft. above grade) | Luminaire Tilt (degrees) | Quantity | Total Lumens (lm) |
| B | HPWINNER | M8B-VCA-63 | POLE-MOUNTED PORTABLE LIGHT PLANT, EACH FIXTURE CONSISTS OF 16 MODULES, VALUES GIVEN ARE TOTAL PER FIXTURE | 960 W | 121,920 | 1-2 | 30' | 75° | 2 | 243,840 |
| C | PAULUHN | DFLMY400/TT 76 | WALL-MOUNTED FLOODLIGHT | 400 W | 24,091 | 3-10 | 21' | 75° | 8 | 192,728 |
| | | | | | | 55-64 | 36' | 75° | 10 | 240,910 |
| | | | | | | 79-82 | 20' | 75° | 4 | 96,364 |
| D | PAULUHN | DLL4/UNV1S903D | WALL-MOUNTED LINEAR 4FT. LED, INCLUDES DIFFUSED POLYCARBONATE LENS | 63 W | 7,900 | 11-13 | 20' | 0° | 3 | 23,700 |
| | | | | | | 14-40 | 9' | 75° | 27 | 213,300 |
| | | | | | | 67 | 53' | 90° | 1 | 7,900 |
| | | | | | | 68 | 61' | 90° | 1 | 7,900 |
| | | | | | | 69 | 73' | 90° | 1 | 7,900 |
| | | | | | | 70 | 82' | 90° | 1 | 7,900 |
| | | | | | | 71 | 92' | 90° | 1 | 7,900 |
| | | | | | | 72 | 149' | 90° | 1 | 7,900 |
| | | | | | | 73 | 158' | 90° | 1 | 7,900 |
| | | | | | | 74-78 | 19' | 0° | 5 | 39,500 |
| E | PAULUHN | DLL2/UNV1S903D | WALL-MOUNTED LINEAR 2FT. LED, INCLUDES DIFFUSED POLYCARBONATE LENS | 32 W | 3,958 | 65 | 41' | 90° | 1 | 3,958 |
| | | | | | | 66 | 167' | 90° | 1 | 3,958 |
| | | | | | | | | Drilling Phase Total Lumens: | | 1,113,558 |

### 6.2 COMPLETIONS PHASE

Refer to:
Drawing 21010-EE-387 for Completions Phase Photometric
Drawing 21010-EE-390 for Completions Phase Shaded View

| Fixture Schedule - Completions Phase | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Luminaire ID | Manufacturer | Catalog No. | Description | Power (W) | Luminous Flux (lm) | Luminaire No. | Luminaire Height (ft. above grade) | Luminaire Tilt (degrees) | Quantity | Total Lumens (lm) |
| A | STANPRO | WPS-PS40-Q-3C | WALL-MOUNTED WALL PACK LED | 40 W | 5,800 | 83-88 | 11' | 0° | 6 | 34,800 |
| B | HPWINNER | M8B-VCA-63 | POLE-MOUNTED PORTABLE LIGHT PLANT, EACH FIXTURE CONSISTS OF 16 MODULES, VALUES GIVEN ARE TOTAL PER FIXTURE | 960 W | 121,920 | 89-95 | 30' | 75° | 7 | 853,440 |
| | | | | | | | | Completions Phase Total Lumens: | | 888,240 |

## 6.3 PRODUCTION PHASE

Refer to:
Drawing 21010-EE-388 for Production Phase Photometric
Drawing 21010-EE-391 for Production Phase Shaded View

| Fixture Schedule - Production Phase | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Luminaire ID | Manufacturer | Catalog No. | Description | Power (W) | Luminous Flux (lm) | Luminaire No. | Luminaire Height (ft. above grade) | Luminaire Tilt (degrees) | Quantity | Total Lumens (lm) |
| F | RAYCHEM | E-100-L-A | HEAT TRACE VERTICAL END SEAL KIT LIGHT, FIXTURE IS AN ESTIMATE OF TYPICAL END SEAL KIT LIGHTS | 2 W | 60 | 96-144 | 5' | 180° | 49 | 2,940 |
| G | PHOENIX | CL-13LED-120-240 | COMPACT LED AREA CUBE LIGHT, INCLUDES VISOR KIT (#VSR-CL) TO MITIGATE UPLIGHT | 13 W | 1,000 | 145-148 | 8' | 0° | 4 | 4,000 |
| | | | | | | | | | Production Phase Total Lumens: | 6,940 |

## 7.0 SITE MITIGATION NOTES AND BEST MANAGEMENT PRACTICES

Construction Phase:

- During construction of all phases, KMOG will only conduct day light operation and there will be no nighttime operations that require lighting.
- Exterior lighting shall be directed away from residential and other sensitive areas or shielded from said areas to eliminate glare. Light spillage beyond the perimeter of the well site shall be minimized.
- Bulbs shall be fully shielded to prevent light emissions above a horizontal plane drawn from the bottom of each fixture.
- Prior to commencement of drilling and completion activities during the HP STIP window of January 1st-April 30th, a full-perimeter engineered sound wall consisting of approximately 2,500 linear feet of 16-foot-tall, STC32 wall will be installed around the edge of the well pad to reduce noise levels in the vicinity of the proposed location.

Drilling Phase:

- KMOG will utilize LED fixtures to reduce skyglow.
- KMOG will position all lights to point in a downward direction where vertical lighting is not required. Where it is required, lights are angled in a vertical direction to provide task lighting for safety and operations involving personnel.
- Derrick mast lighting in Section 6.1 is facing horizontally to provide adequate lighting for safe operation.
- Lighting is angled to mitigate the amount of light leaving the location boundary, and away from surrounding off site buildings.
- Lighting within the Drilling area has been reduced to provide a minimum acceptable value for safe operation.
- Light masts are automatically switched off/on based on lighting sensors.
- Lights are switched off when not required.
- Low power (63 W) LED lights are used for the drill rig.
- In the event of a lightning complaint, KMOG will address the complaint and work with all parties involved to ensure the complaint is resolved.

Completions and Flowback Phases:

- KMOG will utilize LED fixtures to reduce skyglow.
- KMOG will position all lights to point in a downward direction where vertical lighting is not required. Where it is required, lights are angled in a vertical direction to provide task lighting for safety and operations involving personnel.
- Lighting is angled to mitigate the amount of light leaving the location boundary, and away from surrounding off site buildings.
- Lighting within the Completion and Flowback areas have been reduced to provide a minimum acceptable value for safe operation.
- Light masts are automatically switched off/on based on lighting sensors.
- Lights are switched off when not required.
- Lights are directed to task areas only.
- In the event of a lightning complaint, KMOG will address the complaint and work with all parties involved to ensure the complaint is resolved.

Production Phase:

- KMOG will utilize LED fixtures to reduce skyglow.
- KMOG will position all lights to point in a downward direction, in order to mitigate light leaving the location boundary.
- Lighting within the Production areas have been reduced to provide a minimum acceptable value for safe operation.
- In the event of a lighting complaint, KMOG will address the complaint and work with all parties involved to ensure the complaint is resolved.

1) Lighting Cut Sheet Notes for Attachment B

1. Type A Fixtures (Pre-Production Phase)
    - Type A fixtures are construction trailer lights. These units vary significantly depending on supplier, rental agency, inventory, and current market available fixtures. Lights varied significantly during site inspections. A representative model was selected based on a lumen output for a trailer.

2. Type B Fixtures (Pre-Production Phase)
    - Type B fixtures are portable construction light towers with vertical masts. These units vary significantly depending on supplier, rental agency, inventory, and current market available fixtures. HP Winner M8B Model was selected for this analysis based on site inspections and current available units; however specific site units may vary based on time of construction. The model for these portable light towers consisted of a LED light source with 4 fixtures. Each of these fixtures were comprised of 4 LED modules mounted in a rectangular arrangement. The attached cut sheet for HP Winner represents 1 LED module. 16 total modules were modeled for each light mast.

    - The typical light pole center of fixtures is raised approximately 30 feet from grade and pointed downward toward work area.

    - The fixture mounting for portable light towers are articulated mountings which allows for both vertical and horizontal plane adjustments. For this analysis, the light mast fixtures were modeled at indicated angles.

3. Type C Fixtures (Pre-Production Phase) are representative of current fixtures used during drilling operations.
4. Type D Fixtures (Pre-Production Phase) are representative of current fixtures used during drilling operations.
5. Type E Fixtures (Pre-Production Phase) are representative of current fixtures used during drilling operations.
6. Type F Fixtures (Production Phase)
    - Type F Fixtures is an estimation of heat trace end kits. Photometric data from the manufacturer is not available. These lights are low power LED's mounted on the pipe where heat trace is installed. Mounting height, and location vary based on

final design and installation.

7. Type G Fixtures (Production Phase) are representative of current fixtures used for LACT skids and mounted near the doors to the skids.

## 8.0 ATTACHMENTS

Attachment A – 21010 Roan Angel Pad Site Lighting Plans

Attachment B – 21010 Roan Angel Pad Lighting Fixture Cut Sheets Attachment

END OF REPORT

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# ATTACHMENT A

## SITE LIGHTING PLANS

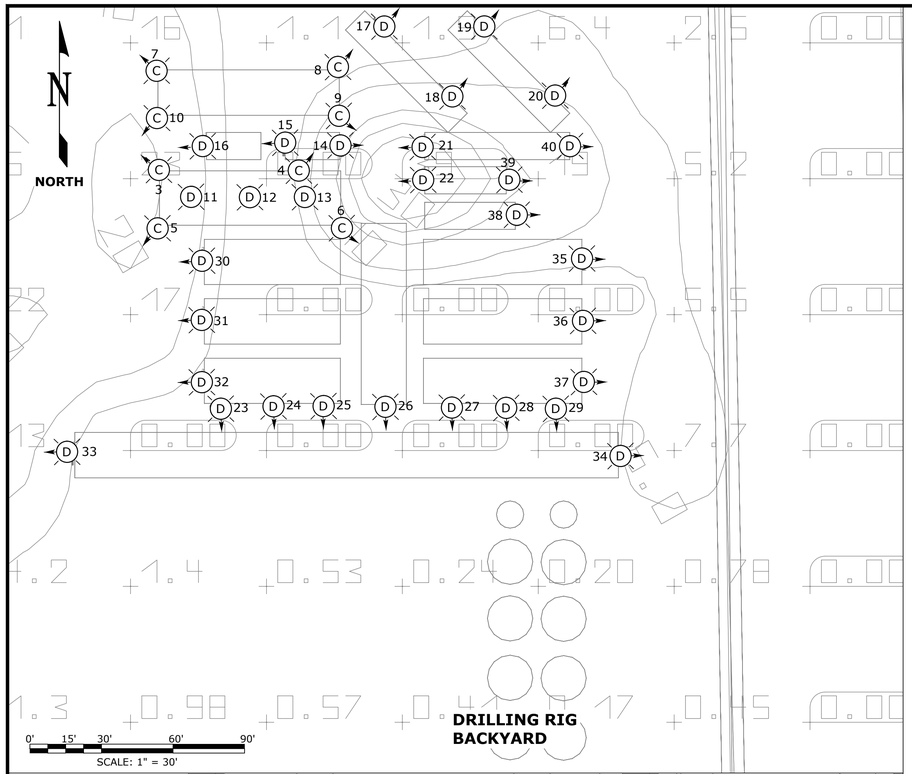
## LIGHTING MITIGATION PLAN

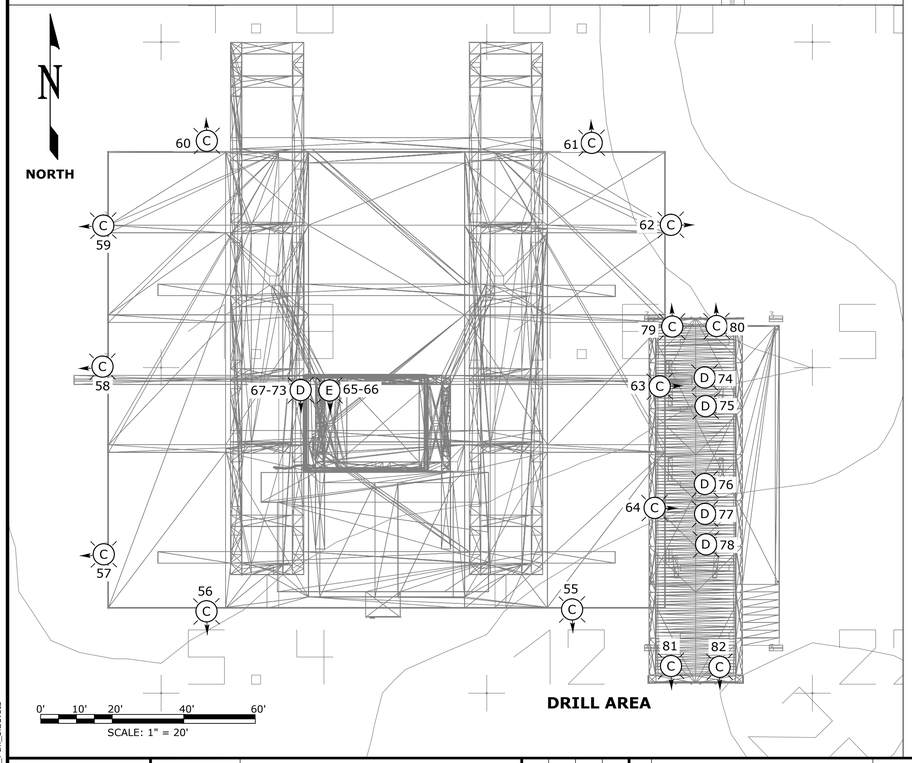
FOR

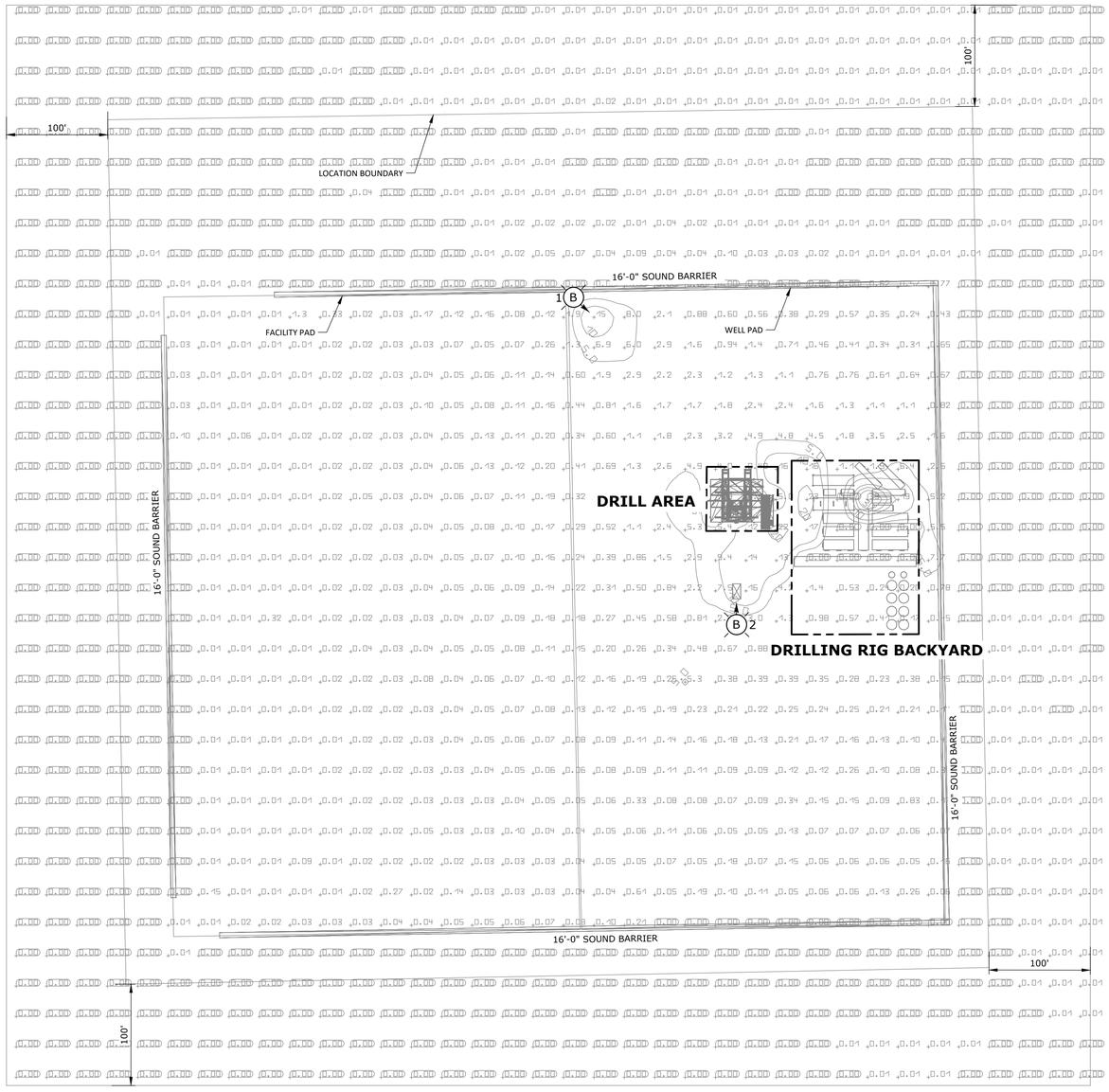
## KERR MCGEE OIL & GAS ONSHORE LP

## ROAN ANGEL PAD

**Project Number: 21010-28**






## NOTES:

1. ALL VALUES IN FOOT-CANDLES (FC).
2. LIGHTING WILL BE DOWNCAST AND SHIELDED, EXCEPT WHERE NECESSARY FOR PERSONNEL SAFETY.

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CTB Used: SE_Std_B&W_Full_size.ctb

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| PE APPROVED: | R.MORRIS | 03/15/23 |
| PM APPROVED: | B.PRIMEAUX | 03/15/23 |

CLIENT: KERR McGEE
PROJECT LOCATION: WELD COUNTY, CO

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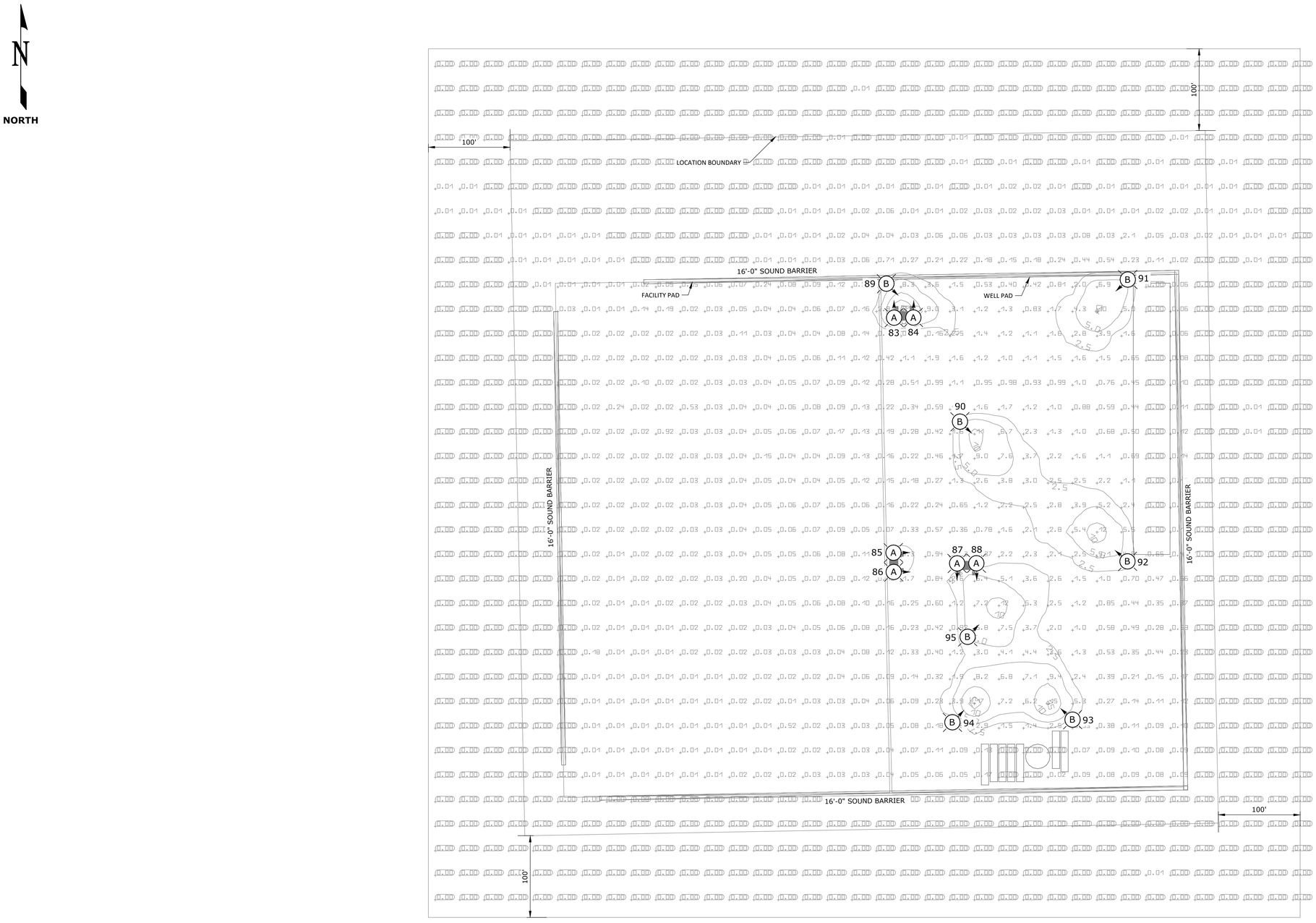
TITLE
LIGHTING STUDY
WELD COUNTY
ELECTRICAL
ROAN ANGEL PAD
PHOTOMETRIC LIGHTING PLAN - DRILLING

PROJECT NUMBER
21010
DRAWING NUMBER
21010-EE-386
REV. 1

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PROJECT LOCATION: WELD COUNTY, CO

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TITLE
LIGHTING STUDY
WELD COUNTY
ELECTRICAL
ROAN ANGEL PAD
PHOTOMETRIC LIGHTING PLAN - COMPLETIONS

PROJECT NUMBER
**21010**
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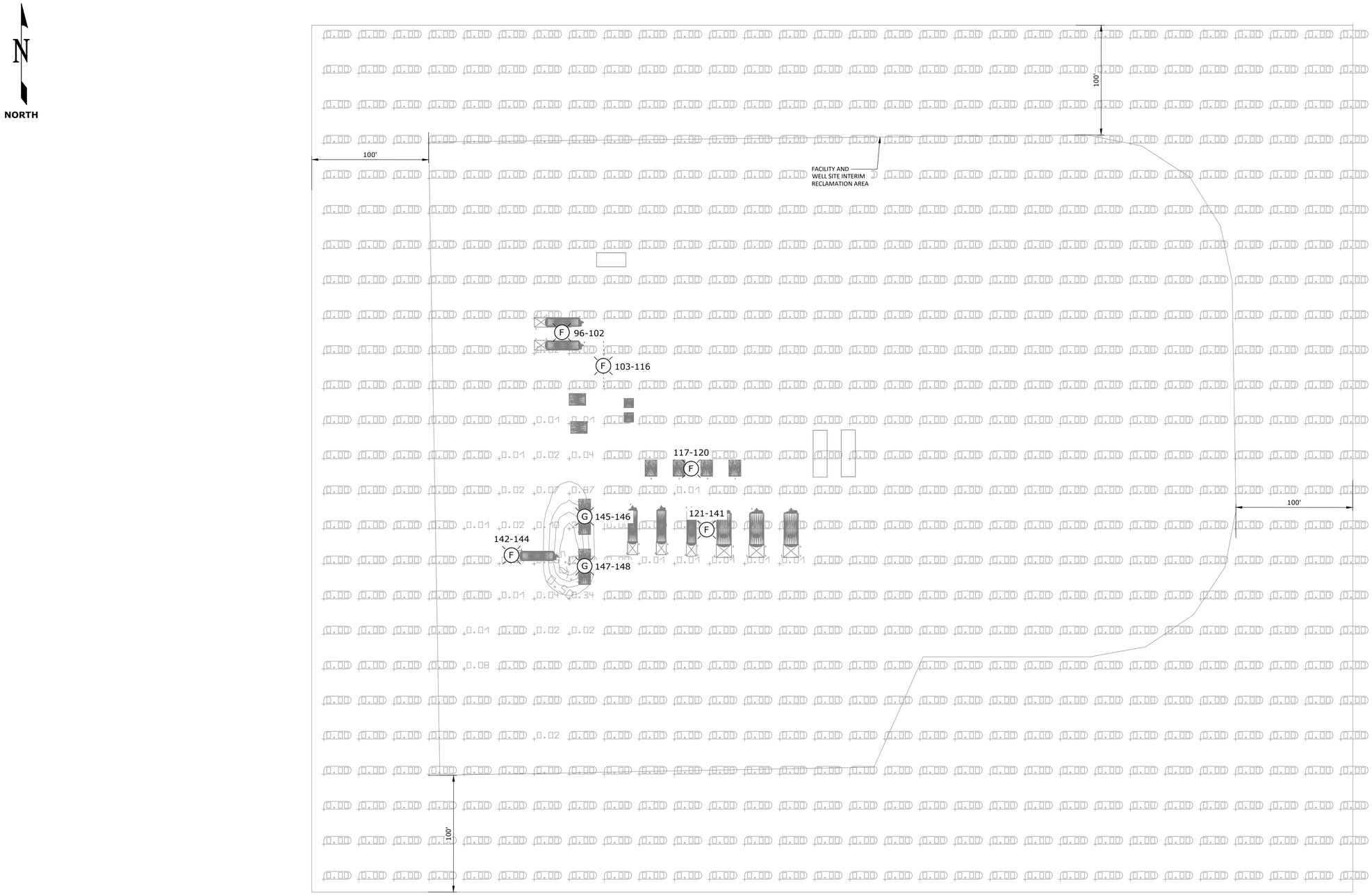
21010-EE-387
REV. 1




0' 30' 60' 120' 180'

SCALE: 1" = 60'

## NOTES:

1. ALL VALUES IN FOOT-CANDLES (FC).
2. LIGHTING WILL BE DOWNCAST AND SHIELDED, EXCEPT WHERE NECESSARY FOR PERSONNEL SAFETY.

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REFERENCE DRAWINGS

| NUMBER | TITLE |
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CLIENT | PROJECT MANAGER | PROJECT ENGINEER | CHECK

REVISIONS

| NO. | DESCRIPTION | DATE | BY |
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CLIENT | PROJECT MANAGER | PROJECT ENGINEER | CHECK

REVISIONS

| NO. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | | | |
| 1 | ISSUED FOR ATTACHMENT TO PERMIT | 06/28/23 | LJB |
| 0 | ISSUED FOR ATTACHMENT TO PERMIT | 03/15/23 | DJM |

BP RM LO

| | | |
|---|---|---|
| SCALE: | AS NOTED | DATE |
| DESIGNED: | D.MILLER | 03/15/23 |
| DRAWN: | D.MILLOER | 03/10/23 |
| CHECKED: | L.OHL | 03/15/23 |
| PE APPROVED: | R.MORRIS | 03/15/23 |
| PM APPROVED: | B.PRIMEAUX | 03/15/23 |

CLIENT: KERR McGEE

PROJECT LOCATION: WELD COUNTY, CO

KerrMcGee

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WE PROVIDE SOLUTIONS
8450 E. Crescent Parkway, Suite 200
Greenwood Village, CO 80111
Phone: 303.714.4840
Fax: 303.714.4800
Web: samuelengineering.com

TITLE

LIGHTING STUDY
WELD COUNTY
ELECTRICAL
ROAN ANGEL PAD
PHOTOMETRIC LIGHTING PLAN - PRODUCTION

PROJECT NUMBER

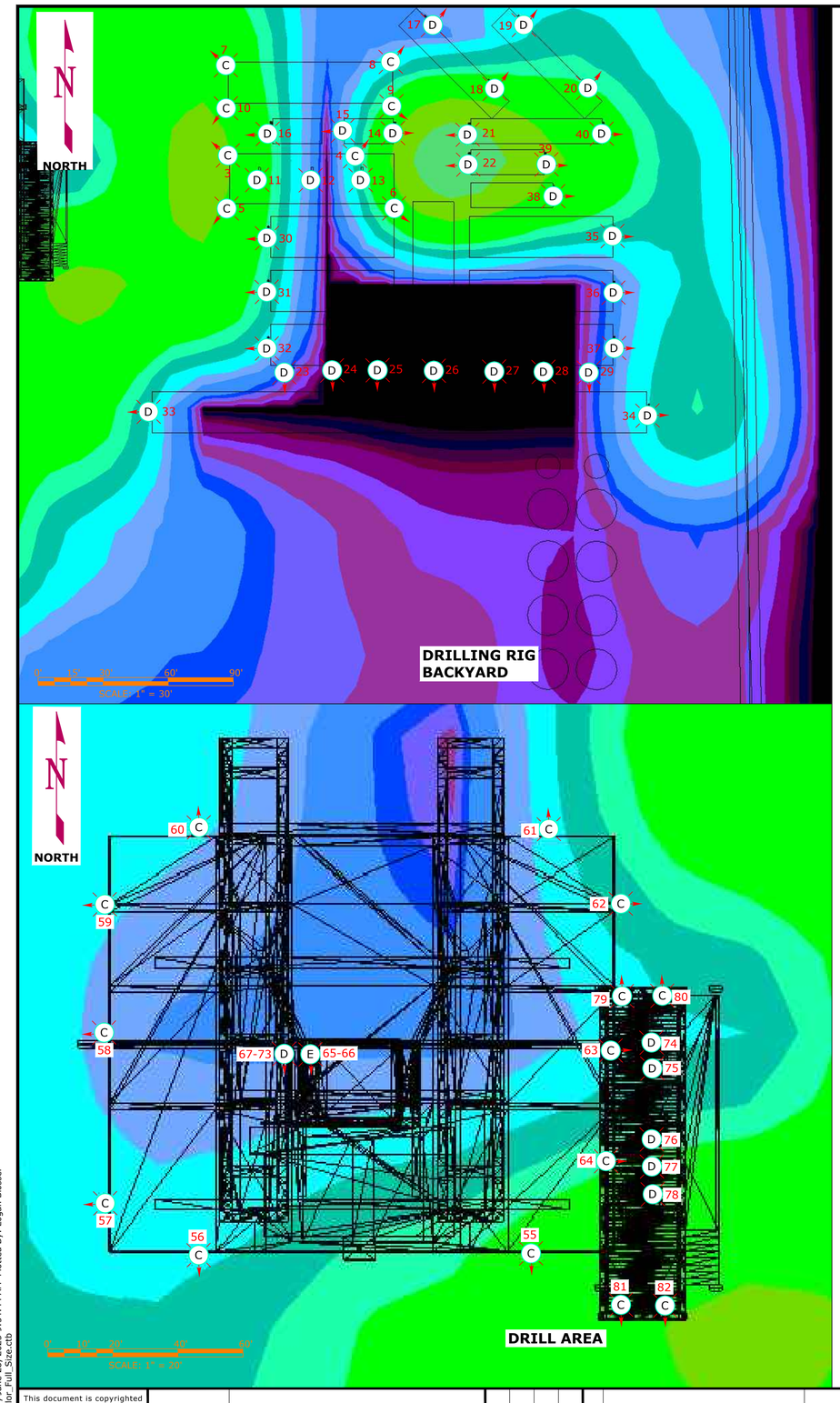
**21010**

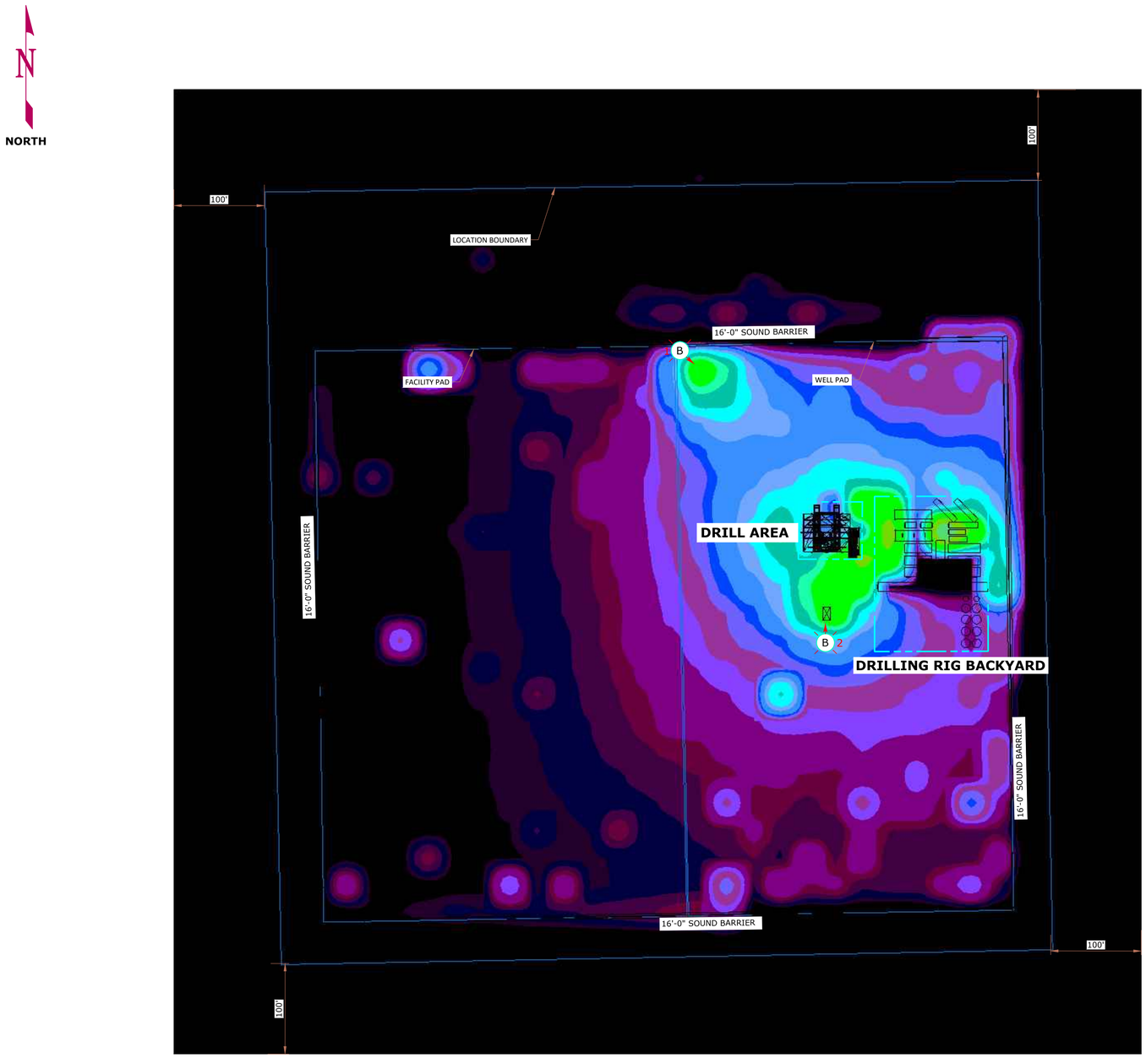
DRAWING NUMBER

21010-EE-388

REV. 1

CAD File: S:\Projects\21010_Oxy_Lighting_Studies\CAD\Electrical\Drawings\Physical Plans\21010-EE-388.dwg
Plot Date: Wednesday, June 28, 2023 12:46:17 PM Plotted By: Logan Blosser
CTB Used: SE_Std_B&W_Full_size.ctb




## LEGEND

| 0.01 | 0.02 | 0.03 | 0.05 | 0.07 | 0.10 | 0.20 | 0.30 | 0.50 | 0.75 | 1.00 | 2.00 | 3.00 | 5.00 | 7.50 | 10.0 | 20.0 | 30.0 | 50.0 | 75.0 | 100.0 | 200.0 | 300.0 | 500.0 | 750.0 | 1000.0 | 1500.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

0' 30' 60' 120' 180'
SCALE: 1" = 60'

## NOTES:

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CAD File: S:\Projects\21010_Oxy_Lighting_Studies\CAD\Electrical\Drawings\Physical Plans\21010-EE-389.dwg
Plot Date: Wednesday, June 28, 2023 9:54:44 AM Plotted By: Logan Blosser
CTB Used: SE_Std_Color_Full_Size.ctb

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

REVISIONS

| NO. | DESCRIPTION | DATE | BY |
|---|---|---|---|

REVISIONS

| NO. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| 1 | ISSUED FOR ATTACHMENT TO PERMIT | 06/28/23 | LJB |
| 0 | ISSUED FOR ATTACHMENT TO PERMIT | 03/15/23 | DJM |

| | | |
|---|---|---|
| SCALE: | AS NOTED | DATE |
| DESIGNED: | D.MILLER | 03/15/23 |
| DRAWN: | D.MILLER | 03/15/23 |
| CHECKED: | L.OHL | 03/15/23 |
| PE APPROVED: | R.MORRIS | 03/15/23 |
| PM APPROVED: | B.PRIMEAUX | 03/15/23 |

CLIENT: KERR McGEE
PROJECT LOCATION: WELD COUNTY, CO

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Phone: 303.714.4840
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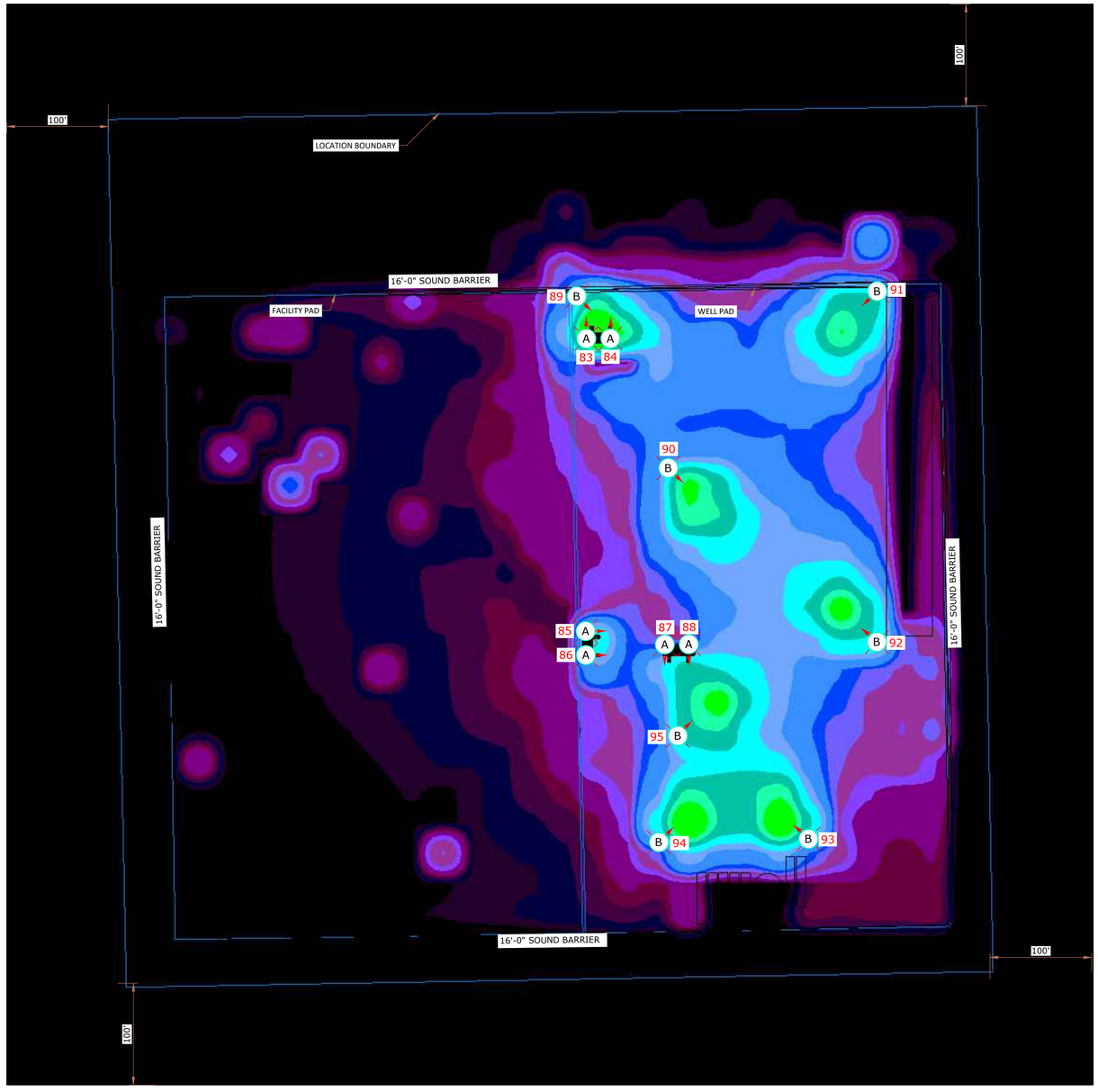
TITLE
LIGHTING STUDY
WELD COUNTY
ELECTRICAL
ROAN ANGEL PAD
PHOTOMETRIC HEAT MAP - DRILLING

PROJECT NUMBER
21010
DRAWING NUMBER
21010-EE-389
REV. 1

NORTH




0' 30' 60' 120' 180'

SCALE: 1" = 60'

## NOTES:

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2. LIGHTING WILL BE DOWNCAST AND SHIELDED, EXCEPT WHERE NECESSARY FOR PERSONNEL SAFETY.

## LEGEND

| 0.01 | 0.02 | 0.03 | 0.05 | 0.07 | 0.10 | 0.20 | 0.30 | 0.50 | 0.75 | 1.00 | 2.00 | 3.00 | 5.00 | 7.50 | 10.0 | 20.0 | 30.0 | 50.0 | 75.0 | 100.0 | 200.0 | 300.0 | 500.0 | 750.0 | 1000.0 | 1500.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.01 | 0.02 | 0.03 | 0.05 | 0.07 | 0.10 | 0.20 | 0.30 | 0.50 | 0.75 | 1.00 | 2.00 | 3.00 | 5.00 | 7.50 | 10.0 | 20.0 | 30.0 | 50.0 | 75.0 | 100.0 | 200.0 | 300.0 | 500.0 | 750.0 | 1000.0 | 1500.0 |

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CAD File: S:\Projects\21010_Oxy_Lighting_Studies\CAD\Electrical\Drawings\Physical Plans\21010-EE-390.dwg
Plot Date: Wednesday, June 28, 2023 9:56:12 AM Plotted By: Logan Blosser
CTB Used: SE_Std_Color_Full_Size.ctb

REFERENCE DRAWINGS

| NUMBER | TITLE |
|---|---|

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|---|---|---|---|

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| NO. | DESCRIPTION | DATE | BY |
|---|---|---|---|

| CLIENT | PROJECT MANAGER | PROJECT ENGINEER | CHECK |
|---|---|---|---|
| | BP | RM | LO |
| | BP | RM | LO |

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| NO. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| 1 | ISSUED FOR ATTACHMENT TO PERMIT | 06/28/23 | LJB |
| 0 | ISSUED FOR ATTACHMENT TO PERMIT | 03/15/23 | DJM |

| | | DATE |
|---|---|---|
| SCALE: | AS NOTED | |
| DESIGNED: | D.MILLER | 03/15/23 |
| DRAWN: | D.MILLER | 03/15/23 |
| CHECKED: | L.OHL | 03/15/23 |
| PE APPROVED: | R.MORRIS | 03/15/23 |
| PM APPROVED: | B.PRIMEAUX | 03/15/23 |

CLIENT: KERR McGEE
PROJECT LOCATION: WELD COUNTY, CO

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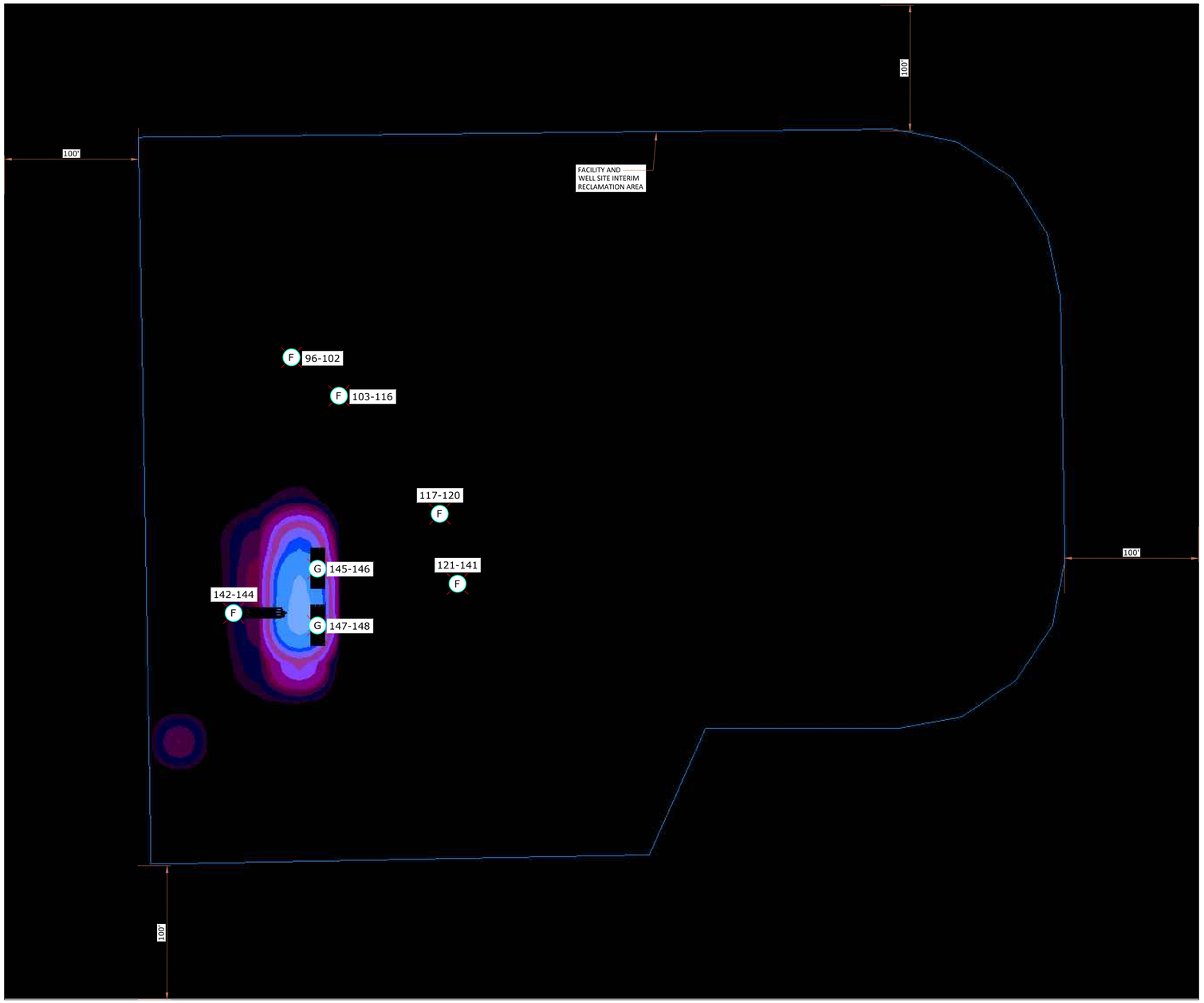
Fax: 303.714.4800
Web: samuelengineering.com

TITLE
LIGHTING STUDY
WELD COUNTY
ELECTRICAL
ROAN ANGEL PAD
PHOTOMETRIC HEAT MAP - COMPLETIONS

PROJECT NUMBER
**21010**
DRAWING NUMBER
21010-EE-390
REV. 1

NORTH




0' 30' 60' 120' 180'

SCALE: 1" = 60'

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## LEGEND

| 0.01 | 0.02 | 0.03 | 0.05 | 0.07 | 0.10 | 0.20 | 0.30 | 0.50 | 0.75 | 1.00 | 2.00 | 3.00 | 5.00 | 7.50 | 10.0 | 20.0 | 30.0 | 50.0 | 75.0 | 100.0 | 200.0 | 300.0 | 500.0 | 750.0 | 1000.0 | 1500.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.01 | 0.02 | 0.03 | 0.05 | 0.07 | 0.10 | 0.20 | 0.30 | 0.50 | 0.75 | 1.00 | 2.00 | 3.00 | 5.00 | 7.50 | 10.0 | 20.0 | 30.0 | 50.0 | 75.0 | 100.0 | 200.0 | 300.0 | 500.0 | 750.0 | 1000.0 | 1500.0 |

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| NO. | DESCRIPTION | DATE | BY |
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CLIENT | PROJECT MANAGER | PROJECT ENGINEER | CHECK

REVISIONS

| NO. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | | | |
| BP | RM | LO | 1 | ISSUED FOR ATTACHMENT TO PERMIT | 06/28/23 | LJB |
| BP | RM | LO | 0 | ISSUED FOR ATTACHMENT TO PERMIT | 03/15/23 | DJM |

| | | |
|---|---|---|
| SCALE: | AS NOTED | DATE |
| DESIGNED: | D.MILLER | 03/15/23 |
| DRAWN: | D.MILLOER | 03/10/23 |
| CHECKED: | L.OHL | 03/15/23 |
| PE APPROVED: | R.MORRIS | 03/15/23 |
| PM APPROVED: | B.PRIMEAUX | 03/15/23 |

CLIENT: KERR McGEE

PROJECT LOCATION: WELD COUNTY, CO

KerrMcGee

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Phone: 303.714.4840
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TITLE

LIGHTING STUDY
WELD COUNTY
ELECTRICAL
ROAN ANGEL PAD
PHOTOMETRIC HEAT MAP - PRODUCTION

PROJECT NUMBER

**21010**

DRAWING NUMBER

21010-EE-391 REV. 1

CAD File: S:\Projects\21010_Oxy_Lighting_Studies\CAD\Electrical\Drawings\Physical Plans\21010-EE-391.dwg
Plot Date: Wednesday, June 28, 2023 12:41:56 PM Plotted By: Logan Blosser
CTB Used: SE_Std_Color_Full_Size.ctb

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# ATTACHMENT B

FIXTURE CUT SHEETS TYPES A,B,C,D,E,F,G

LIGHTING MITIGATION PLAN

FOR

**KERR MCGEE OIL & GAS ONSHORE LP**

**ROAN ANGEL PAD**

**Project Number: 21010-28**

# Fixture Cut Sheet
# Type A

STANPRO

Project: _____ Type: _____

Drawn by: _____ Catalogue #: _____ Date: _____

*Series Spec Sheet*

# WPS GEN 4

## CLASSIC WALL PACK

Selectable color temperature (3 000 K / 4 000 K / 5 000 K)[1]
Power selectable[1]
Integrated photocell[1]
Multi-Voltage (120-347 V)[1]

This wall pack series is a classic and familiar design integrated with modern LED technology to promote better energy efficiency and long life. Certain configurations come with integrated photocell, selectable power and/or selectable color temperature. It is best suited for entrances, underpasses or anywhere controlled security lighting is required, the series luminaire is a great addition to any commercial or industrial outdoor wall mount application. The tough die cast aluminum housing is moisture and dustproof. [1]

### FEATURES AND SPECIFICATIONS

- **Construction**

  Housing
  - This luminaire is made of aluminum die cast and comes standard in a bronze powder coat finish.
  - The housing has four conduit entries of 1/2" on each sides and some of the configurations comes with a button type photocell that can be turned off by using the internal switch if needed.[1]

  Lens

  Prismatic tempered glass lens is standard in this product series.

- **Electrical**
  - The drivers allows an input voltage from 120-277 V or 120-347 V AC 50/60 Hz and are 0-10 V dimmable. They are coming with an onboard surge protection:
    - NS29: 2.5kV standard
    - NS40, NS60, NS80, PS40, PS100: 2kV standard
    - NS120: 4kV standard
  - This wall pack series is suitable for ambient temperature range of -40°C to +50°C. Available in color temperatures of 4 000 K, 5 000 K or 3CCT selectable (3 000/4 000/5 000 K) with a lumen per watt ratio of 140 lm/W to 152 lm/W depending on the lumen package.
  - The color temperature of the fixture is set by default at 4 000 K and can be changed on the field.

- **Compliances**
  - Wet location
  - IP65
  - Meets requirements of ICES-005 issue 5 for class B products
  - cULus
  - IK06
  - BC Hydro

### OVERVIEW

| | |
|---|---|
| **Light source** | LED |
| **Watts (W)** | 25/30/40,<br>60/80/100<br>30, 40, 60, 80, 120 |
| **Lumens output (lm)** | 3 625 - 17 885 |
| **Efficiency (lm/W)** | 140 - 152 |
| **Color temperature (K)** | 3CCT (3 000/4 000/5 000)<br>4 000, 5 000 |
| **CRI** | > 80 |

[1] Integrated photocell, multi-volt driver, CCT and Power selectable on some configurations. Consult Quick ship and technical specification table for more details.

5 yrs warranty

quick ship

LED fixture

power selectable [1]

3 CCT TCC [1]
3000 K / 4000 K / 5000 K

dimmable fixture

wet location

IP 65

ICES 005

IK06

DLC QPL LISTED PREMIUM

cULus

Not all products are qualified on the DLC QPL. To view our DLC qualified products, please consult the DLC Qualified Products List at www.designlights.org/search.



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STANPRO

## QUICK SHIP AND TECHNICAL SPECIFICATION TABLE [1]

| Order code | Model number | DLC unique ID | Watts (W) | Volts (V) | Color temp. (K)[2] | Lumen output (lm)[3] | Effi-ciency (lm/W) | Photo-cell[6] | CRI | Life L70 (hrs)[5] | Tested hours LM-80 (hrs)[5] | Calculated TM21 (hrs)[5] | Finish | Dim-ming | B.U.G. | LED current (mA) | Power factor | THD (%) | Case qty (master) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Power Select, CCT Select and Integrated Photocell[6]** | | | | | | | | | | | | | | | | | | | |
| 68314 | WPS-PS40-Q-3C | PLW61NEJG50K | 25/30/40 | 120-347 | 3000/4000/5000 | 3875/4500/5800[4] | 141 | Yes | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U3G4 | 850 | ≥0.9 | ≤20 | 1 |
| 68315 | WPS-PS100-Q-3C | PLE7PYF9LCSH | 60/80/100 | 120-347 | 3000/4000/5000 | 9300/12000/14500[4] | 137 | Yes | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U3G4 | 2 100 | ≥0.9 | ≤20 | 1 |
| **Single Power, Single CCT and Integrated Photocell[6]** | | | | | | | | | | | | | | | | | | | |
| 68524 | WPS-NS30-W-40K/P127 | | 29 | 120-277 | 4 000 | 4 200 | 150 | Yes | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U3G5 | 230 | ≥0.9 | ≤20 | 1 |
| 68525 | WPS-NS30-W-50K/P127 | | 29 | 120-277 | 5 000 | 4 300 | 148 | Yes | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U3G5 | 230 | ≥0.9 | ≤20 | 1 |
| **Single Power and Single CCT** | | | | | | | | | | | | | | | | | | | |
| 68490 | WPS-NS40-W-40K | PLVM09BUX07G | 40 | 120-277 | 4 000 | 6 004 | 142 | No | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U3G4 | 354 | ≥0.9 | ≤20 | 1 |
| 68491 | WPS-NS40-W-50K | PL3ULW7TEV5H | 40 | 120-277 | 5 000 | 6 034 | 144 | No | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U3G4 | 354 | ≥0.9 | ≤20 | 1 |
| 68492 | WPS-NS60-W-40K | PL6EFOUTBPWB | 60 | 120-277 | 4 000 | 8 458 | 146 | No | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U3G5 | 486 | ≥0.9 | ≤20 | 1 |
| 68493 | WPS-NS60-W-50K | PL01JETYSQ80 | 60 | 120-277 | 5 000 | 8 611 | 147 | No | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U3G5 | 486 | ≥0.9 | ≤20 | 1 |
| 68497 | WPS-NS80-W-40K | PLVXL8TOP2UF | 80 | 120-277 | 4 000 | 11 242 | 146 | No | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U4G5 | 645 | ≥0.9 | ≤20 | 1 |
| 68498 | WPS-NS80-W-50K | PL2AZJG3L0RQ | 80 | 120-277 | 5 000 | 11 446 | 148 | No | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B1U4G5 | 645 | ≥0.9 | ≤20 | 1 |
| **Single Power, CCT Select and Integrated Photocell[6]** | | | | | | | | | | | | | | | | | | | |
| 68316 | WPS-NS120-Q-3C | PLYRMZYS3AY3 | 120 | 120-277 | 3000/4000/5000 | 16 943 | 137 | Yes | >80 | 54 000 | 9 000 | 173 600 | Bronze | Yes | B2U4G5 | 2 600 | ≥0.9 | ≤20 | 1 |

[1] **QUICK SHIP:** Product availability is subject to change without notice. Please contact your Stanpro customer service representative to confirm inventory levels at time of order.
[2] Typical color temperature range: +/- 5 %.
[3] Lumen values are derived from photometric testing. Initial lumens range: +/- 10 %.
[4] Lumen values are based on 4 000 K default settings. Please refer to Quick ship Technical Specification Table for more details on other color temperatures.
[5] Life hours are derived from IESNA LM-80-08 testing report and projected per IESNA TM-21-11 extrapolations.
[6] Integrated ON/OFF photocell that can be easily disabled.

## ACCESSORIES (order separately)

| Order code | Description |
|---|---|
| 68370 | 18'' Bronze metal backplate |
| 68371 | Bronze glareshield |
| 68372 | Stainless Steel wireguard |

## ORDERING GUIDE

WPS — ____ — ____ — ____ — ____ / ____

| Series | Lumen package (W) | Volts (V) | Color temp. (K) | Casting color | Options |
|---|---|---|---|---|---|
| WPS | **PS40 -** 25/30/40<br>**PS100 -** 60/80/100<br>**NS120 -** 120 | **Q -** 120-347 | **3C -** 3 000/4 000/5 000 | **BR -** Bronze (standard)<br>**BK -** Black<br>**WH -** White<br>**SP-** Special color | **KV -** 10 kV surge Protection<br>**PC -** Polycarbonate lens |
| | **NS30** [1] **-** 29<br>**NS40 -** 40<br>**NS60 -** 60<br>**NS80 -** 80 | **W -** 120-277 | **40K -** 4 000<br>**50K -** 5 000 | | **KV -** 10 kV surge Protection<br>**P127** [1] **-** Button type photocell 120-277 V<br>**PC -** Polycarbonate lens |

[1] Button type photocell 120-277 V comes standard with the ''NS30'' lumen package.

**Data is based upon tests performed in a controlled environment. Actual performance can vary depending on operating conditions.**
**All products are subject to change or may be discontinued any time without notice.**



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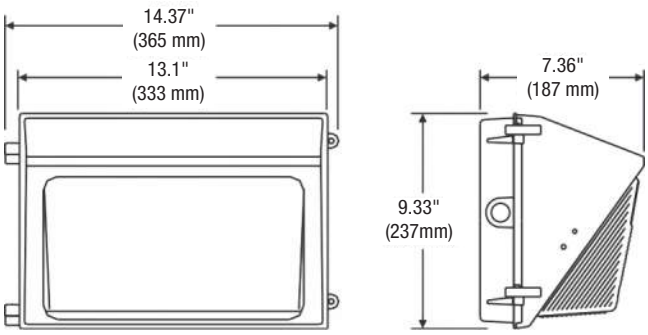
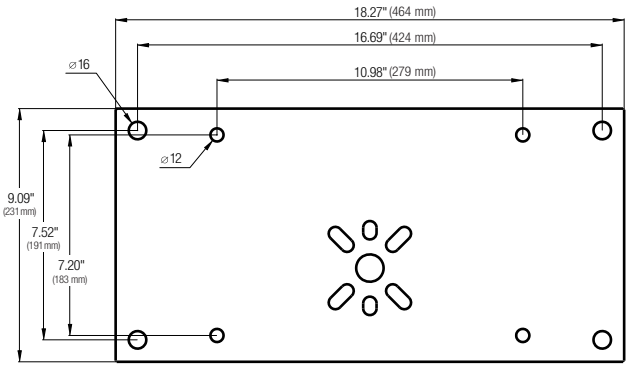
## DIMENSIONS




## BACKPLATE

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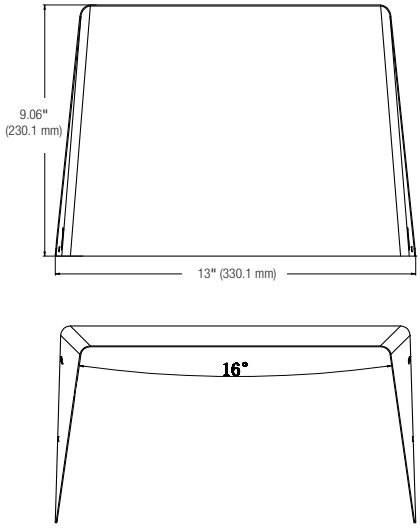


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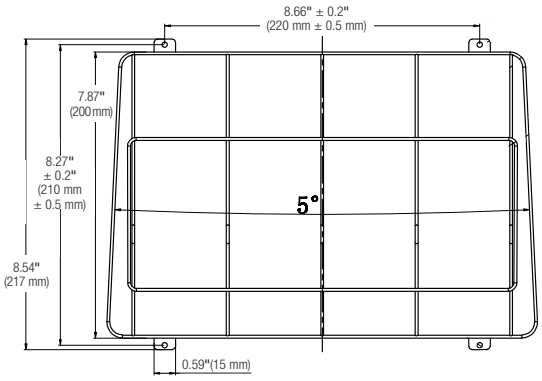


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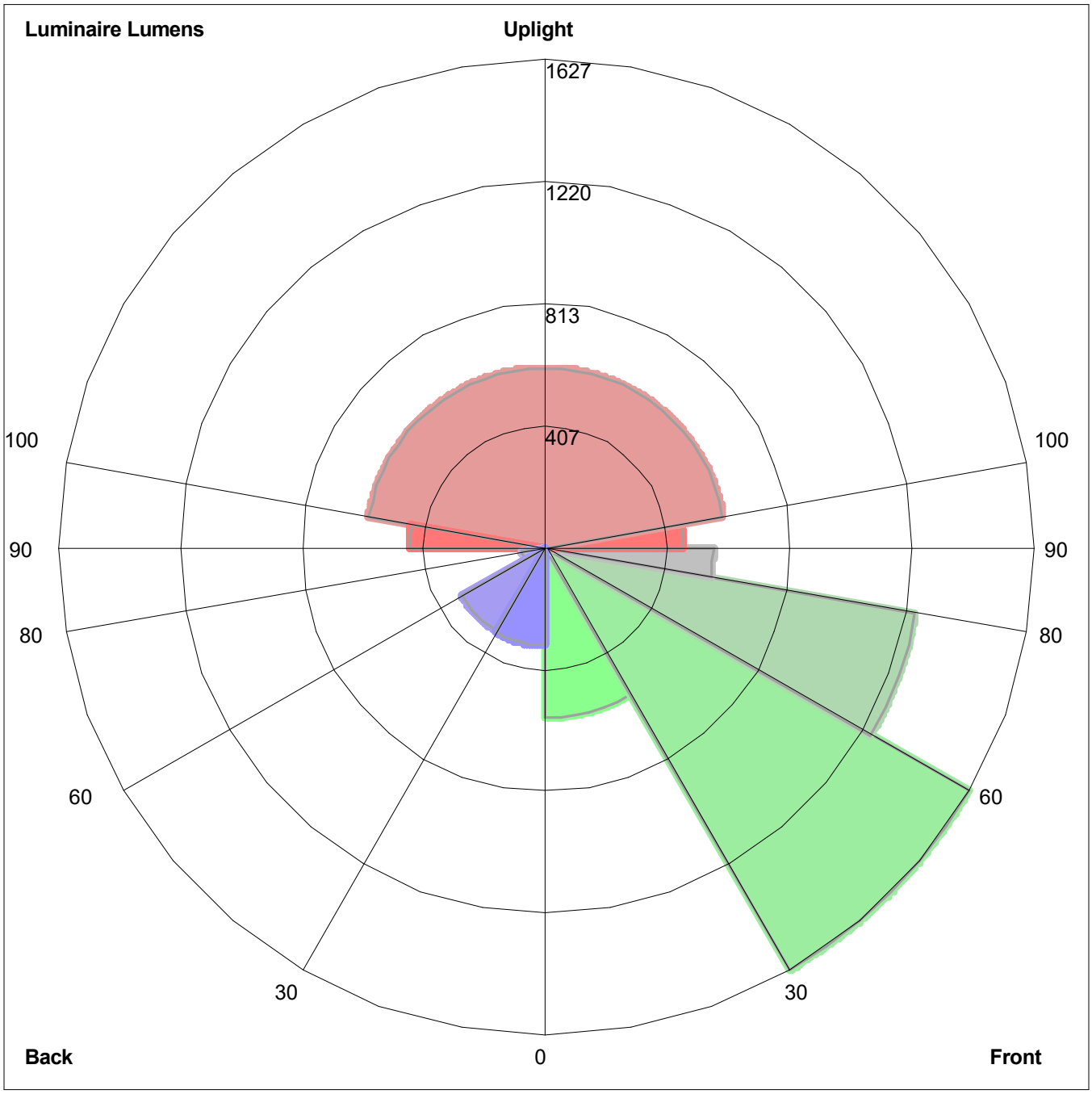
**IES ROAD REPORT**
**PHOTOMETRIC FILENAME : WPS-PS40-Q-3C-40W-40K-68314.IES**

**LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH**




Luminaire Lumens:
Front: Low=566.0, Medium=1626.5, High=1251.8, Very High=558.0
Back: Low=327.7, Medium=323.2, High=79.4, Very High=11.6
Uplight: Low=456.3, High=599.7

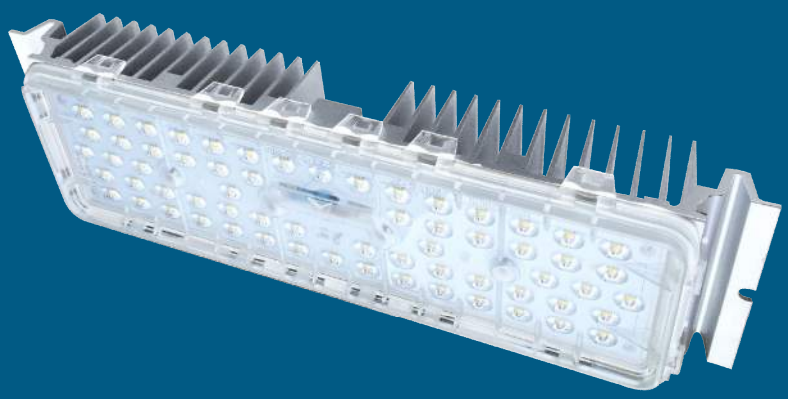
BUG Rating : B1-U4-G4

Photometric Toolbox® Copyright 2002-2019 by Lighting Analysts, Inc.
Calculations based on published IES Methods and recommendations, values rounded for display purposes.
Results derived from content of manufacturers photometric file.

# Fixture Cut Sheet
# Type B

# Example Used

# LED Module
# M8B
# Series



## Specification

**Working Environment:** -40℃~+50℃

**Storage Temperature:** -40℃~+50℃

**Relative humidity:** 10%~90%RH

**Typical value of pad temperature[1]:** 70℃

**IP Rating of LED Light Engine:** IP68

**Impact Protection Level:** IK09

**Color Temperature (CCT)[2]:** 3000K, 4000K, 5000K, 5700K

**Main Material:** Aluminum 6063

**Module N.W.:** 0.67±0.04 kg

**Note :**

[1] Typical values of pad temperature is obtained based on 60W with a ambient temperature of 25℃.

[2] Efficacy of 3000K is 5% lower than other CCTs.

## Features

- Lumileds Luxeon 3030;
- Super long lifetime(Lumen maintenance);
- Multiple lighting distributions available;
- Wide applicability for complex situations;
- High versatility apply for all sorts of lamps retrofit.

## Application

- Street lighting retrofit and application;
- Factory lighting retrofit and application;
- Tunnel lighting retrofit and application;
- Sports lighting retrofit and application.

## Ordering Information

For example: M8B-VCA-63 -1321-7040-LU

| Module Model | Interface | Dimension of LEDS | Wire Material | LED Qty | Lens Model | | Ra & CCT | LED Brand |
|---|---|---|---|---|---|---|---|---|
| **M8B** | **V:** V-shape Groove | **C:** 3030 | **A:** CCC+VDE<br>**C:** PSE<br>**H:** UL<br>**X:** Others | **49** 49PCS<br>**63** 63PCS | **1324** Type II Short<br>**2322** Type II Short (V)<br>**5321** Type II Short<br>**2321** Type II Short<br>**1321** Type III Medium | **1325** 25 DEG<br>**2360** 60 DEG<br>**5340** 40 DEG<br>**5390** 90 DEG<br>**1310** Lambert Type<br>**1390** Tunnel Lighting | **7030:** Ra≥70, 3000K<br>**8040:** Ra≥80, 4000K<br>... | **LU:** Lumileds<br>**SN:** Sanan<br>**XX:** Others |

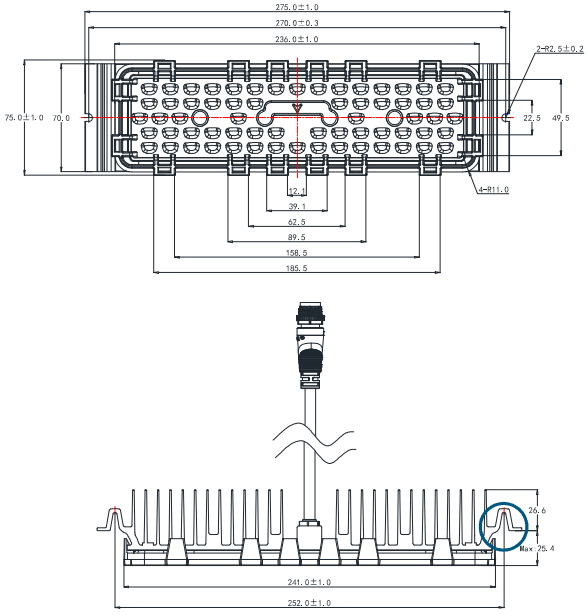
## Performance

| Model | Power (W) | Driving current (mA) | Input voltage (Vdc) | Efficacy (lm/W) | Lumens (lm) |
|---|---|---|---|---|---|
| M8B-VCA-63 | 40 | 700 | 48~61 | 140 | 5600 |
| M8B-VCA-49 | 50 | 1050 | 38~48 | 127 | 6350 |
| M8B-VCA-63 | 50 | 860 | 48~61 | 135 | 6750 |
| M8B-VCA-63 | 60 | 1050 | 48~61 | 127 | 7620 |

Note : Values shown are subject to ±5%~±8% tolerance; Cable default A type;

Efficacy above is based on calculated @92% power efficiency ; Light efficacy of 3000K is 5% lower than other CCTs.

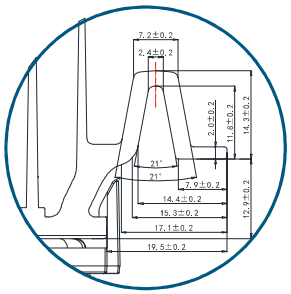
## Dimensions




| L (mm) | W (mm) | H (mm) |
|---|---|---|
| 275 | 75 | Max52 |

The height of the module is the maximum value.

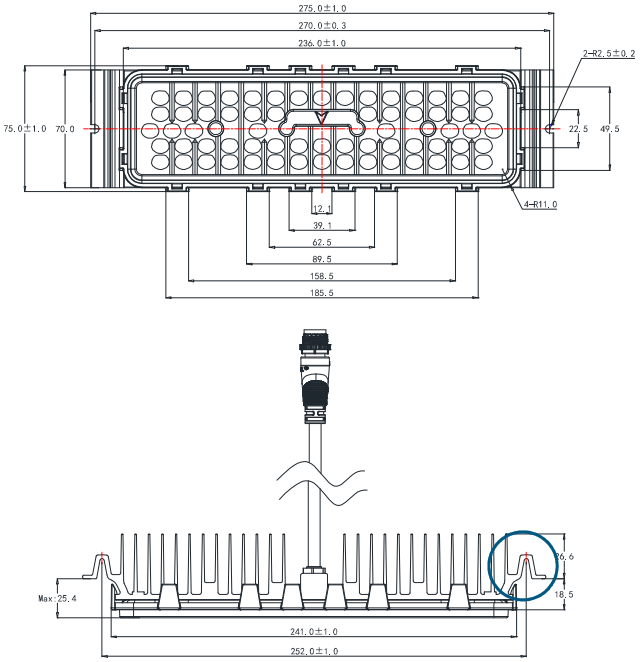
Tolerance: ±0.5mm




### Available Lens Model

| | | |
|---|---|---|
| 1321 | 1324 | 1390 |
| 1232 | 2322 | 5321 |
| | | |

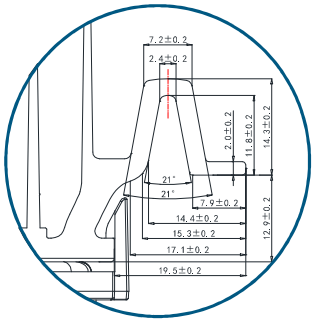
## Dimensions




| L (mm) | W (mm) | H (mm) |
|---|---|---|
| 275 | 75 | Max52 |

The height of the module is the maximum value.

Tolerance: ±0.5mm



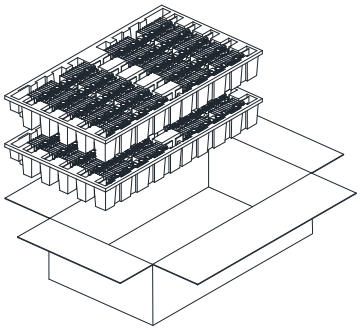

### Available Lens Model

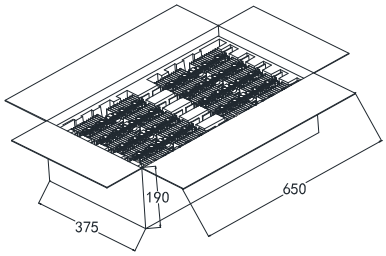
| | | | |
|---|---|---|---|
| 1310 | 1325 | 5340 | 2360 |
| 5390 | | | |

## Package Information

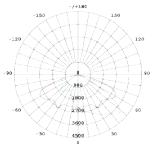
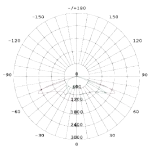
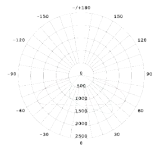
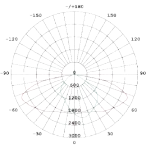
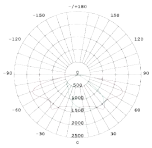
| L (mm) | W (mm) | H (mm) | Module pcs/carton (PCS) | Package weight (kg) |
|---|---|---|---|---|
| 650 | 375 | 190 | 20 | 14.9 |

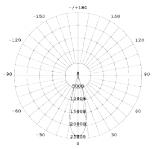
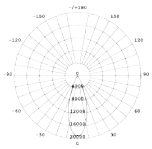
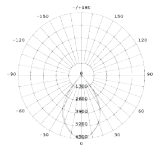
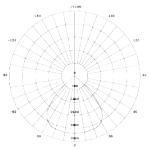
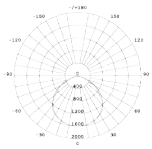
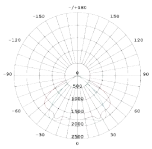
Values shown are subject to ±5% tolerance.





## Lighting distributions

| T2S1324 | T2S(V)2322 | T2S5321 | T2S2321 | T3M1321 |
|---|---|---|---|---|
|  |  |  |  |  |

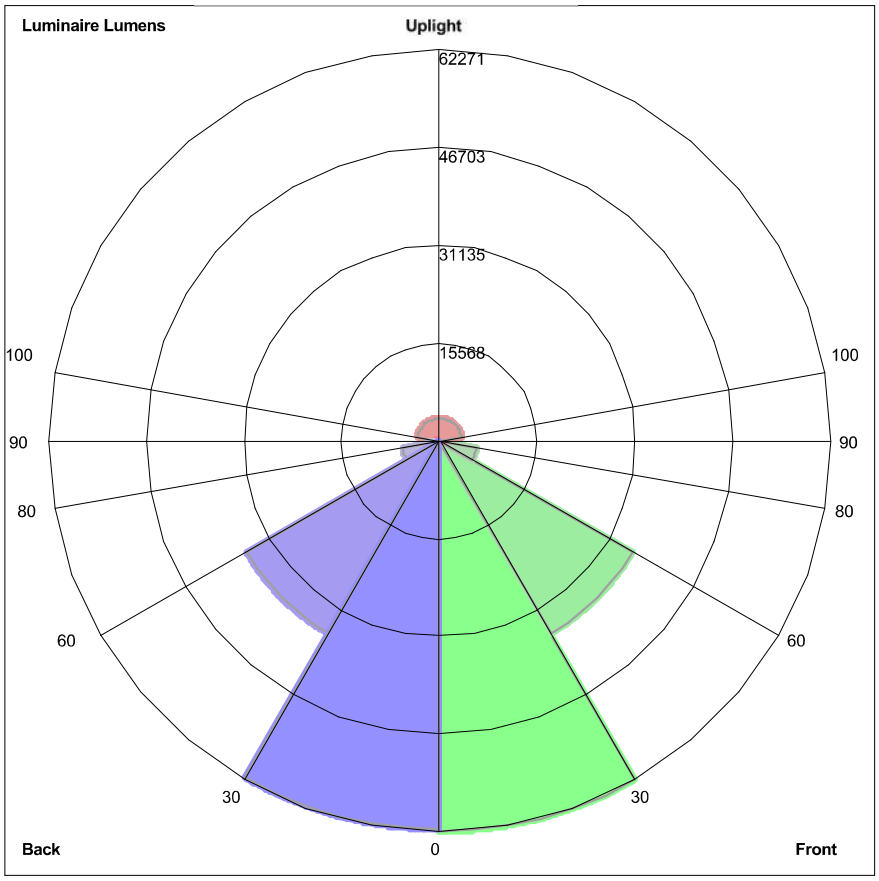
| 25D1325 | 40D5340 | 60D2360 | 90D5390 | LBN1310 | Tunnel lighting 1390 |
|---|---|---|---|---|---|
|  |  |  |  |  |  |

## Version History

| Change Date | Version | Description of Change | | |
|---|---|---|---|---|
| | | Item | From | To |
| 20190905 | Ver2.0 | Data sheets release (new version) | | |
| | | Update of luminous efficacy | | |
| | | Optimized G.W of Module package | 16.2kgs | 14.9kgs |

**IES ROAD REPORT**
**PHOTOMETRIC FILENAME : 3560-400W 16 BANKS ESTIMATE.IES**

**LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH**




Luminaire Lumens:
Front: Low=62270.6, Medium=35421.7, High=5946.3, Very High= 1328.0
Back: Low= 61920.0, Medium=35466.8, High=5958.8, Very High=1320.7
Uplight: Low=493.0, High=3564.5

BUG Rating : B5-U5-G5

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Calculations based on published IES Methods and recommendations, values rounded for display purposes.
Results derived from content of manufacturers photometric file.

# Fixture Cut Sheet
# Type C

# Pauluhn DFL HID hazardous area floodlights

Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2, AEx nR II
Cl. II, Div. 1, Groups F, G (250W max.)
Ex nR II

Marine & Wet Locations
NEMA 4X
IP66



## Applications:

- Onshore drilling and exploration
- Pipeline compressor and storage
- Corrosive environments
- Façade security lighting

## Features:

- 150-400W high pressure sodium or 175-400W metal halide
- AEx nR, Ex nR restricted breathing rating is standard – restricted breathing offers cooler T-numbers for increased hazardous locations suitability
- NEMA 7x6 butterfly beam floodlight pattern – wide, uniform and far reaching to provide excellent efficiency and more light where you need it
- NEMA Type 4X and IP66 heavy duty, die cast copper-free aluminum construction is designed for use indoors and outdoors in marine and wet locations with stainless steel external hardware suitable for saltwater and corrosive applications
- 40°C, 55°C and 65°C ambient suitability – addresses high ambient common at industrial facilities
- Low ambient capability to -40°C – perfect for colder climates
- Hinged door frame assembly – has captive cover screws for ease of relamping
- Yoke mount design – standard construction provides the greatest mounting flexibility; can be mounted vertically (wall), horizontally (rooftop or floor) or any angle in between
- 3-axis resonance withstand and UL844 vibration compliant – can stand up to the tough jobs
- Precision formed aluminum reflector – superior beam control, distribution and efficiency
- High light output with a low cost of operation – cost-effectiveness in a high wattage floodlight
- Slipfitter adapter for pole mounting and wall mounting bracket available

## Certifications and compliances:

- Class I, Division 2, Groups A, B, C, D
- Class I, Zone 2, AEx nR II
- Class II, Division 1, Groups F, G (250W maximum)
- Ex nR II
- UL/cUL844 – Hazardous Locations
- UL/cUL1598 – Luminaires
- UL/cUL1598A – Supplemental Requirements for Luminaires for Installation on Marine Vessels
- 60079-15
- NEMA Type 4X
- IP66
- Marine and wet locations
- ABS

## Standard materials and finishes:

- Housing and lens frame – heavy duty die cast copper-free aluminum with Corro-free epoxy powder coat finish
- Lens – heat- and impact-resistant tempered glass
- Gasket – one-piece silicone
- Mounting brackets – aluminum with Corro-free epoxy powder coat finish
- Reflector – precision formed aluminum
- Lamp holder – porcelain
- Hardware – stainless steel

## Technical specifications:

- Entries – one ¾" AEx/Ex gland
- Wind rating – EPA: 2.90 at vertical
- Lamp type – high pressure sodium; probe start metal halide[A]; pulse start metal halide (lamps not provided)
- Lamp holder – mogul base
- Ballast – multi-tap 120/208/240/277V, 60 Hz (standard); 220-240V, 50 Hz (optional); tri-tap 120/277/347V (optional); 480V (optional)

## Mounting option:

- Yoke mount

## Photometrics:

- Complete photometrics can be found at www.crouse-hinds.com/photometrics

[A] Not available in the U.S.



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# Pauluhn DFL HID hazardous area floodlights

Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2, AEx nR II
Cl. II, Div. 1, Groups F, G (250W max.)
Ex nR II

Marine & Wet Locations
NEMA 4X
IP66

## Options:

| Description | Suffix |
|---|---|
| • Lamps included | L[B] |
| • 480V | 480 |
| *Replace /MT in catalog number with /480* | |
| • 230V | 230 |
| *Replace /220 ONLY in catalog number with /230* | |

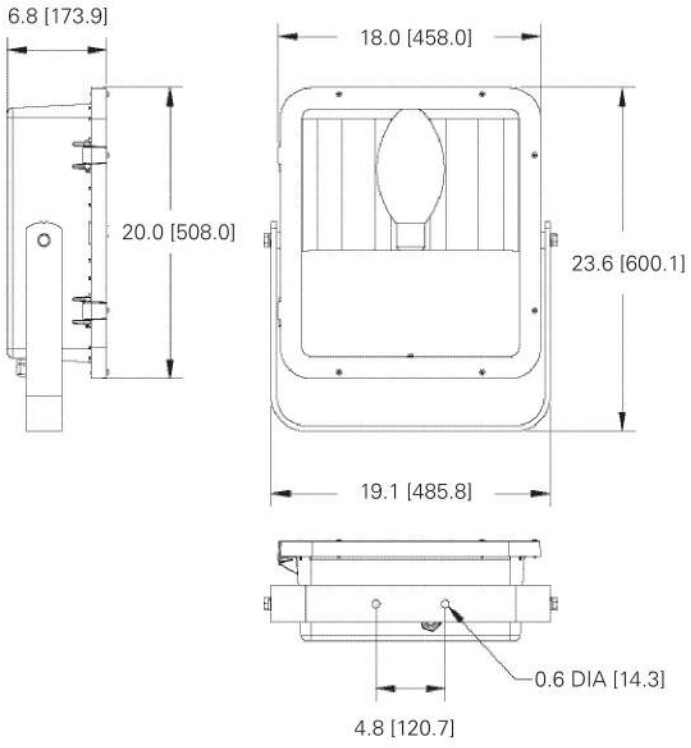
## Accessories (ordered separately):

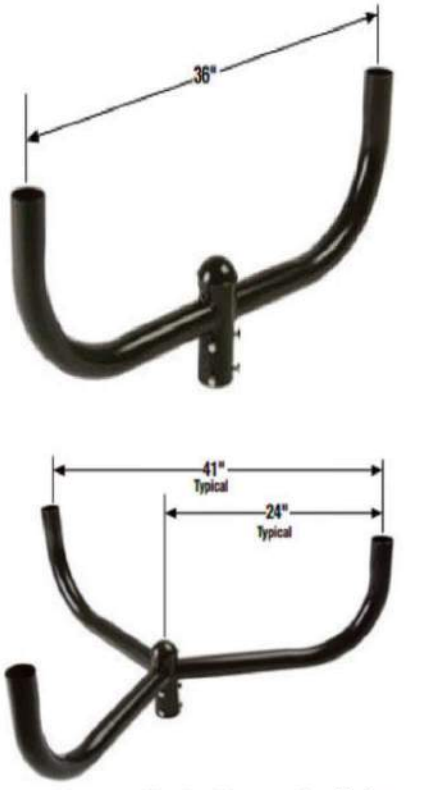
| Description | Cat. # |
|---|---|
| • Pole mount slipfitter adapter | SFA6 |
| • Wall mount bracket adapter | SWB6 |
| • Bull horn, 2 tenon, gray | BLHN2 |
| • Bull horn, 3 tenon, gray | BLHN3 |

## Ordering information:

| Cat. # | Lamp type | Watts | Weight (lbs.) | ANSI lamp type | Zone T-code | Division T-code | Ambient temperature °C | Supply wire °C |
|---|---|---|---|---|---|---|---|---|
| DFLMY250/MT 76 S828 | Pulse start metal halide | 250 | 42.0 | M153 | T3 | T1 | 40/55/65 | 90/90/105 |
| DFLMY400/MT 76 S828 | Pulse start metal halide | 400 | 44.0 | M155 | T3 | T1 | 40/55 | 105/105 |
| DFLMY320/MT 76 S828 | Pulse start metal halide | 320 | 44.0 | M154 | T3 | T1 | 40/55 | 105/105 |
| DFLMY250/TT 76[C] | Probe start metal halide | 250 | 42.0 | M58[C] | T3 | T1 | 40/55/65 | 90/90/105 |
| DFLMY400/TT 76[C] | Probe start metal halide | 400 | 44.0 | M59[C] | T3 | T1 | 40/55 | 90/105 |
| DFLMY250/220 50 76[C] | Probe start metal halide | 250 | 42.0 | M58[C] | T3 | T1 | 40/55/65 | 90/90/105 |
| DFLMY400/220 50 76[C] | Probe start metal halide | 400 | 44.0 | M59[C] | T3 | T1 | 40/55 | 90/105 |
| DFLSY250/MT 76 | High pressure sodium | 250 | 40.0 | S50 | T3 | T1 | 40/55/65 | 90/90/105 |
| DFLSY400/MT 76 | High pressure sodium | 400 | 44.0 | S51 | T3 | T1 | 40/55 | 90/105 |
| DFLSY250/TT 76 | High pressure sodium | 250 | 40.0 | S50 | T3 | T1 | 40/55/65 | 90/90/105 |
| DFLSY400/TT 76 | High pressure sodium | 400 | 44.0 | S51 | T3 | T1 | 40/55 | 90/105 |
| DFLSY250/220 50 76 | High pressure sodium | 250 | 40.0 | S50 | T3 | T1 | 40/55/65 | 90/90/105 |
| DFLSY400/220 50 76 | High pressure sodium | 400 | 44.0 | S51 | T3 | T1 | 40/55 | 90/105 |

## Dimensions (in inches):




**Bull horns – provided with 2 3/8" pole tenon**

[B] Lamp is not included unless option 'L' is selected.
[C] Not available in the U.S.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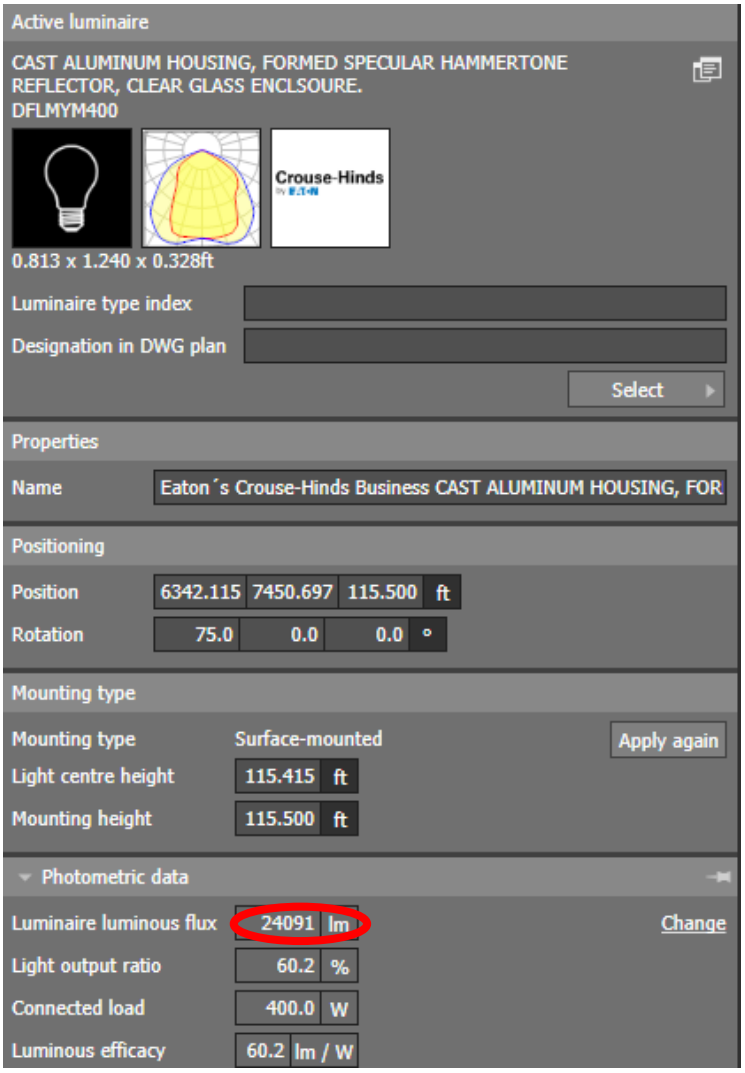
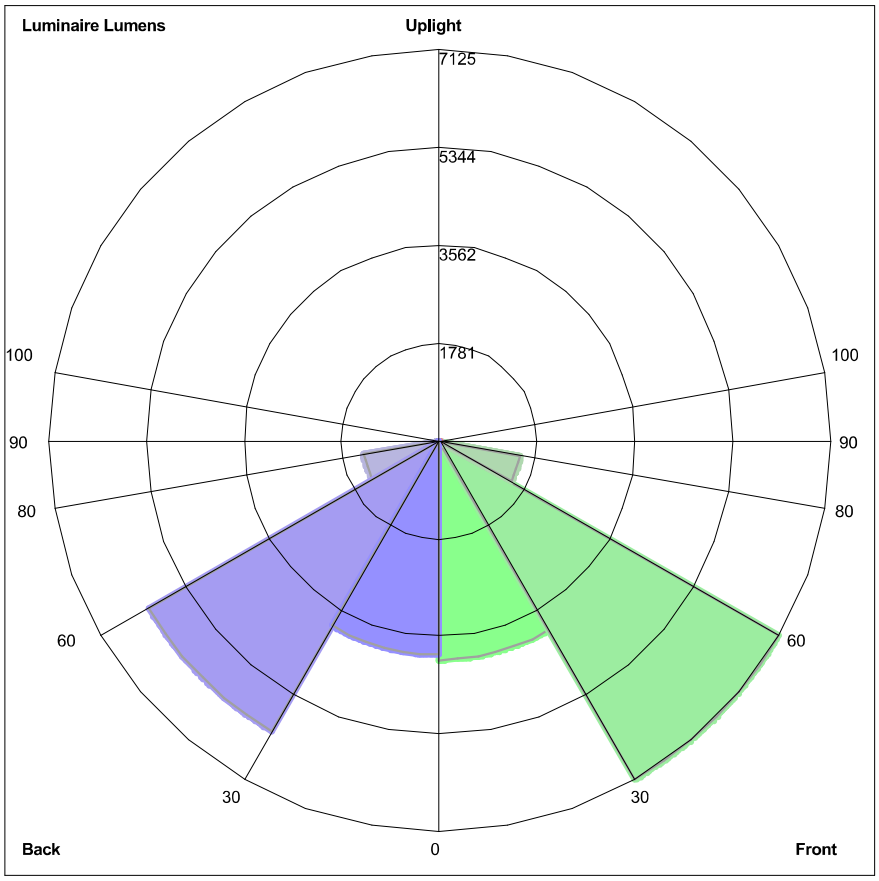
# Pauluhn DFL HID
# hazardous area floodlight

The image below was obtained from the manufacturer's IES file of the fixture.  It is included to show the lumen value of the fixture, which is not included in the manufacturer catalog cutsheet.



**IES ROAD REPORT**
**PHOTOMETRIC FILENAME : DFLMYM400.IES**

**LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH**




Luminaire Lumens:
Front: Low=3985.6, Medium= 7125.0, High=1500.3, Very High=28.6
Back: Low=3894.8, Medium=6102.1, High=1404.5, Very High=40.2
Uplight: Low=0.0, High=0.0

BUG Rating : B4-U0-G3

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Calculations based on published IES Methods and recommendations, values rounded for display purposes.
Results derived from content of manufacturers photometric file.

# Fixture Cut Sheet
# Type D

# Pauluhn DLL LED luminaires

## For land-based drilling

Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2
Cl. II, Div. 2, Groups F, G
Cl. III

UL Listed
CSA Certified
Marine & Wet Locations
NEMA 4X; IP66





The Pauluhn™ DLL linear LED is specifically designed to replace fluorescent T12, T8 and T5HO lighting on land-based and offshore drilling platforms. The rugged and durable design features the industry's most versatile and flexible mounting options. The Pauluhn DLL is the ideal solution for high vibration, impact and hose down in drilling applications.

| Model | Typical lumens | Watts | Lumens per watt | Equivalent HID luminaire | Typical energy savings / lifetime |
|---|---|---|---|---|---|
| DLL2 | 3,958 | 32 | 124 | T12HO | Up to 63% |
| | | | | T8HO | Up to 59% |
| | | | | T5HO | Up to 47% |
| | | | | T12 | Up to 36% |
| | | | | T8 | Up to 25% |
| | | | | T5 | Up to 9% |
| DLL4 | 7,900 | 63 | 130 | T12HO | Up to 58% |
| | | | | T8HO | Up to 54% |
| | | | | T5HO | Up to 43% |
| | | | | T12 | Up to 37% |
| | | | | T8 | Up to 22% |
| | | | | T5 | Up to 10% |

## Applications:

- Land-based and offshore rigs; areas include: derrick, mast, SCR house, top drive, operator's house, power and pump stations

## Features:

- High efficacy: up to 120 LPW
- -40°C to +65°C ambient operating temperature (standard model)
- Low profile (<3" height)
- Versatile ceiling/swivel, wall, flush, pole and pendant mounting options
- Wide and narrow optics for uniform illumination in control room and drill mast
- Four points of secondary retention
- 2,000 PSI high pressure hose rated
- High vibration resistance
- Emergency battery back-up (90 minutes) and surge protection options (up to 10 kV)Ⓐ
- DesignLights Consortium® Qualified (some models are not DLC qualified)Ⓑ
- 5 year fixture warranty

## Standard materials:

- Housing – copper-free aluminum; Corro-free epoxy powder coat (optional)
- Lens – clear polycarbonate; diffused polycarbonate

## Photometrics:

- Complete photometrics can be found at www.crouse-hinds.com/photometrics

## Temperature performance data:

| | | | | Simultaneous rating |
|---|---|---|---|---|
| Ambient temp. °C | Min. temp. supply wire °C | Class I, Div. 2 | Class II, Div. 2 | Class I, Div. 2; Class II, Div. 2 |
| 40 | 60 | T6 | T6 | T6 |
| 55 | 75 | T5 | T5 | T5 |
| 65 | 90 | T5 | T5 | T5 |

## Mounting (ordered separately):

Versatile mounting options:

- Flush back mount
- Swivel/ceiling back mount
- Offset ceiling mount
- Offset wall mount
- Pole mount
- Pendant mount

Easily retrofit to:

- Existing Pauluhn DuraPro and MagnaPro fluorescent light fixtures
- Rig-A-Lite and Snelson C1D2 fluorescent lighting fixtures

## Certifications and compliances:

**NEC:**

- Class I, Division 2, Groups A, B, C, D
- Class I, Zone 2
- Class II, Division 2, Groups F, G
- Class III
- NEMA 4X, IP66
- Marine and wet locations

**UL standards:**

- UL844 – Electrical Fixture Hangers for Hazardous Locations
- UL1598 – Luminaire
- UL1598A – Luminaire for Installation on Marine Vessels
- UL924 – Emergency Lighting

**CSA standard:**

- C22.2 No. 137

**Additional certifications:**

- ABS design assessed

## Electrical ratings:

| | DLL2 | DLL4 |
|---|---|---|
| Lumen output | 3,958 | 7,900 |
| Frequency | 50/60 Hz | 50/60 Hz |
| Voltage | 100-277 VAC, 108-250 VDC; 347-480 VAC | |

| Model | Voltage | Current (A) | Watts | Power factor | THD |
|---|---|---|---|---|---|
| DLL2/UNV1 | 100 | 0.33 | 32.5 | 0.92 | <20% |
| DLL2/UNV1 | 277 | 0.13 | 34.3 | 0.92 | <20% |
| DLL2/UNV34 | 347 | 0.10 | 32.2 | 0.92 | <20% |
| DLL2/UNV34 | 480 | 0.07 | 34.5 | 0.92 | <20% |
| DLL4/UNV1 | 100 | 0.63 | 63.4 | 0.92 | <20% |
| DLL4/UNV1 | 277 | 0.23 | 62.5 | 0.92 | <20% |
| DLL4/UNV34 | 347 | 0.18 | 61.4 | 0.92 | <20% |
| DLL4/UNV34 | 480 | 0.13 | 63.9 | 0.92 | <20% |

## Weights:

| Model | Lbs. | Kg. |
|---|---|---|
| DLL2 | 12.50 | 5.70 |
| DLL4 | 22.50 | 10.20 |

Ⓐ One year warranty.

Ⓑ Refer to www.designlights.org Qualified Products List under Family Models for full listing details. Not all models are approved for all application categories.



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# Pauluhn DLL LED luminaires

## For land-based drilling

Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2
Cl. II, Div. 2, Groups F, G
Cl. III

UL Listed
CSA Certified
Marine & Wet Locations
NEMA 4X; IP66





**Designed for drilling.** Pauluhn DLL linear LED luminaires are engineered to handle demanding conditions faced on land-based drilling rigs. The DLL stands up to high vibration, hose down, shock and impact, while delivering long life and high lumen performance for up to 20 years.

**Custom optics:**

- Standard wide (120°) beam spread for control room and indoor application maximizes illumination on wall panels
- Narrow (80°) beam spread option for high mast/derrick application avoids spillage and light loss

**Comprehensive certification:**

- Single model certified for use in Class I, Division 2 and Class II, Division 2 harsh and hazardous applications

**Quick & easy installation:**

- Easy access to drivers and wiring
- No custom brackets or hardware needed
- Seven mounting options available
- Easily retrofit to Pauluhn DuraPro and MagnaPro, Rig-A-Lite and Snelson

**Slim profile:**

- 2.7" fixture height (excluding mounting brackets)
- Perfect for mounting in confined or low height areas

**Built to last:**

- Ingress protection from hose down water or diesel fuel in harsh operational conditions – passed 2,000 PSI high pressure test
- Vibration-, impact- and shock-resistant – passed 5G, 3-axis vibration test
- 60,000 hour lifetime at 55°C ambient

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# Pauluhn DLL LED luminaires

For land-based drilling

Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2
Cl. II, Div. 2, Groups F, G
Cl. III

UL Listed
CSA Certified
Marine & Wet Locations
NEMA 4X; IP66



## Ordering information:

**Part number example**

**DLL4N/UNV1 S903 TF P EM1**

**DLL** **4** **N** **/UNV1** **S903** **TF** **P** **EM1**

| Series | |
|---|---|
| DLL | Pauluhn DLL linear LED luminaire |

| Length / lumens | |
|---|---|
| 4 | 4 ft. length, 7,900 lumens |
| 2 | 2 ft. length, 3,958 lumens |

| Optics | |
|---|---|
| BLANK | Wide (120°) |
| N | Narrow (80°) |

| Voltage | |
|---|---|
| /UNV1 | 100-277 VAC; 108-250 VDC |
| /UNV34 | 347-480 VAC |

| Lens | |
|---|---|
| S903 | Clear polycarbonate |
| S903D | Diffused polycarbonate |

| Options | |
|---|---|
| TF | Pull wire included in fixture |

| Finish | |
|---|---|
| BLANK | Natural aluminum |
| P | Painted (gray, epoxy) |
| WH | Painted (white, epoxy) |

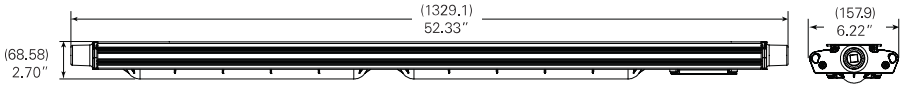
| Emergency back-up | |
|---|---|
| BLANK | Standard model (no battery back-up) |
| EM1[C] | Integrated emergency battery back-up |
| EM | Remote emergency kit |

## Accessories (ordered separately):

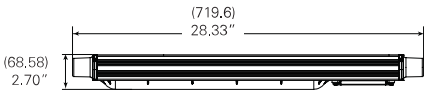
| Description | Cat. # |
|---|---|
| • Flush/back mount back plate<br>*Compatible with DuraPro* | **DP1057MTK** |
| • Ceiling/swivel mount<br>*Compatible with DuraPro* | **DP1050MTK** |
| • Ceiling/wall mount offset<br>*Compatible with DuraPro* | **DP1053MTK** |
| • Ceiling mount bracket and adapter kit<br>*Compatible with MagnaPro* | **MP1054MTK KIT** |
| • Offset wall mount<br>*Compatible with DuraPro* | **DP1052MTK** |
| • Pole mount kit, 1.25" conduit | **PM KIT 1.25** |
| • Pole mount kit, 1.50" conduit | **PM KIT 1.5** |
| • Pole mount kit, 2.00" conduit | **PM KIT 2.0** |

| Description | Cat. # |
|---|---|
| • Pendant mount kit | **PEND HAZ KIT** |
| • Safety chain kit | **SS KIT** |
| • 1 amp driver replacement kit, 100-277 VAC for 4 ft. linear | **VMVL/UNV1 80W 1A KIT** |
| • 1 amp driver replacement kit, 347-480 VAC for 4 ft. linear | **VMVL/UNV34 80W 1A KIT** |
| • 0.5 amp driver replacement kit, 100-277 VAC for 2 ft. linear | **VMVL/UNV1 80W 0.5A KIT** |
| • 0.5 amp driver replacement kit, 347-480 VAC for 2 ft. linear | **VMVL/UNV34 80W 0.5A KIT** |

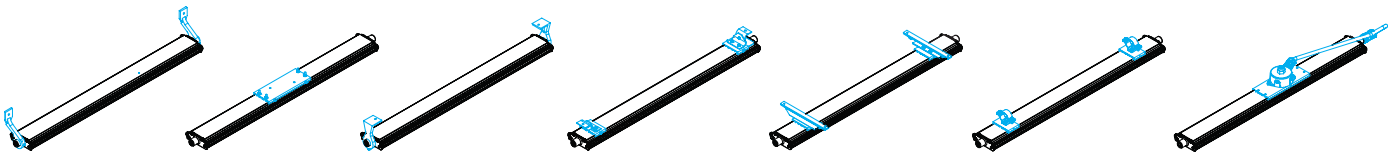
## Dimensions and mounting options:




DLL4




DLL2



**Offset wall**
**DP1052MTK**

**Flush ceiling**
**DP1057MTK**

**Offset ceiling**
**DP1053MTK**

**Ceiling/swivel**
**DP1050MTK**

**Ceiling and adapter**
**MP1054MTK KIT**

**Pole mount**
**PM KIT 1.25/1.5/2.0**

**Pendant mount**
**PEND HAZ KIT**

[C] One year warranty. Remote EM kit also available, 120-277 VAC only. Available with 4 ft. model only.



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# Pauluhn DLL LED luminaires

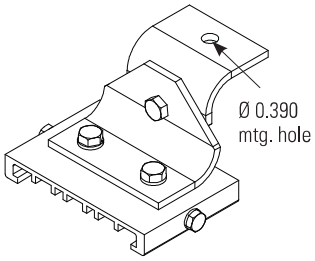
For land-based drilling

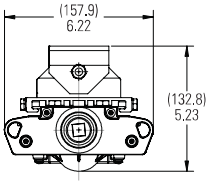
Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2
Cl. II, Div. 2, Groups F, G
Cl. III

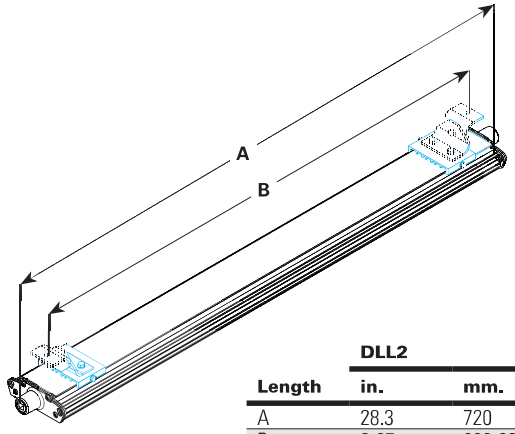
UL Listed
CSA Certified
Marine & Wet Locations
NEMA 4X; IP66

## Mounting options:

### Ceiling/swivel mount
### DP1050MTK

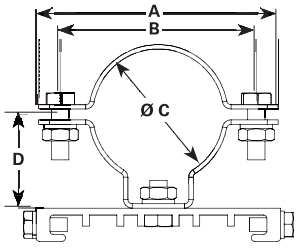


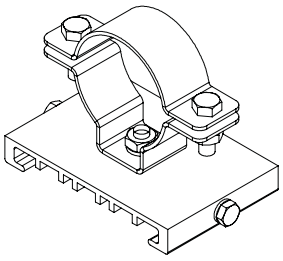



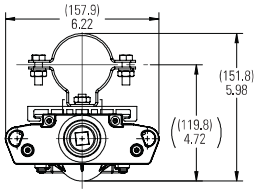

| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| Length | in. | mm. | in. | mm. |
| A | 28.3 | 720 | 52.3 | 1329 |
| B | 9-27 | 222-681 | 9-51 | 222-1289 |

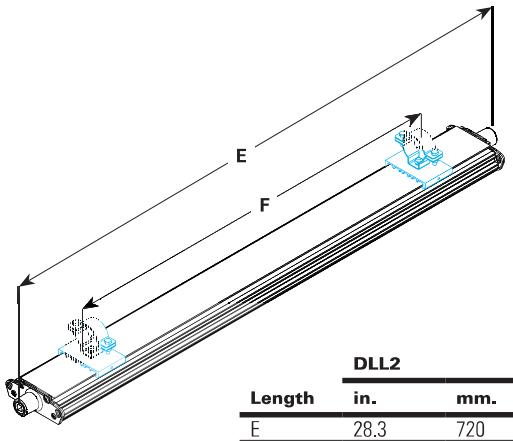
### Pole mount
### PM KIT 1.25/1.5/2.0




| | ALL MEASUREMENTS IN INCHES | | | |
|---|---|---|---|---|
| Configuration | A | B | C | D |
| PM KIT 1.25 | 4.331 | 3.543 | 1.680 | 1.693 |
| PM KIT 1.5 | 3.740 | 2.953 | 2.000 | 1.535 |
| PM KIT 2.0 | 3.386 | 2.598 | 2.360 | 1.378 |

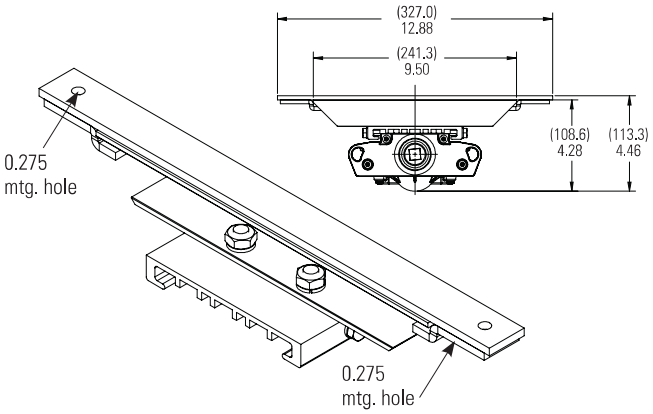


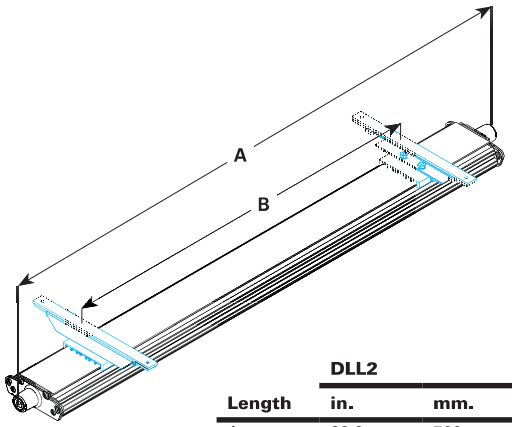



| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| Length | in. | mm. | in. | mm. |
| E | 28.3 | 720 | 52.3 | 1329 |
| F | 12-21 | 305-533 | 24-45 | 610-1143 |

### MagnaPro mount
### MP1054MTK KIT




| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| Length | in. | mm. | in. | mm. |
| A | 28.3 | 720 | 52.3 | 1329 |
| B | 12-22 | 305-559 | 24-46 | 610-1168 |

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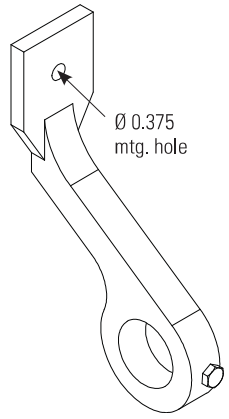
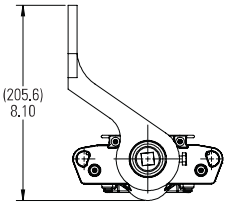
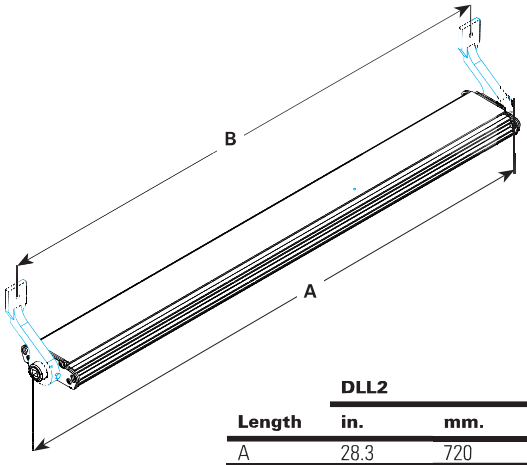
## Mounting options (continued):

### Offset wall
**DP1052MTK**

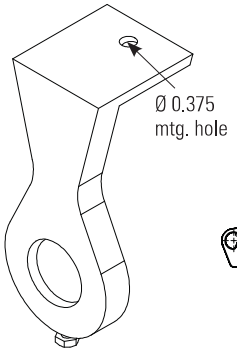


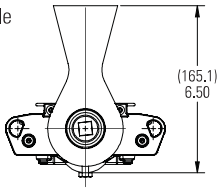



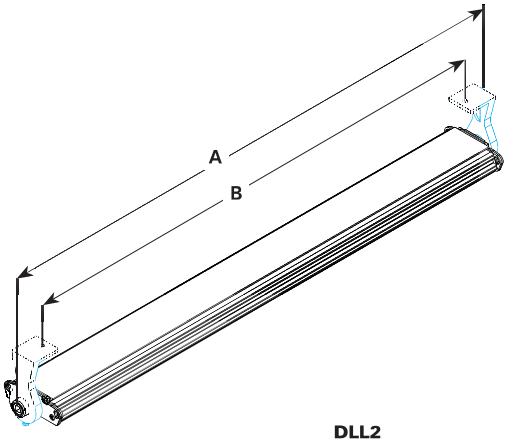




| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| **Length** | **in.** | **mm.** | **in.** | **mm.** |
| A | 28.3 | 720 | 52.3 | 1329 |
| B | 26.3 | 669 | 50.3 | 1278 |

### Offset ceiling/wall mount
**DP1053MTK**

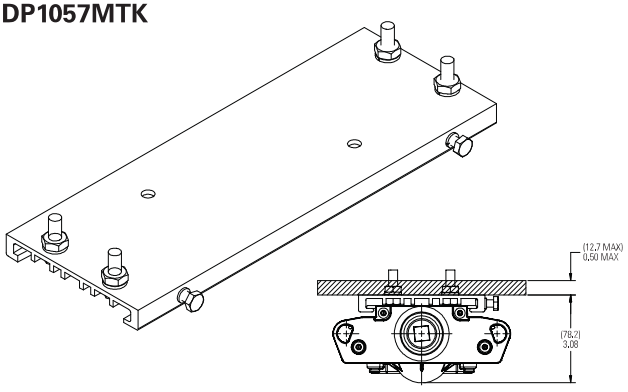


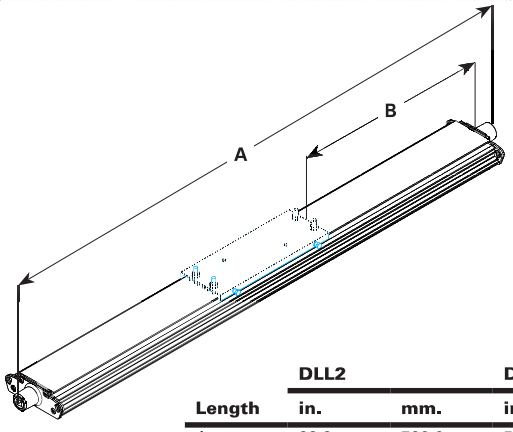




| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| **Length** | **in.** | **mm.** | **in.** | **mm.** |
| A | 28.3 | 720 | 52.3 | 1329 |
| B | 26.3 | 584 | 47.0 | 1194 |

### Flush ceiling
**DP1057MTK**



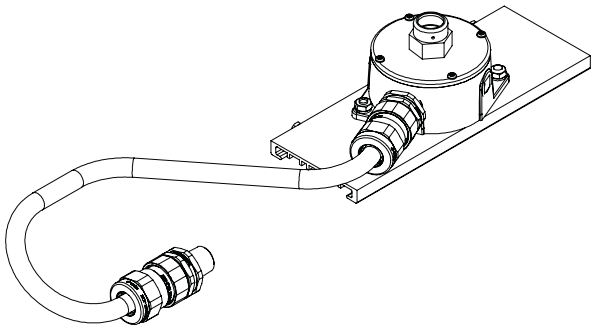

| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| **Length** | **in.** | **mm.** | **in.** | **mm.** |
| A | 28.3 | 720.0 | 52.3 | 1329.0 |
| B | 6.2 | 157.5 | 18.2 | 462.0 |

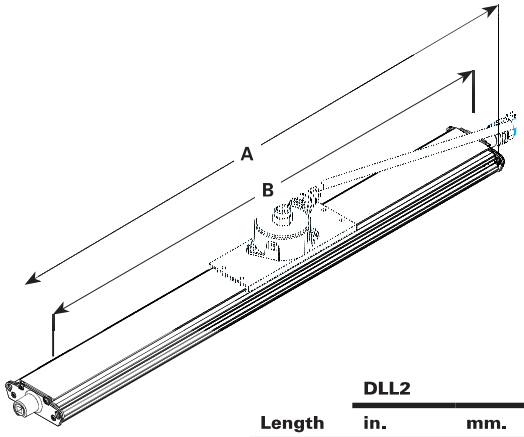


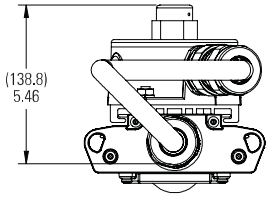
www.crouse-hinds.com US: 1-866-764-5454 CAN: 1-800-265-0502 Copyright® 2019 Eaton

## Mounting options (continued):

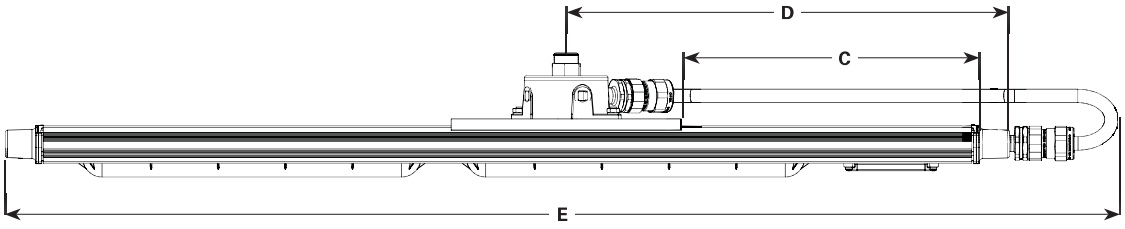
**Pendant mount – Class I, Division 2 only**
**PEND HAZ KIT**






| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| Length | in. | mm. | in. | mm. |
| A | 31.7 | 805 | 55.8 | 1418 |
| B | 28.3 | 720 | 52.3 | 1329 |
| C | 4.2 | 108 | 16.0 | 406 |
| D | 12.2 | 310 | 24.0 | 610 |
| E | 34.9 | 886 | 58.9 | 1495 |



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# Pauluhn DLL LED luminaires

## Integral battery back-up

Cl. I, Div. 2, Groups A, B, C, D
Cl. II, Div. 2, Groups F, G

UL Listed
CSA Certified
Wet Locations
Type 4X; IP66



Pauluhn DLL linear LED luminaires are available with an integral battery back-up module. Virtually the same size as the standard 4 foot model and 90 minutes of emergency lighting to keep your facility and personnel safe.

| Model | EM output | Normal output |
|---|---|---|
| DLL4/UNV1 S903 EM1 | 1,400 lumens (100-277V) | 6,720 lumens (100-277V) |

## Applications:

- Egress and emergency lighting for areas requiring uninterrupted lighting during power failure
- Hazardous rated indoor and outdoor emergency lighting in manufacturing plants, heavy industrial, chemical and petrochemical facilities, platforms, loading docks and parking areas

## Features:

- Operating ambient: 0°C to +40°C
- 90-minute run time in emergency mode
- 6,720 lumen output for normal operation; 1,400 lumen output in emergency mode
- 50,000 hours rated life at 40°C
- IP66 rated enclosure
- LED indicator to check battery operation
- Nickel cadmium battery
- 1 year warranty

## Certifications and compliances:

**NEC/CEC:**

- Class I, Division 2, Groups A, B, C, D
- Class II, Division 2, Groups F, G
- Wet locations, Type 4X, IP66

**UL standards:**

- UL844 – Hazardous (Classified)
- UL1598 – Luminaires
- UL1598A – Marine
- UL924 – Emergency Lighting

**CSA standard:**

- CSA C22.2 Nos. 137, 141

## Electrical ratings:

| | EM output | Normal output |
|---|---|---|
| Voltage | 120 | 277 |
| Amperage at 120 VAC | 0.480 | 0.212 |
| Wattage at 120 VAC | 57.8 | 57.7 |
| Lumen output | 1,400 | 6,720 |
| Frequency | 50/60 Hz | 50/60 Hz |
| Power factor at 100 VAC | >0.90 | >0.90 |
| THD | 6.58 | 11.70 |

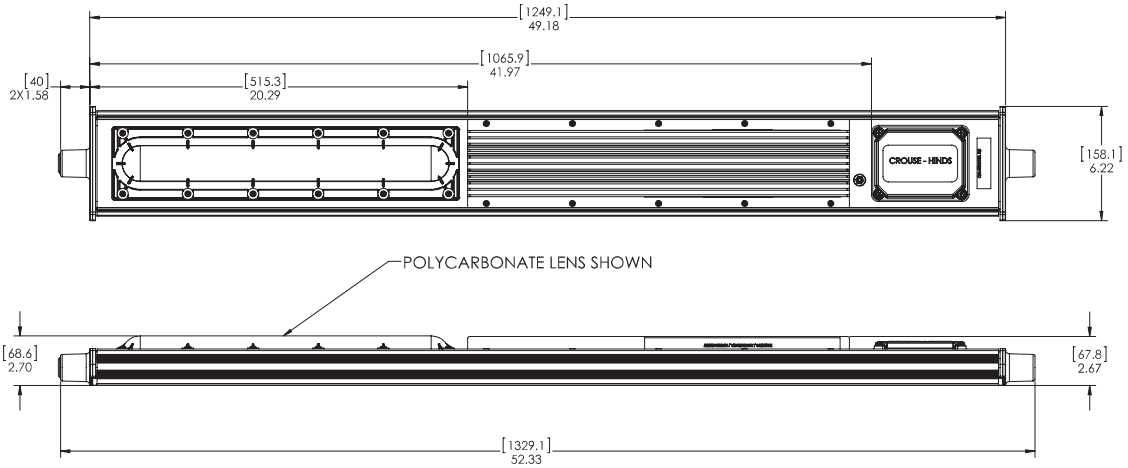
## Temperature performance data:

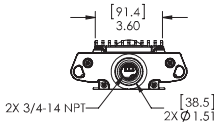
| | | | | Simultaneous rating |
|---|---|---|---|---|
| **Ambient temp. °C** | **Min. temp. supply wire °C** | **Class I, Div. 2** | **Class II, Div. 2** | **Class I, Div. 2; Class II, Div. 2** |
| 40 | 60 | T5 | T6 | T5 |

## Photometrics:

- Complete photometrics can be found at www.crouse-hinds.com/photometrics

## Dimensions:



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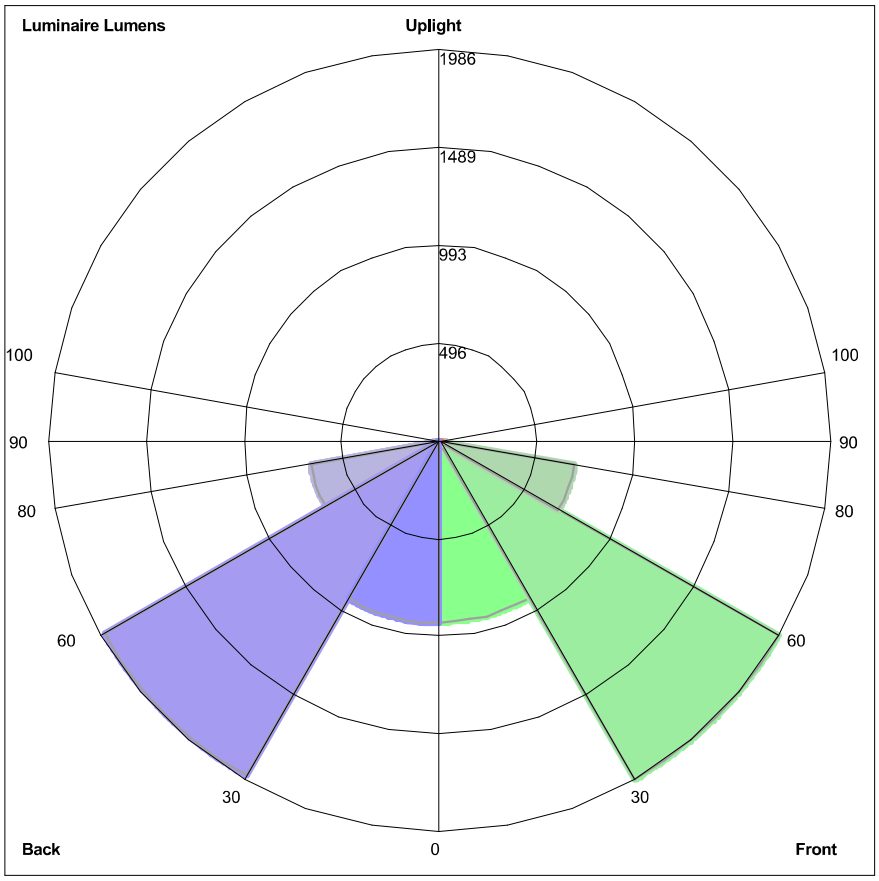
**IES ROAD REPORT**
**PHOTOMETRIC FILENAME : DLL4 UNV1-S903.IES**

**LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH**




Luminaire Lumens:
Front: Low=921.0, Medium=1985.6, High=698.7, Very High=29.2
Back: Low=925.1, Medium=1963.4, High=664.7, Very High=26.5
Uplight: Low=4.7, High=1.2

BUG Rating : B2-U1-G1

Photometric Toolbox® Copyright 2002-2019 by Lighting Analysts, Inc.
Calculations based on published IES Methods and recommendations, values rounded for display purposes.
Results derived from content of manufacturers photometric file.

# Fixture Cut Sheet
# Type E

# Pauluhn DLL LED luminaires

## For land-based drilling

Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2
Cl. II, Div. 2, Groups F, G
Cl. III

UL Listed
CSA Certified
Marine & Wet Locations
NEMA 4X; IP66





The Pauluhn™ DLL linear LED is specifically designed to replace fluorescent T12, T8 and T5HO lighting on land-based and offshore drilling platforms. The rugged and durable design features the industry's most versatile and flexible mounting options. The Pauluhn DLL is the ideal solution for high vibration, impact and hose down in drilling applications.

| Model | Typical lumens | Watts | Lumens per watt | Equivalent HID luminaire | Typical energy savings / lifetime |
|---|---|---|---|---|---|
| DLL2 | 3,958 | 32 | 124 | T12HO | Up to 63% |
| | | | | T8HO | Up to 59% |
| | | | | T5HO | Up to 47% |
| | | | | T12 | Up to 36% |
| | | | | T8 | Up to 25% |
| | | | | T5 | Up to 9% |
| DLL4 | 7,900 | 63 | 130 | T12HO | Up to 58% |
| | | | | T8HO | Up to 54% |
| | | | | T5HO | Up to 43% |
| | | | | T12 | Up to 37% |
| | | | | T8 | Up to 22% |
| | | | | T5 | Up to 10% |

## Applications:

- Land-based and offshore rigs; areas include: derrick, mast, SCR house, top drive, operator's house, power and pump stations

## Features:

- High efficacy: up to 120 LPW
- -40°C to +65°C ambient operating temperature (standard model)
- Low profile (<3" height)
- Versatile ceiling/swivel, wall, flush, pole and pendant mounting options
- Wide and narrow optics for uniform illumination in control room and drill mast
- Four points of secondary retention
- 2,000 PSI high pressure hose rated
- High vibration resistance
- Emergency battery back-up (90 minutes) and surge protection options (up to 10 kV)Ⓐ
- DesignLights Consortium® Qualified (some models are not DLC qualified)Ⓑ
- 5 year fixture warranty

## Standard materials:

- Housing – copper-free aluminum; Corro-free epoxy powder coat (optional)
- Lens – clear polycarbonate; diffused polycarbonate

## Photometrics:

- Complete photometrics can be found at www.crouse-hinds.com/photometrics

## Temperature performance data:

| | | | | Simultaneous rating |
|---|---|---|---|---|
| Ambient temp. °C | Min. temp. supply wire °C | Class I, Div. 2 | Class II, Div. 2 | Class I, Div. 2; Class II, Div. 2 |
| 40 | 60 | T6 | T6 | T6 |
| 55 | 75 | T5 | T5 | T5 |
| 65 | 90 | T5 | T5 | T5 |

## Mounting (ordered separately):

Versatile mounting options:

- Flush back mount
- Swivel/ceiling back mount
- Offset ceiling mount
- Offset wall mount
- Pole mount
- Pendant mount

Easily retrofit to:

- Existing Pauluhn DuraPro and MagnaPro fluorescent light fixtures
- Rig-A-Lite and Snelson C1D2 fluorescent lighting fixtures

## Certifications and compliances:

**NEC:**

- Class I, Division 2, Groups A, B, C, D
- Class I, Zone 2
- Class II, Division 2, Groups F, G
- Class III
- NEMA 4X, IP66
- Marine and wet locations

**UL standards:**

- UL844 – Electrical Fixture Hangers for Hazardous Locations
- UL1598 – Luminaire
- UL1598A – Luminaire for Installation on Marine Vessels
- UL924 – Emergency Lighting

**CSA standard:**

- C22.2 No. 137

**Additional certifications:**

- ABS design assessed

## Electrical ratings:

| | DLL2 | DLL4 |
|---|---|---|
| Lumen output | 3,958 | 7,900 |
| Frequency | 50/60 Hz | 50/60 Hz |
| Voltage | 100-277 VAC, 108-250 VDC; 347-480 VAC | |

| Model | Voltage | Current (A) | Watts | Power factor | THD |
|---|---|---|---|---|---|
| DLL2/UNV1 | 100 | 0.33 | 32.5 | 0.92 | <20% |
| DLL2/UNV1 | 277 | 0.13 | 34.3 | 0.92 | <20% |
| DLL2/UNV34 | 347 | 0.10 | 32.2 | 0.92 | <20% |
| DLL2/UNV34 | 480 | 0.07 | 34.5 | 0.92 | <20% |
| DLL4/UNV1 | 100 | 0.63 | 63.4 | 0.92 | <20% |
| DLL4/UNV1 | 277 | 0.23 | 62.5 | 0.92 | <20% |
| DLL4/UNV34 | 347 | 0.18 | 61.4 | 0.92 | <20% |
| DLL4/UNV34 | 480 | 0.13 | 63.9 | 0.92 | <20% |

## Weights:

| Model | Lbs. | Kg. |
|---|---|---|
| DLL2 | 12.50 | 5.70 |
| DLL4 | 22.50 | 10.20 |

ⒶOne year warranty.

ⒷRefer to www.designlights.org Qualified Products List under Family Models for full listing details. Not all models are approved for all application categories.



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# Pauluhn DLL LED luminaires

## For land-based drilling

Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2
Cl. II, Div. 2, Groups F, G
Cl. III

UL Listed
CSA Certified
Marine & Wet Locations
NEMA 4X; IP66





**Designed for drilling.** Pauluhn DLL linear LED luminaires are engineered to handle demanding conditions faced on land-based drilling rigs. The DLL stands up to high vibration, hose down, shock and impact, while delivering long life and high lumen performance for up to 20 years.

**Custom optics:**

- Standard wide (120°) beam spread for control room and indoor application maximizes illumination on wall panels
- Narrow (80°) beam spread option for high mast/derrick application avoids spillage and light loss

**Comprehensive certification:**

- Single model certified for use in Class I, Division 2 and Class II, Division 2 harsh and hazardous applications

**Quick & easy installation:**

- Easy access to drivers and wiring
- No custom brackets or hardware needed
- Seven mounting options available
- Easily retrofit to Pauluhn DuraPro and MagnaPro, Rig-A-Lite and Snelson

**Slim profile:**

- 2.7" fixture height (excluding mounting brackets)
- Perfect for mounting in confined or low height areas

**Built to last:**

- Ingress protection from hose down water or diesel fuel in harsh operational conditions – passed 2,000 PSI high pressure test
- Vibration-, impact- and shock-resistant – passed 5G, 3-axis vibration test
- 60,000 hour lifetime at 55°C ambient

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# Pauluhn DLL LED luminaires

For land-based drilling

Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2
Cl. II, Div. 2, Groups F, G
Cl. III

UL Listed
CSA Certified
Marine & Wet Locations
NEMA 4X; IP66



## Ordering information:

**Part number example**

**DLL4N/UNV1 S903 TF P EM1**

**DLL 4 N /UNV1 S903 TF P EM1**

| Series | |
|---|---|
| DLL | Pauluhn DLL linear LED luminaire |

| Length / lumens | |
|---|---|
| 4 | 4 ft. length, 7,900 lumens |
| 2 | 2 ft. length, 3,958 lumens |

| Optics | |
|---|---|
| BLANK | Wide (120°) |
| N | Narrow (80°) |

| Voltage | |
|---|---|
| /UNV1 | 100-277 VAC; 108-250 VDC |
| /UNV34 | 347-480 VAC |

| Lens | |
|---|---|
| S903 | Clear polycarbonate |
| S903D | Diffused polycarbonate |

| Options | |
|---|---|
| TF | Pull wire included in fixture |

| Finish | |
|---|---|
| BLANK | Natural aluminum |
| P | Painted (gray, epoxy) |
| WH | Painted (white, epoxy) |

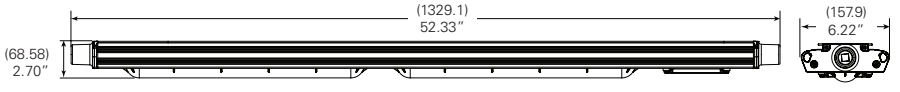
| Emergency back-up | |
|---|---|
| BLANK | Standard model (no battery back-up) |
| EM1[C] | Integrated emergency battery back-up |
| EM | Remote emergency kit |

## Accessories (ordered separately):

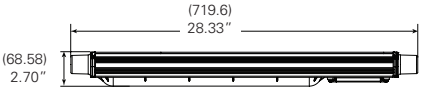
| Description | Cat. # |
|---|---|
| • Flush/back mount back plate<br>*Compatible with DuraPro* | **DP1057MTK** |
| • Ceiling/swivel mount<br>*Compatible with DuraPro* | **DP1050MTK** |
| • Ceiling/wall mount offset<br>*Compatible with DuraPro* | **DP1053MTK** |
| • Ceiling mount bracket and adapter kit<br>*Compatible with MagnaPro* | **MP1054MTK KIT** |
| • Offset wall mount<br>*Compatible with DuraPro* | **DP1052MTK** |
| • Pole mount kit, 1.25" conduit | **PM KIT 1.25** |
| • Pole mount kit, 1.50" conduit | **PM KIT 1.5** |
| • Pole mount kit, 2.00" conduit | **PM KIT 2.0** |

| Description | Cat. # |
|---|---|
| • Pendant mount kit | **PEND HAZ KIT** |
| • Safety chain kit | **SS KIT** |
| • 1 amp driver replacement kit, 100-277 VAC for 4 ft. linear | **VMVL/UNV1 80W 1A KIT** |
| • 1 amp driver replacement kit, 347-480 VAC for 4 ft. linear | **VMVL/UNV34 80W 1A KIT** |
| • 0.5 amp driver replacement kit, 100-277 VAC for 2 ft. linear | **VMVL/UNV1 80W 0.5A KIT** |
| • 0.5 amp driver replacement kit, 347-480 VAC for 2 ft. linear | **VMVL/UNV34 80W 0.5A KIT** |

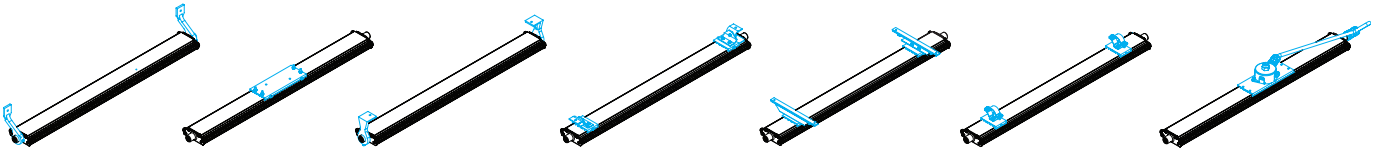
## Dimensions and mounting options:




DLL4




DLL2



**Offset wall**
**DP1052MTK**

**Flush ceiling**
**DP1057MTK**

**Offset ceiling**
**DP1053MTK**

**Ceiling/swivel**
**DP1050MTK**

**Ceiling and adapter**
**MP1054MTK KIT**

**Pole mount**
**PM KIT 1.25/1.5/2.0**

**Pendant mount**
**PEND HAZ KIT**

[C] One year warranty. Remote EM kit also available, 120-277 VAC only. Available with 4 ft. model only.



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# Pauluhn DLL LED luminaires

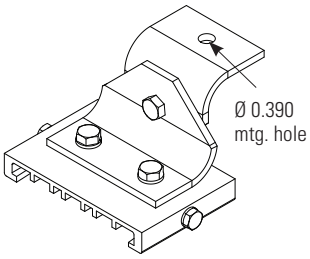
For land-based drilling

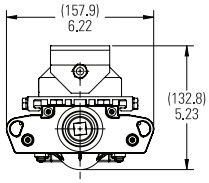
Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2
Cl. II, Div. 2, Groups F, G
Cl. III

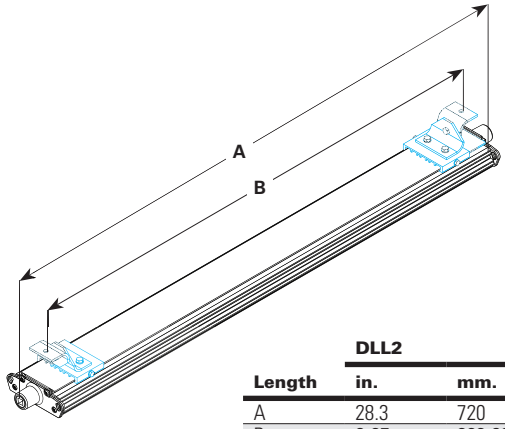
UL Listed
CSA Certified
Marine & Wet Locations
NEMA 4X; IP66

## Mounting options:

### Ceiling/swivel mount
### DP1050MTK

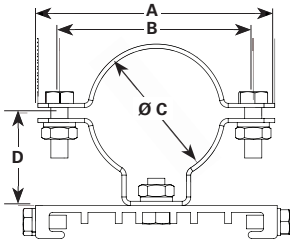


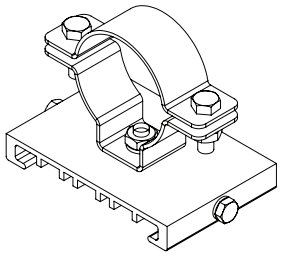



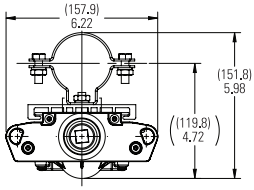

| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| Length | in. | mm. | in. | mm. |
| A | 28.3 | 720 | 52.3 | 1329 |
| B | 9-27 | 222-681 | 9-51 | 222-1289 |

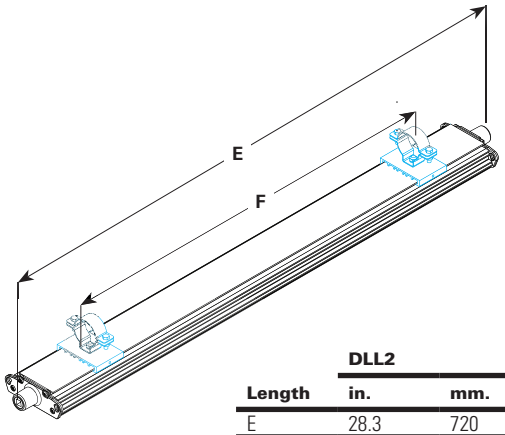
### Pole mount
### PM KIT 1.25/1.5/2.0




| | ALL MEASUREMENTS IN INCHES | | | |
|---|---|---|---|---|
| Configuration | A | B | C | D |
| PM KIT 1.25 | 4.331 | 3.543 | 1.680 | 1.693 |
| PM KIT 1.5 | 3.740 | 2.953 | 2.000 | 1.535 |
| PM KIT 2.0 | 3.386 | 2.598 | 2.360 | 1.378 |

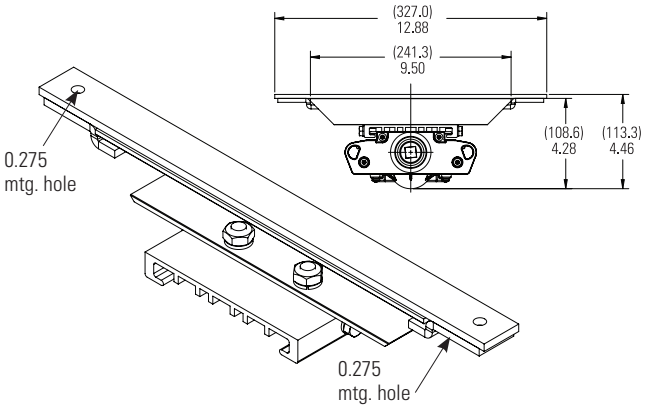


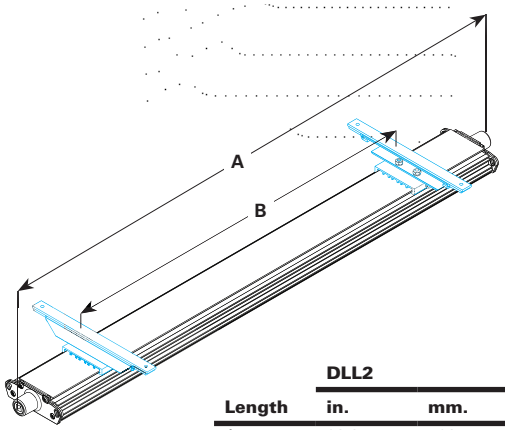



| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| Length | in. | mm. | in. | mm. |
| E | 28.3 | 720 | 52.3 | 1329 |
| F | 12-21 | 305-533 | 24-45 | 610-1143 |

### MagnaPro mount
### MP1054MTK KIT




| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| Length | in. | mm. | in. | mm. |
| A | 28.3 | 720 | 52.3 | 1329 |
| B | 12-22 | 305-559 | 24-46 | 610-1168 |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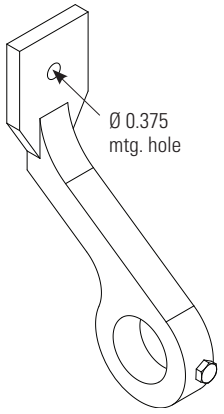
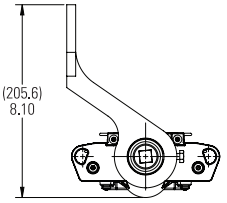
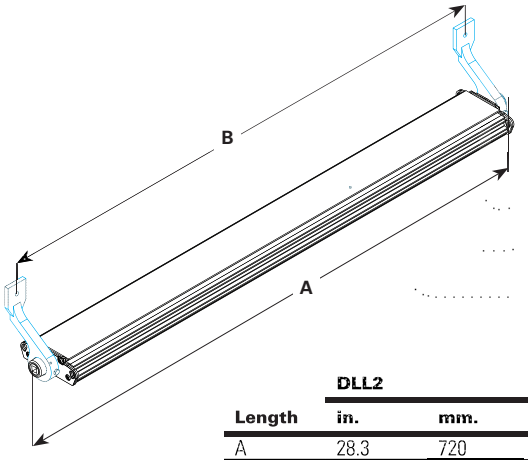
## Mounting options (continued):

### Offset wall
**DP1052MTK**

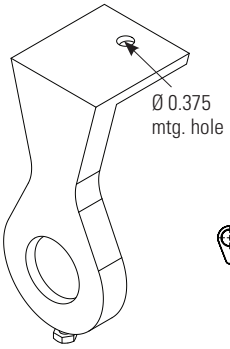


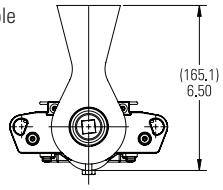



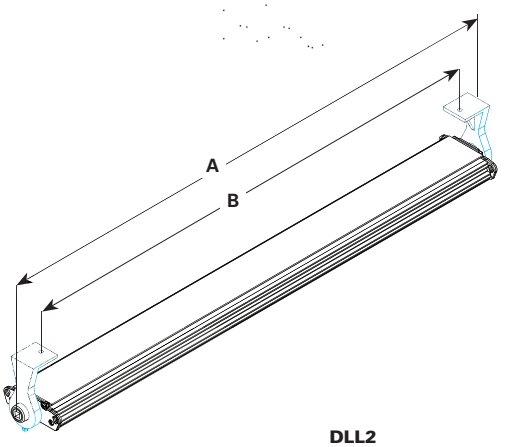




| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| **Length** | **in.** | **mm.** | **in.** | **mm.** |
| A | 28.3 | 720 | 52.3 | 1329 |
| B | 26.3 | 669 | 50.3 | 1278 |

### Offset ceiling/wall mount
**DP1053MTK**

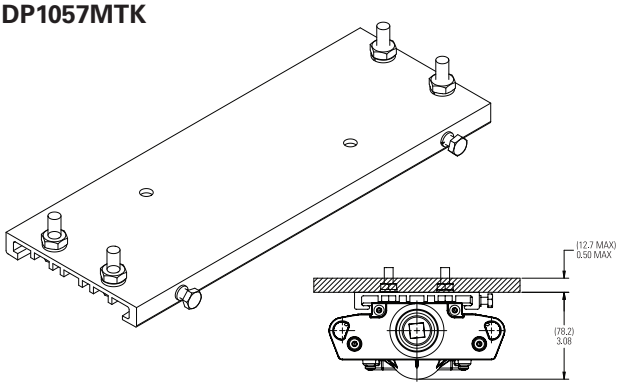


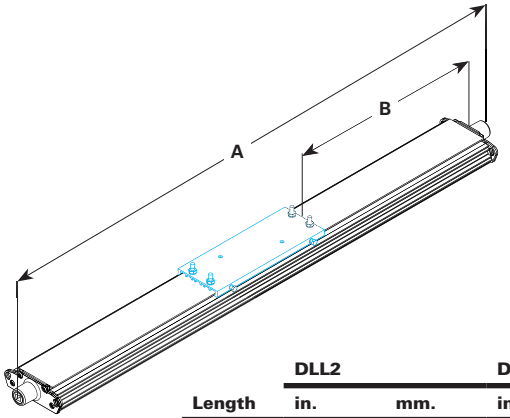




| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| **Length** | **in.** | **mm.** | **in.** | **mm.** |
| A | 28.3 | 720 | 52.3 | 1329 |
| B | 26.3 | 584 | 47.0 | 1194 |

### Flush ceiling
**DP1057MTK**




| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| **Length** | **in.** | **mm.** | **in.** | **mm.** |
| A | 28.3 | 720.0 | 52.3 | 1329.0 |
| B | 6.2 | 157.5 | 18.2 | 462.0 |



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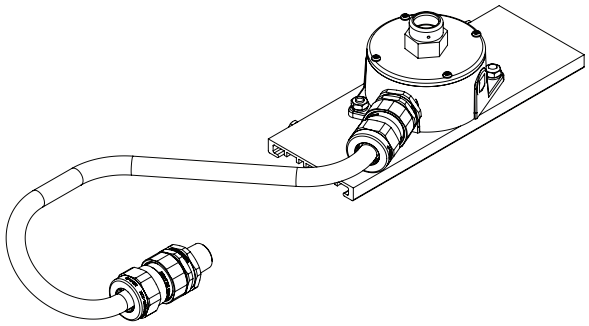
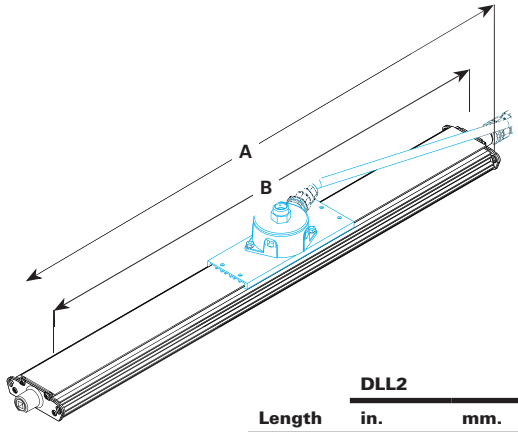
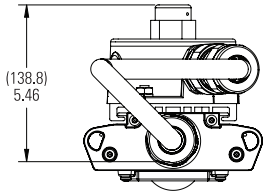
## Mounting options (continued):

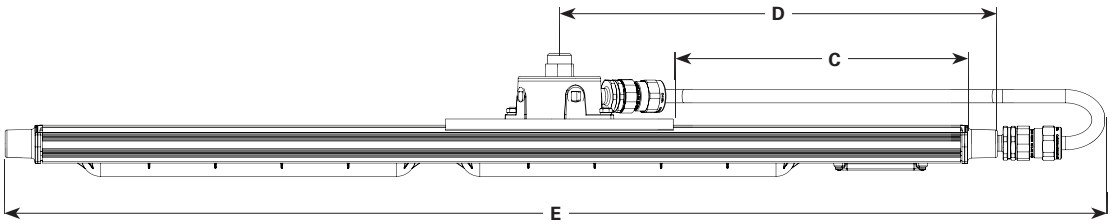
**Pendant mount – Class I, Division 2 only**
**PEND HAZ KIT**






| | DLL2 | | DLL4 | |
|---|---|---|---|---|
| **Length** | **in.** | **mm.** | **in.** | **mm.** |
| A | 31.7 | 805 | 55.8 | 1418 |
| B | 28.3 | 720 | 52.3 | 1329 |
| C | 4.2 | 108 | 16.0 | 406 |
| D | 12.2 | 310 | 24.0 | 610 |
| E | 34.9 | 886 | 58.9 | 1495 |



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# Pauluhn DLL LED luminaires

## Integral battery back-up

Cl. I, Div. 2, Groups A, B, C, D
Cl. II, Div. 2, Groups F, G

UL Listed
CSA Certified
Wet Locations
Type 4X; IP66





Pauluhn DLL linear LED luminaires are available with an integral battery back-up module. Virtually the same size as the standard 4 foot model and 90 minutes of emergency lighting to keep your facility and personnel safe.

| Model | EM output | Normal output |
|---|---|---|
| DLL4/UNV1 S903 EM1 | 1,400 lumens (100-277V) | 6,720 lumens (100-277V) |

## Applications:

- Egress and emergency lighting for areas requiring uninterrupted lighting during power failure
- Hazardous rated indoor and outdoor emergency lighting in manufacturing plants, heavy industrial, chemical and petrochemical facilities, platforms, loading docks and parking areas

## Features:

- Operating ambient: 0°C to +40°C
- 90-minute run time in emergency mode
- 6,720 lumen output for normal operation; 1,400 lumen output in emergency mode
- 50,000 hours rated life at 40°C
- IP66 rated enclosure
- LED indicator to check battery operation
- Nickel cadmium battery
- 1 year warranty

## Certifications and compliances:

**NEC/CEC:**

- Class I, Division 2, Groups A, B, C, D
- Class II, Division 2, Groups F, G
- Wet locations, Type 4X, IP66

**UL standards:**

- UL844 – Hazardous (Classified)
- UL1598 – Luminaires
- UL1598A – Marine
- UL924 – Emergency Lighting

**CSA standard:**

- CSA C22.2 Nos. 137, 141

## Electrical ratings:

| | EM output | Normal output |
|---|---|---|
| Voltage | 120 | 277 |
| Amperage at 120 VAC | 0.480 | 0.212 |
| Wattage at 120 VAC | 57.8 | 57.7 |
| Lumen output | 1,400 | 6,720 |
| Frequency | 50/60 Hz | 50/60 Hz |
| Power factor at 100 VAC | >0.90 | >0.90 |
| THD | 6.58 | 11.70 |

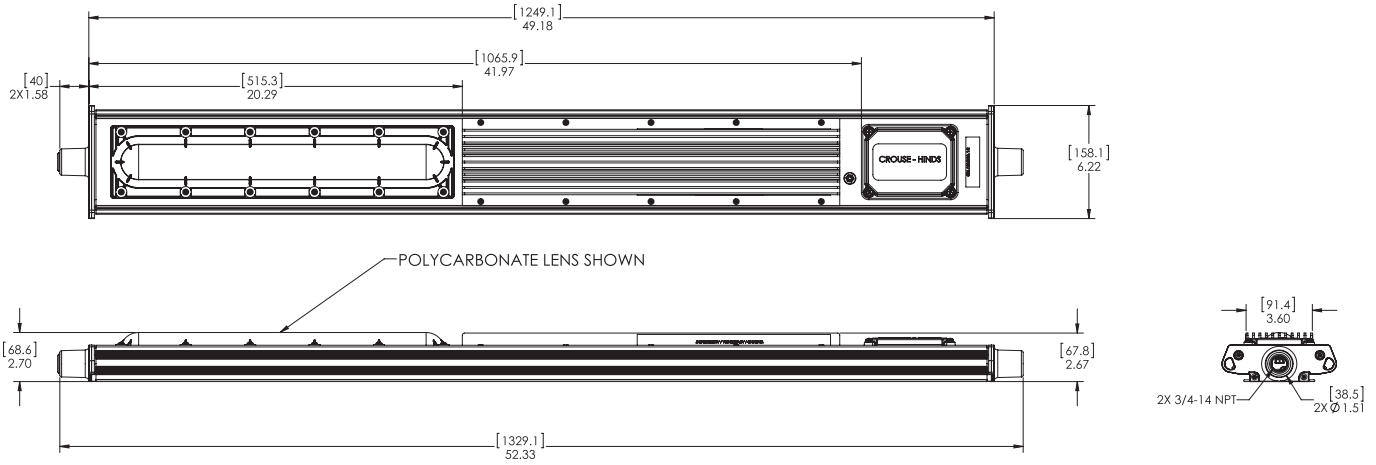
## Temperature performance data:

| | | | | Simultaneous rating |
|---|---|---|---|---|
| **Ambient temp. °C** | **Min. temp. supply wire °C** | **Class I, Div. 2** | **Class II, Div. 2** | **Class I, Div. 2; Class II, Div. 2** |
| 40 | 60 | T5 | T6 | T5 |

## Photometrics:

- Complete photometrics can be found at www.crouse-hinds.com/photometrics

## Dimensions:



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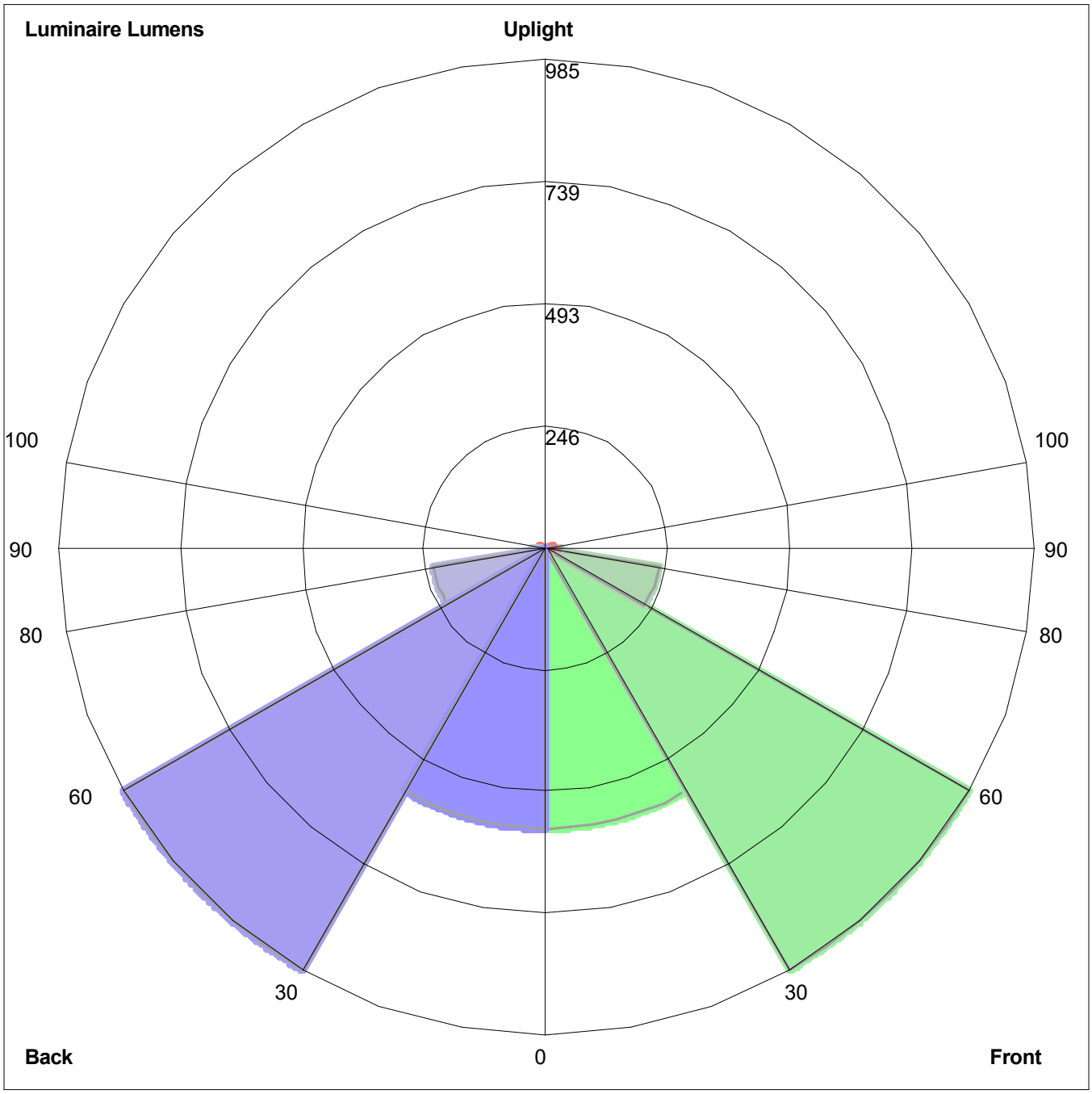
**IES ROAD REPORT**
**PHOTOMETRIC FILENAME : DLL2-UNV1-S903.IES**

**LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH**




Luminaire Lumens:
Front: Low=568.6, Medium=985.4, High=230.6, Very High=28.4
Back: Low=568.6, Medium=985.4, High=230.6, Very High=28.4
Uplight: Low=12.8, High=0.3

BUG Rating : B2-U2-G1

Photometric Toolbox® Copyright 2002-2019 by Lighting Analysts, Inc.
Calculations based on published IES Methods and recommendations, values rounded for display purposes.
Results derived from content of manufacturers photometric file.

# Fixture Cut Sheet
# Type F

Mounting: Vertical Green LED Heat Trace End Seal Kit

Mounting Height: Piping Height Varies.

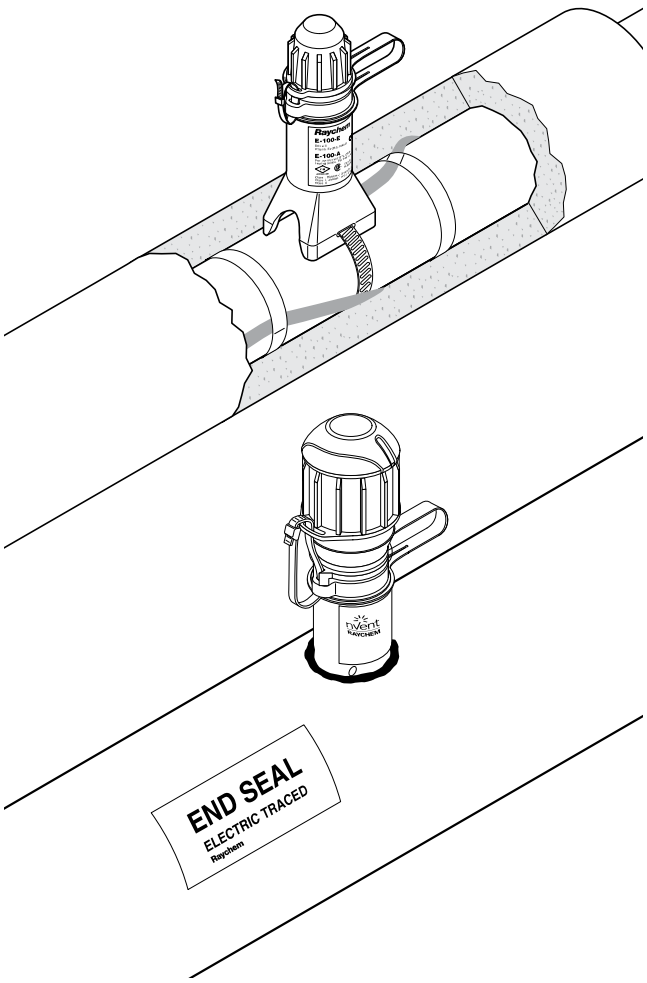
Part Number: E-100-L-A

Manufacturer:  Raychem

Wattage: 2 watts at 60 Lumens/watt LED. 120 Lumens per end seal

# E-100-E AND E-100-L-E

## END SEAL AND LIGHTED END SEAL




Both the nVent RAYCHEM E-100-E and E-100-L-E are accessible, re-entrable end seals, the E-100-E without a light, the E-100-L-E with a signal light. Both end seals can be used with all nVent RAYCHEM BTV, QTVR, XTV, KTV or VPL industrial parallel heating cables. They are approved for use in hazardous areas. They are extremely rugged - made of a strong, moulded part with 4 mm wall thickness.

The heating cable is firmly kept in place by the integral strain relief.

Sealing is done twice. First a dry compartment for the heating cable is created, then a boot filled with a non-curing sealant (silicone free) is placed over the end of the heating cable inside the compartment.

The end seals are mounted on the pipe and project through the cladding.

The light module of the E-100-L-E uses an array of super-bright green LEDs for long life and excellent visibility from almost any angle. The robust industrial-grade electronics are encapsulated to reliably seal out moisture.

Extra sealant filled boots for the E-100-E end seal can be ordered separately.

### KIT CONTENTS

| | E-100-E | E-100-L-E |
|---|---|---|
| | 1 end seal<br>1 cable tie<br>1 polywater sachet<br>1 installation instruction | 1 end seal with indicator light<br>1 cable tie<br>1 polywater sachet<br>2 insulated parallel crimps<br>1 core sealer<br>1 installation instruction |

### APPROVAL DATA

| | |
|---|---|
| Area of use | Hazardous or ordinary (indoors and outdoors) |

## APPROVALS

| E-100-E | E-100-L-E |
|---|---|
| PTB 09 ATEX 1060 U<br>Ⓔx II 2G Ex e II<br>II 2D Ex tD A21 IP66<br>IECEx PTB 09.0038U<br>Ex e II<br>Ex tD A21 IP66<br>SP Ex e II T* | Sira 14ATEX3015X<br>Ⓔx II 2GD<br>Ex e mb IIC T* Gb<br>Ex tb IIIC T***°C Db<br>Ta = -40°C to +40°C<br><br>IECEx SIR 14.0007X<br>Ex e mb IIC T* Gb<br>Ex tb IIIC T***°C Db<br>Ta = -40°C to +40°C<br>FM CLI, ZN1, AEx e mb IIC T* Gb (1)<br>ZN21 AEx tb IIIC T*<br>SP Ex e mb IIC T* Gb<br>Ex tb IIIC T***°C Db |

DNV Certificate No. E-11564 and E-11565
*For T-rating, see heating cable or design documentation
(1) Except VPL

| | |
|---|---|
| EAC Ex | TC RU C-BE.МЮ62.B.00054/18<br>Ex e IIC Gb U Ex tb IIIC Db U<br>Ex e mb IIC Gb U<br>Ex tb mb IIIC Db U<br>Ta -55°C...+56°C IP66<br>ООО "ТехИмпорт" |
| EAC Ex | TC RU C-BE.МЮ62.B.00054/18<br>Ex e IIC Gb U Ex tb IIIC Db U<br>Ex e mb IIC Gb U<br>Ex tb mb IIIC Db U<br>Ta -55°C...+56°C IP66<br>ООО "ТехИмпорт" |

## PRODUCT SPECIFICATIONS

| | E-100-E | E-100-L-E |
|---|---|---|
| Max. pipe temperature | Refer to heating cable specification (absolute maximum is 260°C) | |
| Max. operating voltage | 480 V* | 277 V |
| | *Extra conditions for safe use apply for voltages above 277 V.<br>Please refer to the certificate or installation instructions for full details. | |
| Ambient temperature range | −50°C to +56°C* | −40°C to +40°C |
| | *Extra conditions for safe use apply for ambient temperatures above +40°C.<br>Please refer to the summary the certificate or installation instructions for full details. | |
| Min. installation temperature | −50°C | −40°C |
| Overall height | 171 mm | 197 mm |
| Outer diameter | 46 mm<br>Usable with up to 100 mm thermal insulation | 66 mm |
| Ingress protection | IP66, Type 4X | IP66, Type 4X |
| Impact resistance | EN 60079-30-1, ≥ 7 joules | EN 60079-30-1, ≥ 7 joules |
| UV stability | No degradation after > 1000 h | No degradation after > 1000 h |
| Solvent resistance | Excellent | Excellent |
| Strain relief | > 250 N | > 250 N |

## LIGHT SOURCE

| | |
|---|---|
| Type | Green LEDs |
| Voltage rating range | 110-277 Vac, 50/60 Hz |
| Power consumption | < 2 W |
| Electromagnetic immunity/emissions | Complies with IEC61000-6 and IEC61000-4 |

## INSTALLATION DATA

| | | |
|---|---|---|
| Tools required | Cable knife, wire cutters, screwdriver | Cable knife, wire cutters, screwdriver, crimp tool (Panduit-CT-100), long nose pliers |

## ORDERING DETAILS

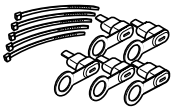
| End seal | | |
|---|---|---|
| Part description | E-100-E | E-100-L-E |
| PN (Weight) | 101255-000 (0.22 kg)<br>Requires one pipe strap (not supplied) | P000001583 (0.63 kg)<br>Requires one pipe strap (not supplied)<br>PTB, DNV and EAC approved product |

## ACCESSORIES

| | |
|---|---|
| Small pipe adaptor | JBS- SPA, required for pipes ≤ 1" (DN 25), E 90515-000 (bag of 5 adaptors) |

## SPARE PART

Boot pack for E-100-E



| | |
|---|---|
| Part description | E-100-BOOT-5-PACK |
| PN (Weight) | 281053-000 (140 g) |
| Pack size | 5 sealant filled boots and 5 cable ties |

Replacement indicator light for E-100-L

| | |
|---|---|
| Part description: | E-100-LR-E |
| PN | P000001586 |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nVent

nVent.com

Our powerful portfolio of brands:
CADDY ERICO HOFFMAN RAYCHEM SCHROFF TRACER

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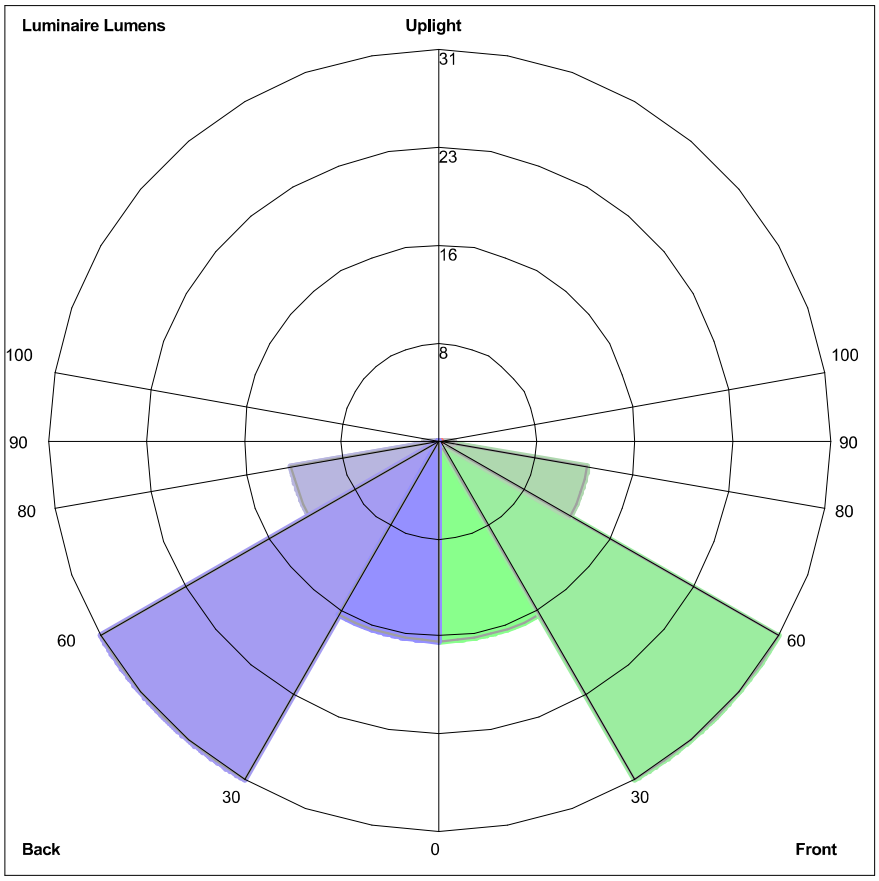
RAYCHEM-DS-EU1421-E100EE100LE-EN-1911

**IES ROAD REPORT**
**PHOTOMETRIC FILENAME : APPROXIMATION RAYCHEM END KITS.IES**

**LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH**




Luminaire Lumens:
Front: Low=16.0, Medium=31.2, High=12.0, Very High=1.2
Back: Low=16.0, Medium=31.2, High=12.0, Very High=1.2
Uplight: Low=0.0, High=0.0

BUG Rating : B0-U0-G0

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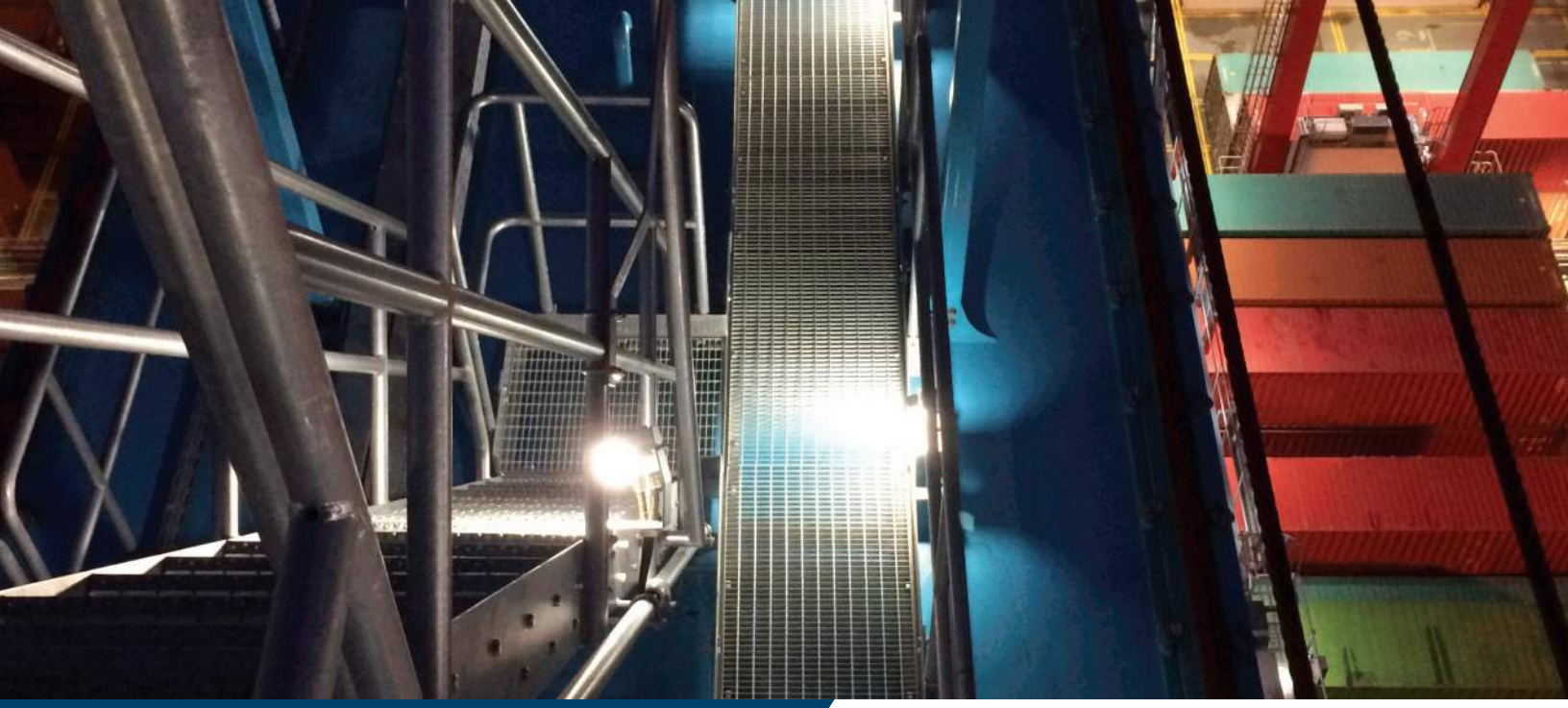
Calculations based on published IES Methods and recommendations, values rounded for display purposes.
Results derived from content of manufacturers photometric file.

# Fixture Cut Sheet
# Type G



PHOENIX®
DURABILITY X DESIGN™

# Cube-Light

## Compact LED Area Light

Australian Design No. 359170
US Patent No. D762,321 S

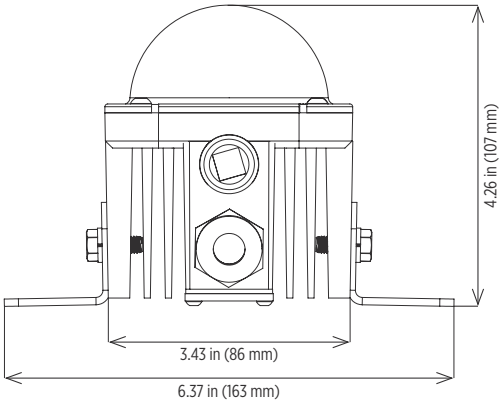
Delivers up to 1000 lumens to doorways, walkways, cabins or other small areas

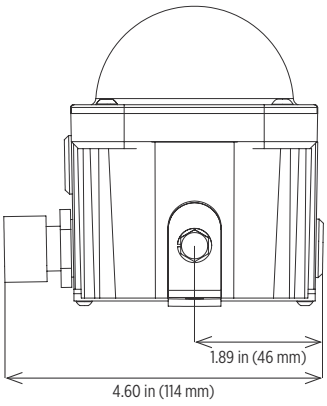
Competitive pricing with short lead times

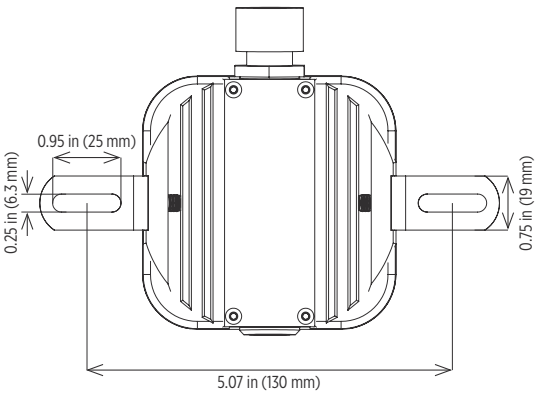
Various mounting options for maximum versatility

LED technology increases efficiency, eliminates maintenance and supports green initiatives

## Dimensions




**Phoenix Products LLC** 8711 West Port Avenue Milwaukee, WI 53224 USA
Phone: +1 414.973.3300 Toll Free: 800.438.1214 Fax: +1 414.973.3210 **www.phoenixlighting.com**

# Cube-Light

Compact LED Area Light

## Specifications

| | |
|---|---|
| **Construction** | Cast aluminum housing |
| **Finish** | White thermoset powder coat |
| **Hardware** | Marine grade (316) stainless steel |
| **Lens** | Impact-resistant, diffuse polycarbonate<br>Diffuse red, green, blue and amber lens accessories available (AMB-CL, BLU-CL, GRN-CL, RED-CL) |
| **Light source** | 13W, up to 1000 lumens<br>Conformal coated<br>CRI ≥ 70<br>CCT 5000K<br>50,000 hour rated life |
| **Power source** | 120-240V, 50/60Hz<br>240V, 50/60Hz<br>13-27V DC |
| **Wiring** | Stranded wires<br>Cord not included - standard<br>72.00 inch (1829 mm) cord with pigtail option (CD)<br>NEMA 5-15 plug (120V only) sold separately (PLG-515) |
| **Through wiring** | Continuous row mounting option (TW) |
| **Ambient operating temperature** | -30°C to +50°C |
| **Mounting** | Flush mount brackets - standard<br>Harp mount available<br>Rail mount available - 2.00 inch overall diameter<br>Fixture can be mounted in any orientation |
| **Weight** | 2.0 lb (0.9 kg) |
| **Warranty** | 3 years |

*For IES files, see website or contact factory*

## Compliances

ETL/cETL Listed to:

- UL 1598 Suitable for Wet Locations
- UL 1598A Marine Outside Type (Saltwater)
- CSA C22.2 No. 250.0

CE
ABS
IP66 rated
LM79 and LM80 reports available

*The Cube-Light on an STS crane*

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## Ordering Information

**Example:** CL-13LED-120-240

| Fixture | Wattage/Type | Voltage | Options |
|---|---|---|---|
| CL | 13LED | 120-240 [1,2] | CD |
| | | 240 [2] | TW |
| | | DC [3] | |

**Wattage/Type**

| | |
|---|---|
| 13LED | 13W, up to 1000 lumens |

**Voltage**

| | |
|---|---|
| 120-240 [1,2] | 120-240V, 50/60Hz |
| 240 [2] | 240V, 50/60Hz |
| DC [3] | 13-27V DC |

**Options**

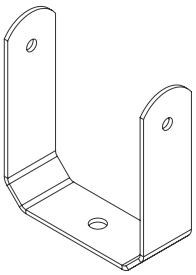
| | |
|---|---|
| CD | 72.00 inch (1829 mm) cord with pigtail option |
| TW | Continuous row mounting |

**Notes**

| | |
|---|---|
| 1 | ETL/cETL listed |
| 2 | CE |
| 3 | No certifications |

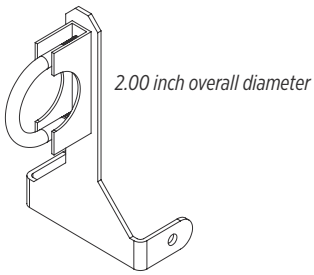
**Special Projects:** We may be able to accommodate your special projects, so please don't hesitate to ask about additional options. Minimum order quantities and/or extended lead times will apply. Contact your Phoenix representative with specific inquiries.

## Mounting (order separately)



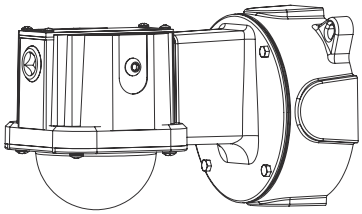
**Harp Mount**

HRP-CL




**Rail Mount**

RLMT-CL
Contact factory

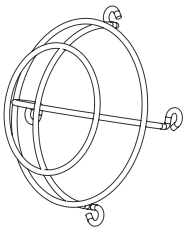


**Wall Mount**

Complete fixture sold separately
Refer to Cube-Light Wall Mount spec sheet

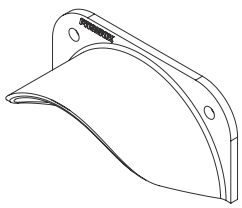
*Flush mount comes standard with fixture*

## Accessories (order separately)



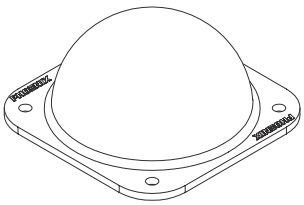
**Wire Guard Kit**

WG-CL



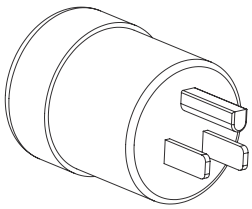
**Visor Kit**

VSR-CL



**Color Lens Kits**

| | |
|---|---|
| AMB-CL | amber lens kit |
| BLU-CL | blue lens kit |
| GRN-CL | green lens kit |
| RED-CL | red lens kit |



**NEMA 5-15 plug** (120V only)

PLG-515

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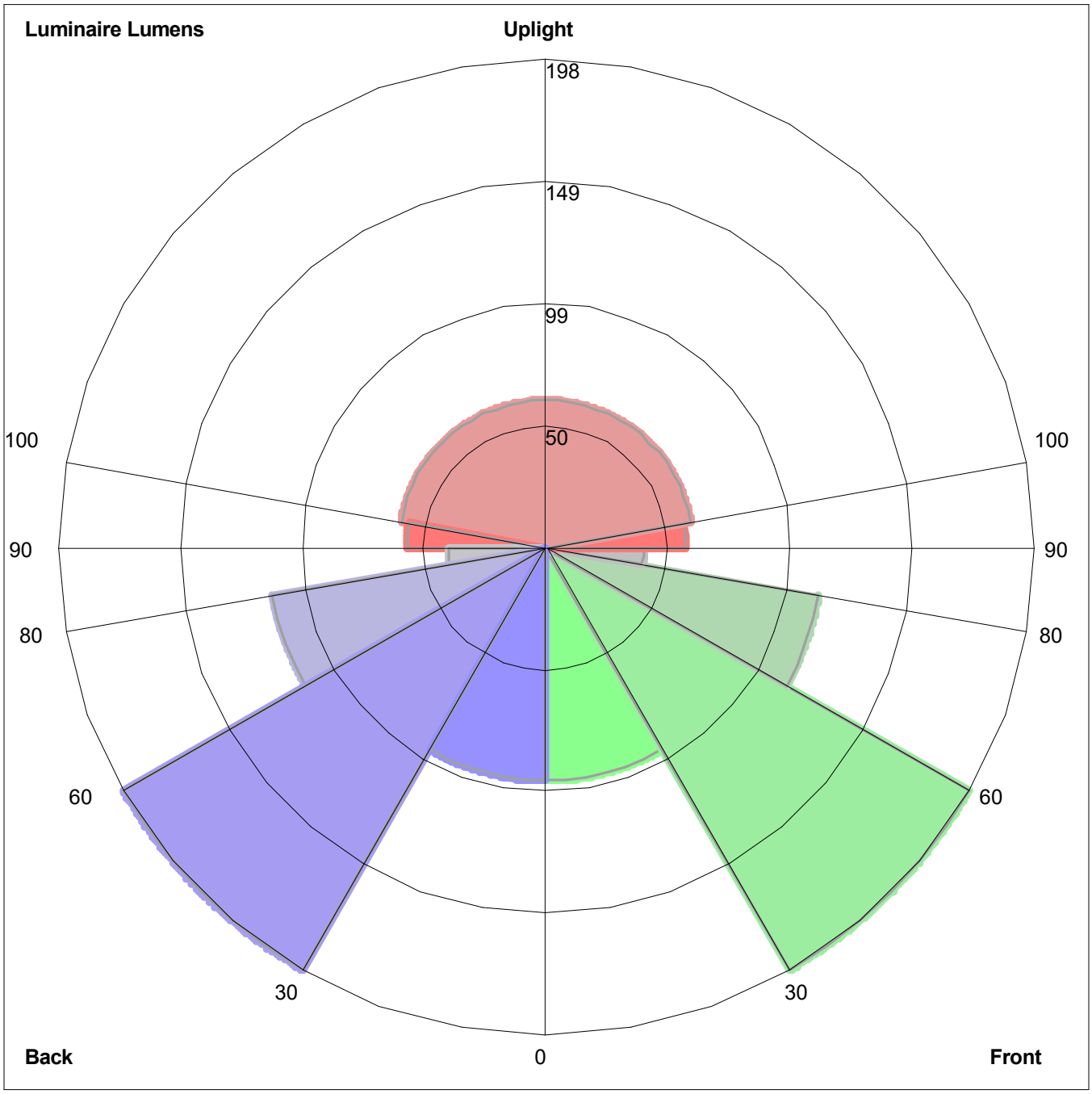
**IES ROAD REPORT**
**PHOTOMETRIC FILENAME : CL-13LED (CUBE 120V ITL TESTED).IES**

**LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH**




Luminaire Lumens:
Front: Low=94.7, Medium=198.1, High=112.5, Very High=39.7
Back: Low=94.7, Medium=198.1, High=112.5, Very High=39.7
Uplight: Low=56.4, High=59.7

BUG Rating : B1-U3-G1

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Calculations based on published IES Methods and recommendations, values rounded for display purposes.
Results derived from content of manufacturers photometric file.