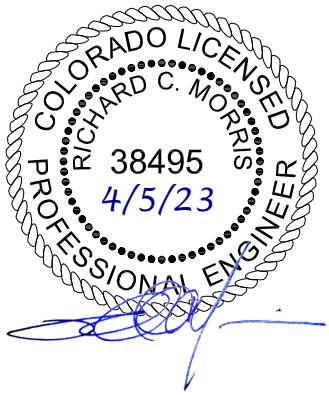
Lighting Mitigation Plan

For



WINDOM PAD

Project Number: 21017

Originators:	E. Olagoke	Date	03-31-2023
Project Engineer Approval:	R. Morris	Date	03-31-2023
Project Manager Approval:	B. Primeaux	Date	03-31-2023
Client Review:	B. Cocchiere	Date	03-31-2023

Rev. No.	By	Revisions	Approval	Date
0	EOO	Issued for Attachment to Permit	RM	03-31-2023

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

PDC Energy commissioned Samuel Engineering to develop a lighting mitigation plan for the Windom State 5N67W24 1-46 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	<0.1 lux	≤ 4.0 lux	COGCC
Construction	Drilling	2.59 lm/ft^2	≤ 12 lm/ft^2	Weld County
	Completions	1.91 lm/ft^2	≤ 12 lm/ft^2	Weld County
Production	Production	0.38 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.

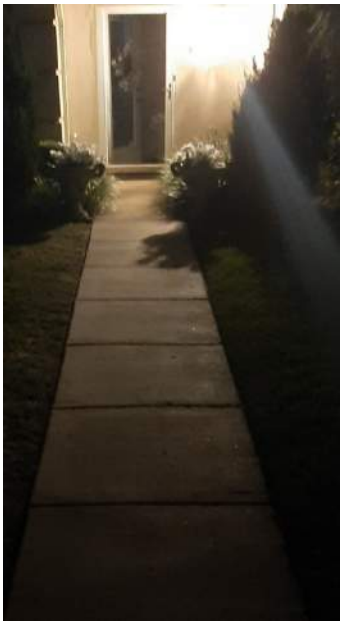


Figure 2.2–Illuminance (lx) level decreasing with distance from light source.

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

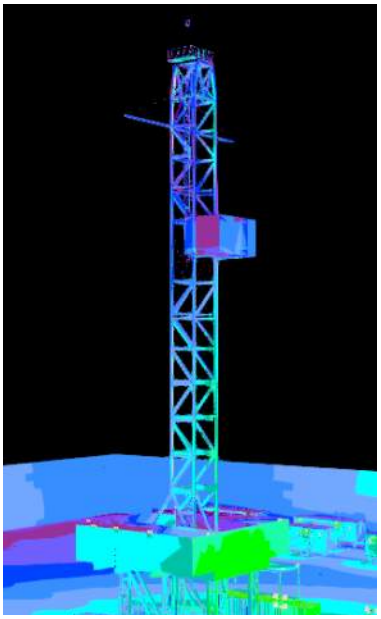


Figure 3.0 – Screenshot from a representative 3-D model showing a false color rendering

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.

Table 4.1 shows the modeled lux values at each wall location.

Calculated Lighting Impact Results Building Units				
Location Unit No.	**Drilling**	**Completions**	**Production**	**Regulatory Limit**
1	<0.1 lux	<0.1 lux	<0.1 lux	4 lux
2	<0.1 lux	<0.1 lux	<0.1 lux	4 lux
3	<0.1 lux	<0.1 lux	<0.1 lux	4 lux

Table 4.1 – Calculated Lighting Impact Results - Building Units

Figure 4.1 shows the building units that are located within a 1-mile radius of the Windom Pad site.

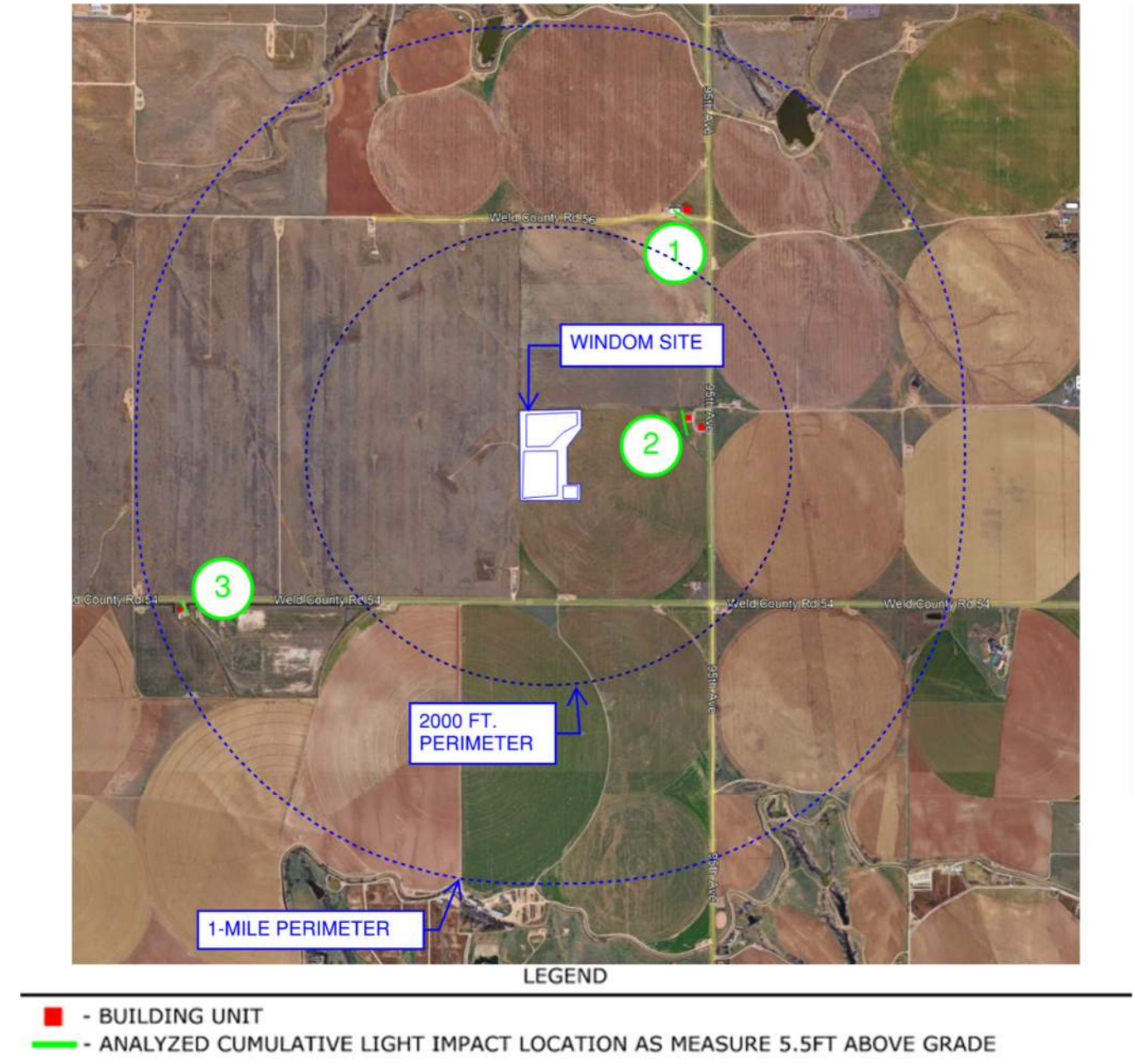
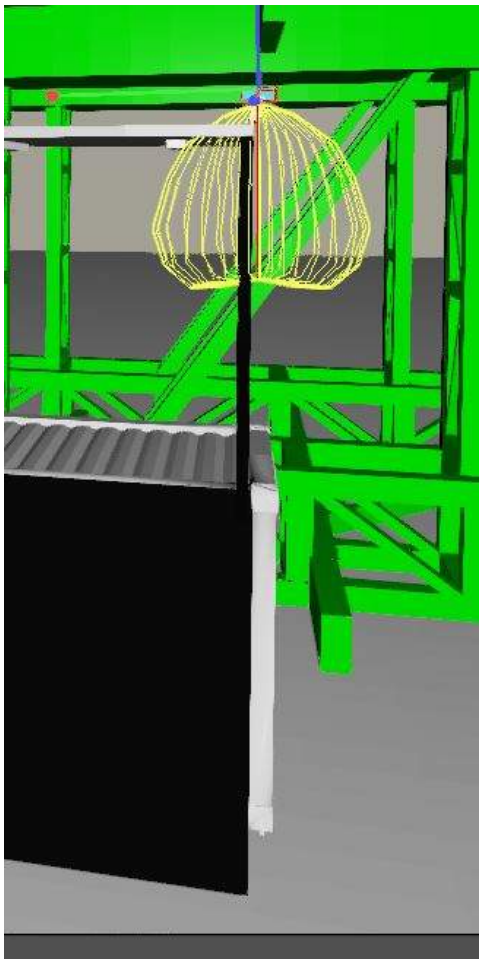


Figure 4.1 –Building Units Within a 1-Mile Radius of PDC Windom Site

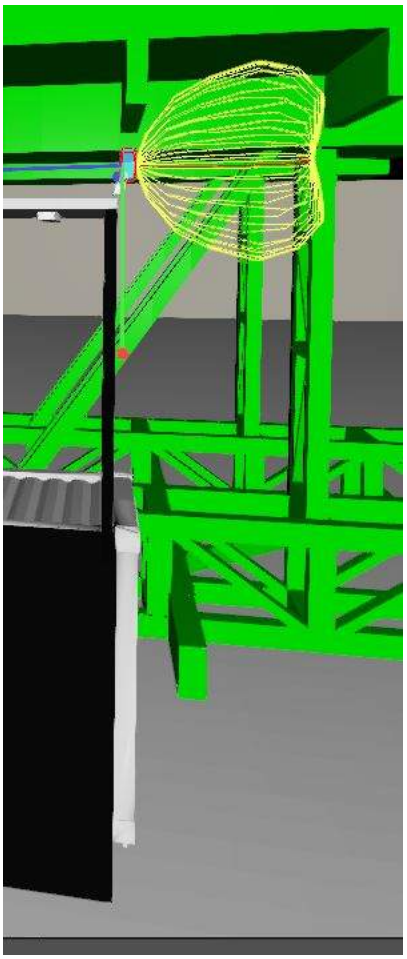
4.2 SITE LIGHTING POSITIONS AND ORIENTATIONS

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.

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:	12.0 acres / 522,720 ft^2	12.0 acres / 522,720 ft^2	6.32 acres / 275,299 ft^2
Total Lumens:	1,352,331 lm	998,154 lm	105,141 lm
Calculated Lumens/ft^2:	2.59 lm/ft^2	1.91 lm/ft^2	0.38 lm/ft^2
Allowable Limit:	≤ 12 lm/ft^2	≤ 12 lm/ft^2	≤ 1.25 lm/ft^2

Table 5.1 – Lighting Compliance with Weld County Regulations

6.0 SITE PLANS & FIXTURE SCHEDULES

6.1 DRILLING PHASE

Refer to:
Drawing 21017-EE-373 for Drilling Phase Photometric
Drawing 21017-EE-376 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)
A	PAULUHN	DLL4/UNV1S903D	WALL-MOUNTED LINEAR 4FT. LED, INCLUDES DIFFUSED POLYCARBONATE LENS	63 W	7,900	2-11	9'	75°	10	79,000
						49-50	37'	75°	2	15,800
						51-54	20'	75°	4	31,600
						55	39'	90°	1	7,900
						56	47'	90°	1	7,900
						57	55'	90°	1	7,900
						58	62'	90°	1	7,900
						59	69'	90°	1	7,900
						60	77'	90°	1	7,900
						61	85'	90°	1	7,900
						62	93'	90°	1	7,900
						63	100'	90°	1	7,900
						64	108'	90°	1	7,900
						65	115'	90°	1	7,900
						66	123'	90°	1	7,900
						67	130'	90°	1	7,900
						68	138'	90°	1	7,900
B	PAULUHN	DFLMY400/TT 76	WALL-MOUNTED FLOODLIGHT	400 W	24,091	12-33	15'	75°	22	530,002
						69-71 80-84	44'	75°	8	192,728
						72-79 87	23'	75°	9	216,819
						85	20'	75°	1	24,091
						86	14'	75°	1	24,091
C	DIALIGHT	HEULMC2ANNWNGN	LED - HIGH BAY W/ DIFFUSED POLYCARBONATE DOME	80W	11,600	34-43	16'	0°	10	116,000
						88	20'	0°	1	11,600
								Drilling Phase Total Lumens:		1,352,331

6.2 COMPLETIONS PHASE

Refer to:
Drawing 21017-EE-374 for Completions Phase Photometric
Drawing 21017-EE-377 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)
D	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	89-91	30'	75°	3	365,760
F	RAB	FXLED300SFY	LED - HIGH OUTPUT FLOODLIGHT	300 W	45,171	92-105	31'	75°	14	632,394
								Completions Phase Total Lumens:		998,154

6.3 PRODUCTION PHASE

Refer to:
Drawing 21017-EE-375 for Production Phase Photometric
Drawing 21017-EE-378 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)
E	EATON - COOPER CROUSE HINDS	CPMV5L-UNV1-S903D	LED - WALL PACK LIGHTING FIXTURE W/ DIFFUSED POLYCARBONATE LENS	45 W	5,200	192-200	9'	0°	9	46,800
G	ORBIT	LWP2-50W-CW	LED - WALL PACK LIGHTING FIXTURE	50 W	5,969	183-191	9'	0°	9	53,721
H	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	106-182	5'	180°	77	4,620
								Production Phase Total Lumens:		105,141

7.0 SITE MITIGATION NOTES AND BEST MANAGEMENT PRACTICES

Construction Phase:

- During construction of all phases, PDC Energy will only conduct day light operation and there will be no nighttime operations that require lighting.

Drilling Phase:

- PDC Energy will utilize LED fixtures to reduce skyglow.
- PDC Energy 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.
- A 32 ft. and a 24 ft. high sound barrier will be constructed, which will reduce light escaping from the site.
- In the event of a lightning complaint, PDC Energy will address the complaint and work with all parties involved to ensure the complaint is resolved.

Completions and Flowback Phases:

- PDC Energy will utilize LED fixtures to reduce skyglow.
- PDC Energy 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.
- A 32 ft. and a 24 ft. high sound barrier will be constructed, which will reduce light escaping from the site.
- In the event of a lightning complaint, PDC Energy will address the complaint and work with all parties involved to ensure the complaint is resolved.

Production Phase:

- PDC Energy will utilize LED fixtures to reduce skyglow.
- PDC Energy 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.

- Luminaire Lights Type “G” and “E” are used exclusively for task lighting when required for maintenance operations at night for safety reasons. Otherwise, these lights are to remain off. The values for these lights are included in the analysis as an upper limit to the actual values that will be present on site.
- In the event of a lighting complaint, PDC Energy 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) are representative of current fixtures used during drilling operations.
2. Type B fixtures (Pre-Production Phase) are representative of current fixtures used during drilling operations.
3. Type C Fixtures (Pre-Production Phase) are representative of current fixtures used during drilling operations.
4. Type D Fixtures (Pre-Production Phase) are portable construction light towers. See the fixture cut sheet cover for further notes.
5. Type E Fixtures (Production Phase) are representative of current fixtures used for LACT skids and mounted near the doors to the skids.
6. Type F Fixtures (Pre-Production Phase) are floodlights placed on the sound wall and are representative of current fixtures used during drilling operations.
7. Type G Fixtures (Production Phase) are representative of current fixtures used for trailers and LACT skids.
8. Type H Fixtures (Production Phase)
    - Type H Fixtures are 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.

8.0 ATTACHMENTS

Attachment A – 21017 Windom Pad Site Lighting Plans

Attachment B – 21017 Windom Pad Lighting Fixture Cut Sheets Attachment

END OF REPORT

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Greenwood Village, Colorado 80111

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ATTACHMENT A

SITE LIGHTING PLANS

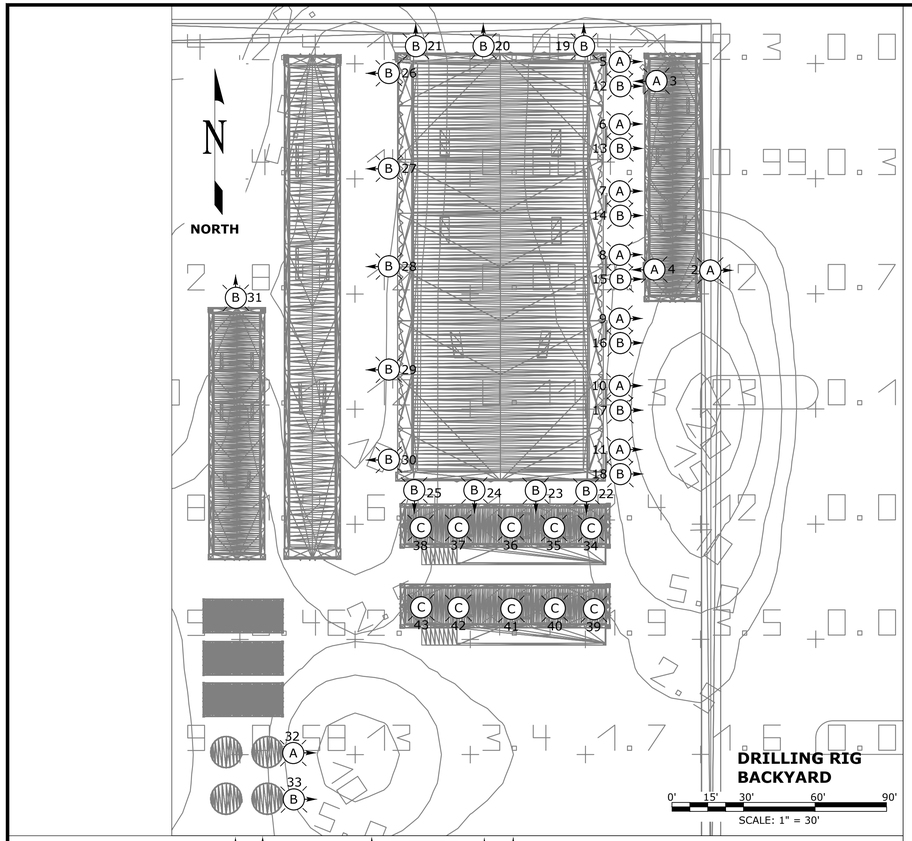
LIGHTING MITIGATION PLAN

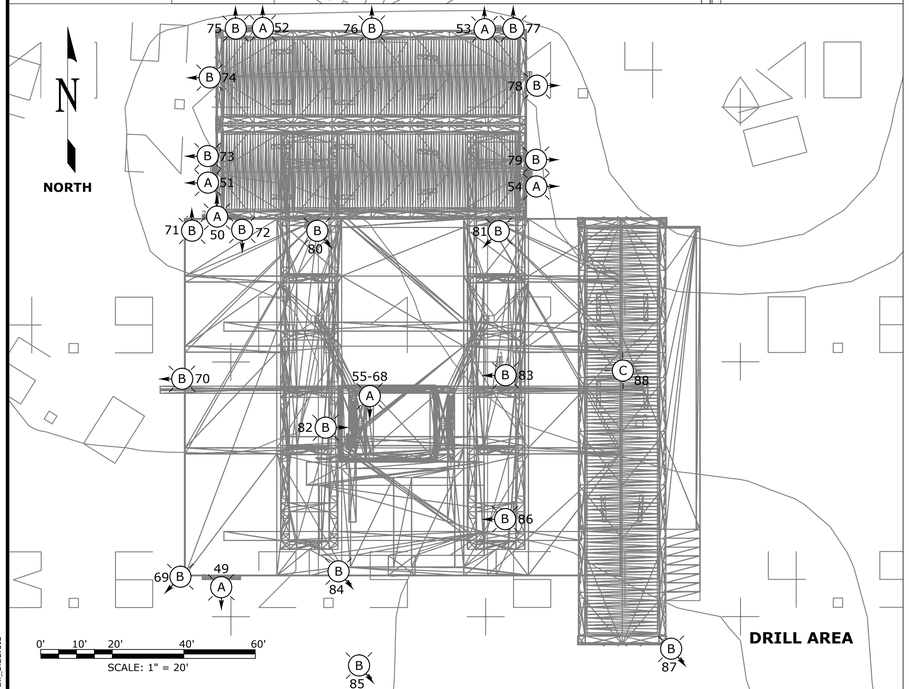
FOR

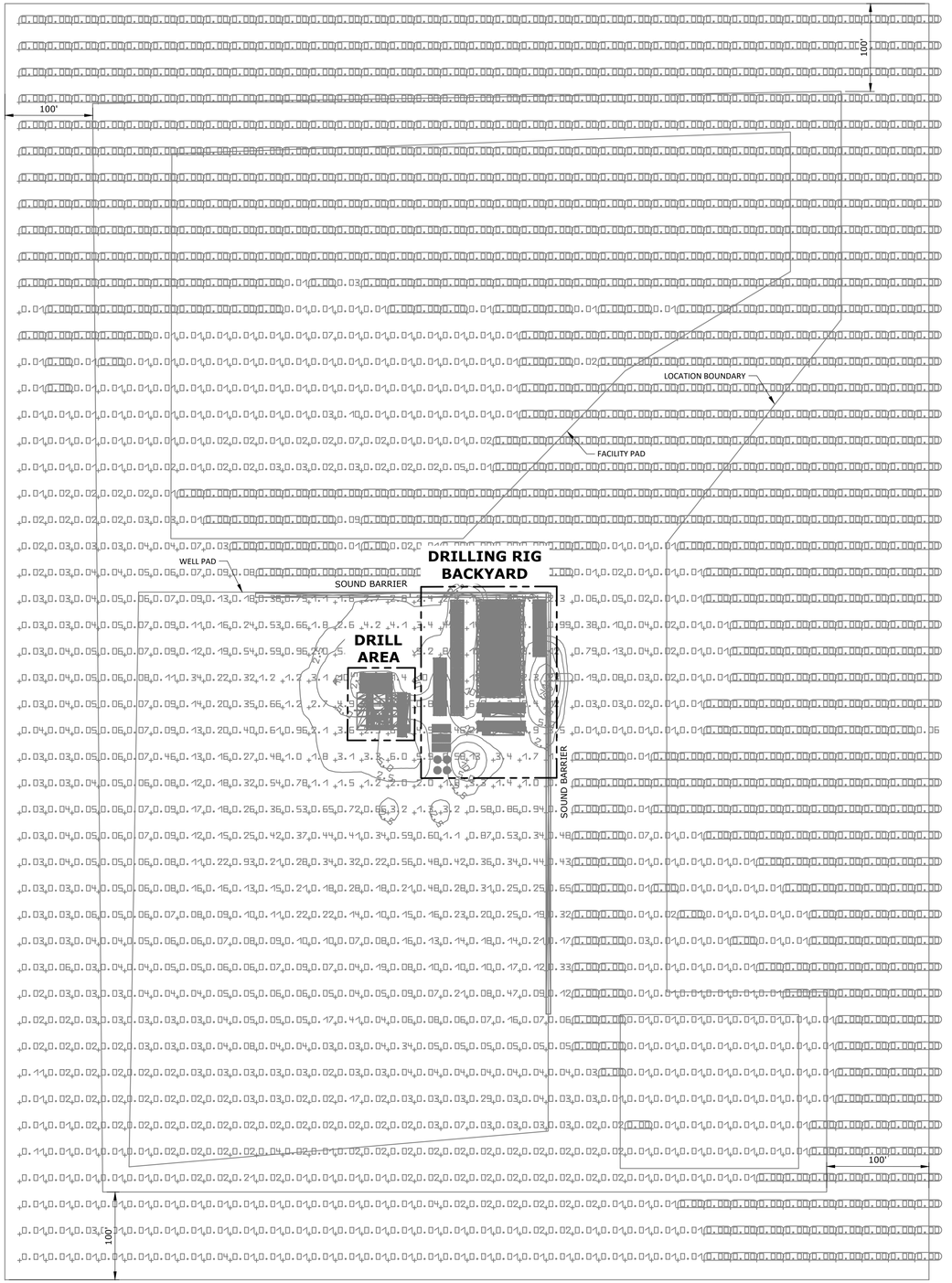
PDC ENERGY

WINDOM PAD

Project Number: 21017







NOTES:

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

REFERENCE DRAWINGS

NUMBER	TITLE

REVISIONS

NO.	DESCRIPTION	DATE	BY

REVISIONS

NO.	DESCRIPTION	DATE	BY
0	ISSUED FOR ATTACHMENT TO PERMIT	03/31/23	AR

SCALE:	AS NOTED	DATE
DESIGNED:	A. RAMIREZ	03/31/23
DRAWN:	A. RAMIREZ	03/31/23
CHECKED:	L.OHL	03/31/23
PE APPROVED:	R.MORRIS	03/31/23
PM APPROVED:	B.PRIMEAUX	03/31/23

CLIENT: PDC ENERGY
PROJECT LOCATION: WELD COUNTY, CO

PDC ENERGY

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TITLE
LIGHTING STUDY
WELD COUNTY
ELECTRICAL
WINDOM PAD
PHOTOMETRIC LIGHTING PLAN - DRILLING

PROJECT NUMBER
21017

DRAWING NUMBER
21017-EE-373

REV.
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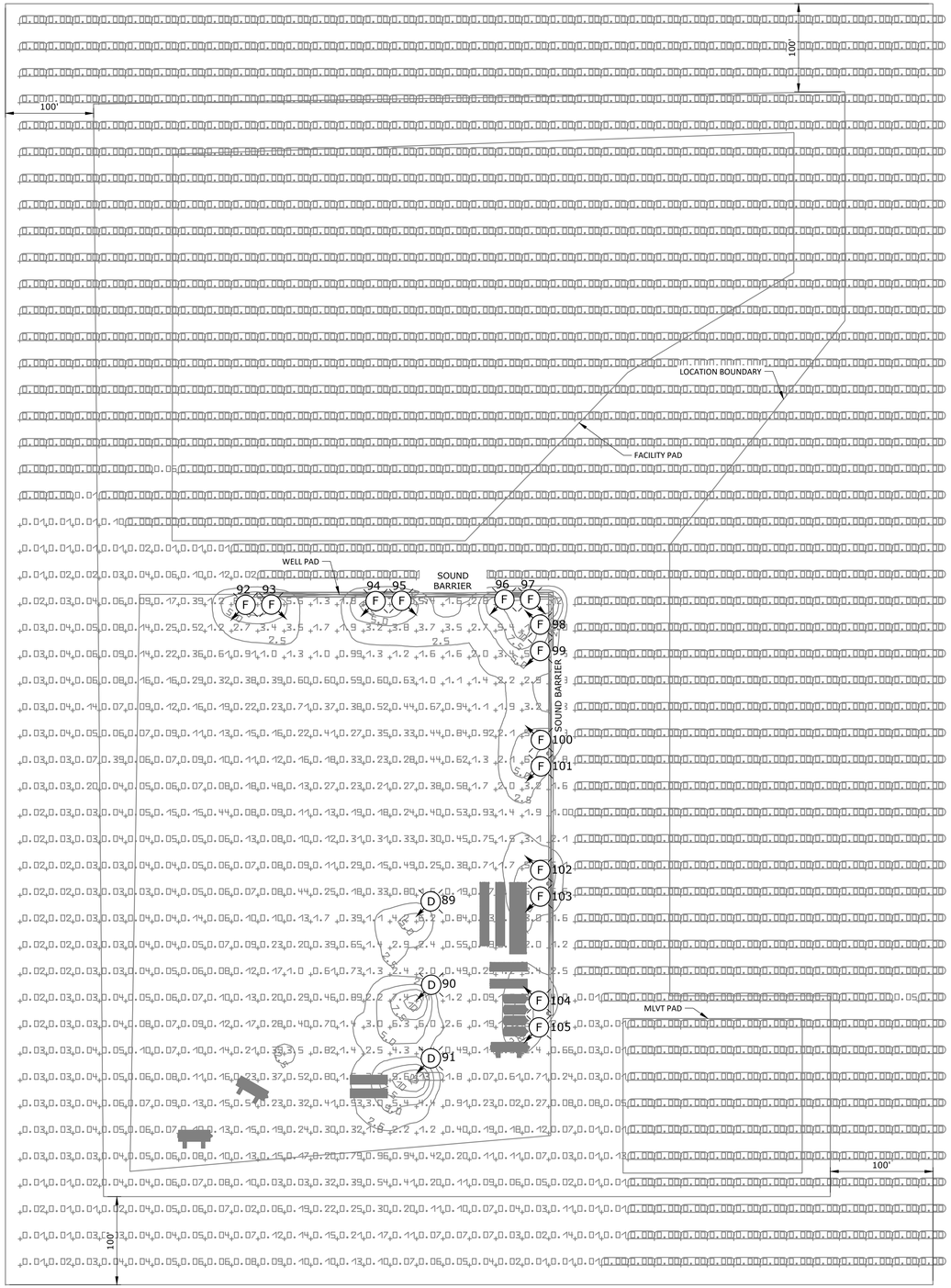

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NOTES:

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DESIGNED:	A. RAMIREZ	03/31/23
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TITLE

LIGHTING STUDY
WELD COUNTY
ELECTRICAL
WINDOM PAD
PHOTOMETRIC LIGHTING PLAN - COMPLETIONS

PROJECT NUMBER

21017

DRAWING NUMBER

21017-EE-374

REV. 0

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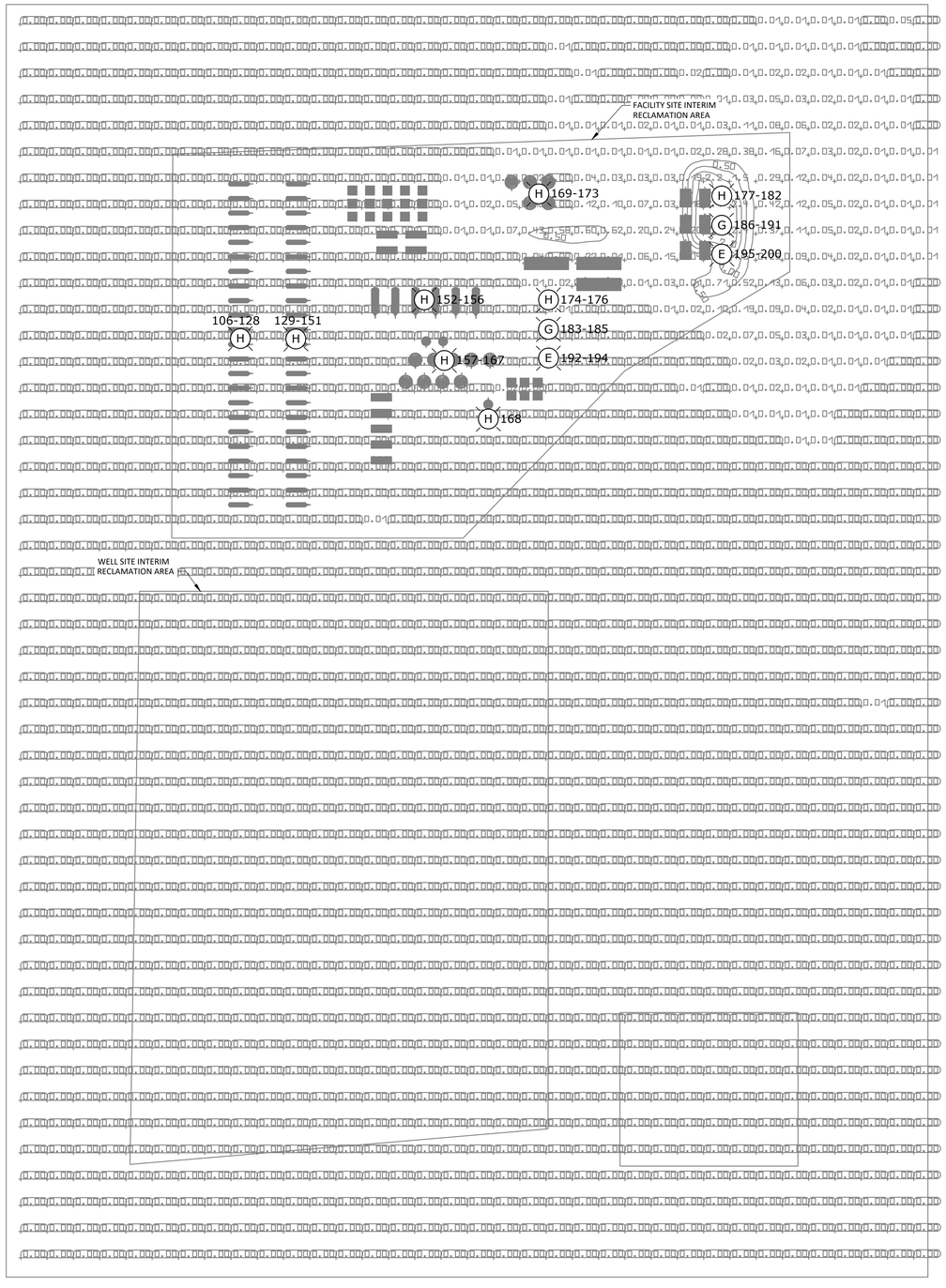

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NOTES:

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

REFERENCE DRAWINGS

NUMBER	TITLE

CLIENT | PROJECT MANAGER | PROJECT ENGINEER | CHECK

REVISIONS

NO.	DESCRIPTION	DATE	BY

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

REVISIONS

NO.	DESCRIPTION	DATE	BY
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SCALE:	AS NOTED	DATE
DESIGNED:	A. RAMIREZ	03/31/23
DRAWN:	A. RAMIREZ	03/31/23
CHECKED:	L.OHL	03/31/23
PE APPROVED:	R.MORRIS	03/31/23
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CLIENT: PDC ENERGY
PROJECT LOCATION: WELD COUNTY, CO

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TITLE

LIGHTING STUDY
WELD COUNTY
ELECTRICAL
WINDOM PAD
PHOTOMETRIC LIGHTING PLAN - PRODUCTION

PROJECT NUMBER: 21017

DRAWING NUMBER: 21017-EE-375

REV.: 0

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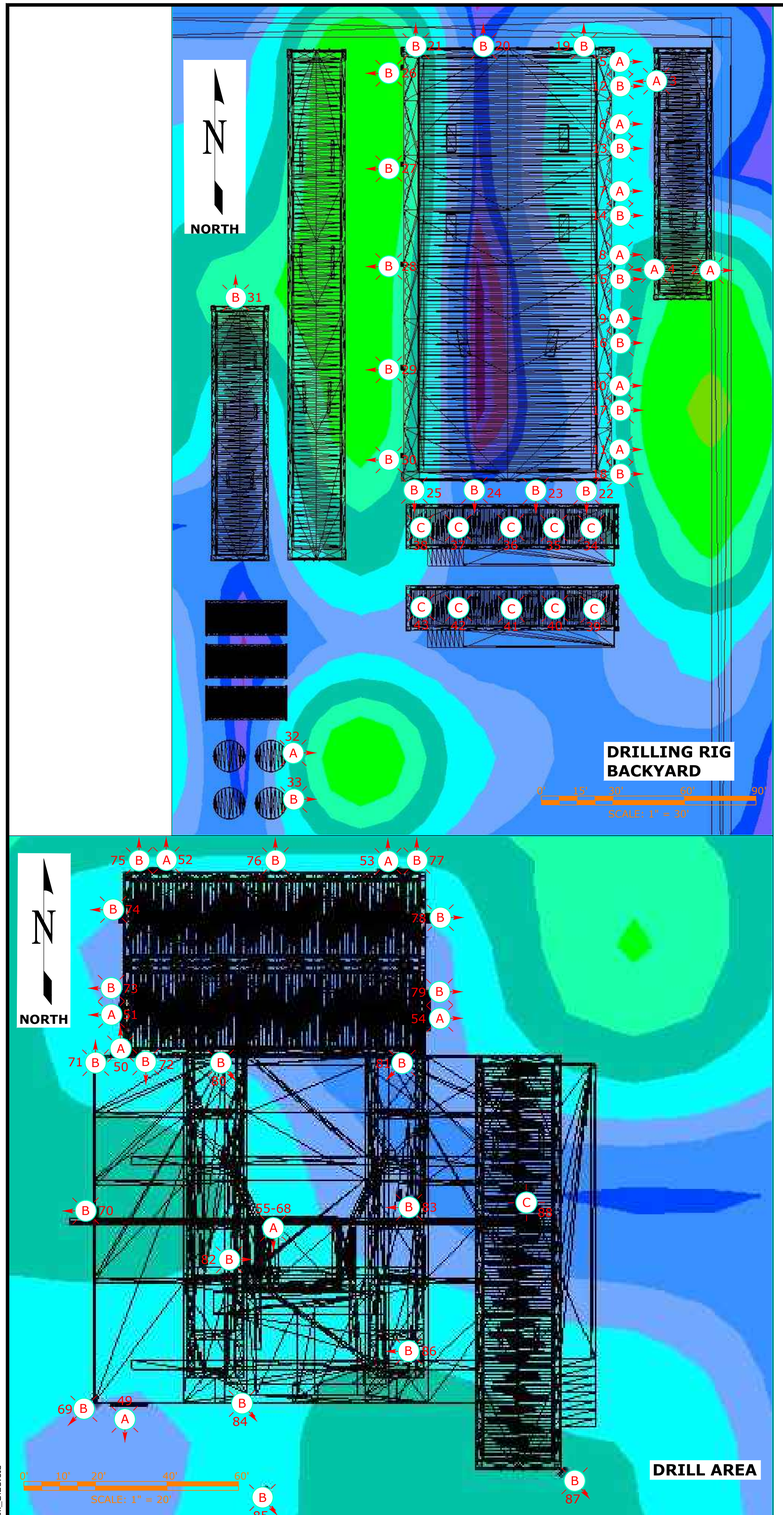

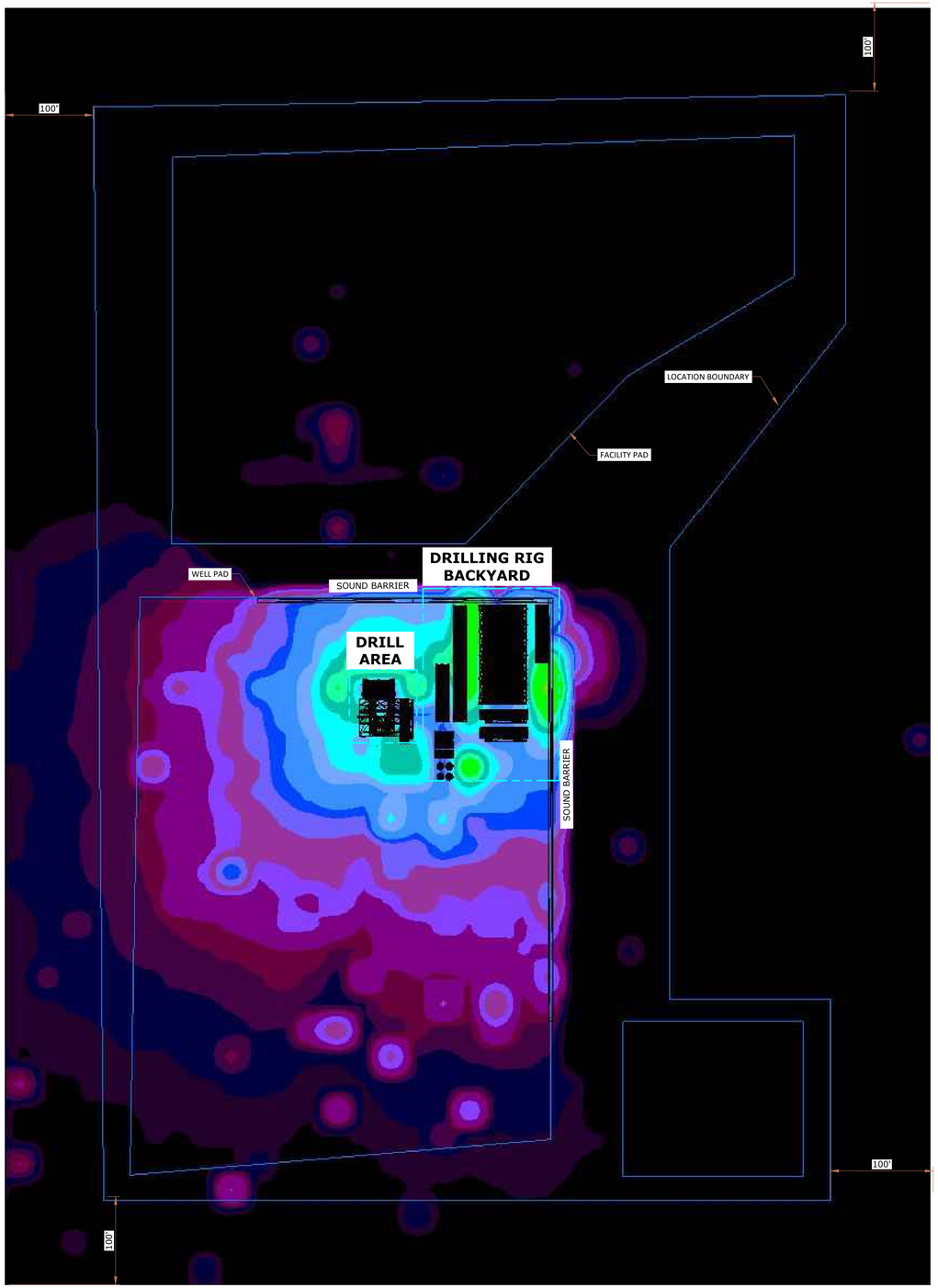

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SCALE: 1" = 100'

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

REFERENCE DRAWINGS

NUMBER	TITLE

REVISIONS

NO.	DESCRIPTION	DATE	BY

REVISIONS

NO.	DESCRIPTION	DATE	BY
0	ISSUED FOR ATTACHMENT TO PERMIT	03/31/23	AR

SCALE:	AS NOTED	DATE
DESIGNED:	A. RAMIREZ	03/31/23
DRAWN:	A. RAMIREZ	03/31/23
CHECKED:	L.OHL	03/31/23
PE APPROVED:	R.MORRIS	03/31/23
PM APPROVED:	B.PRIMEAUX	03/31/23

CLIENT: PDC ENERGY
PROJECT LOCATION: WELD COUNTY, CO

PDC ENERGY

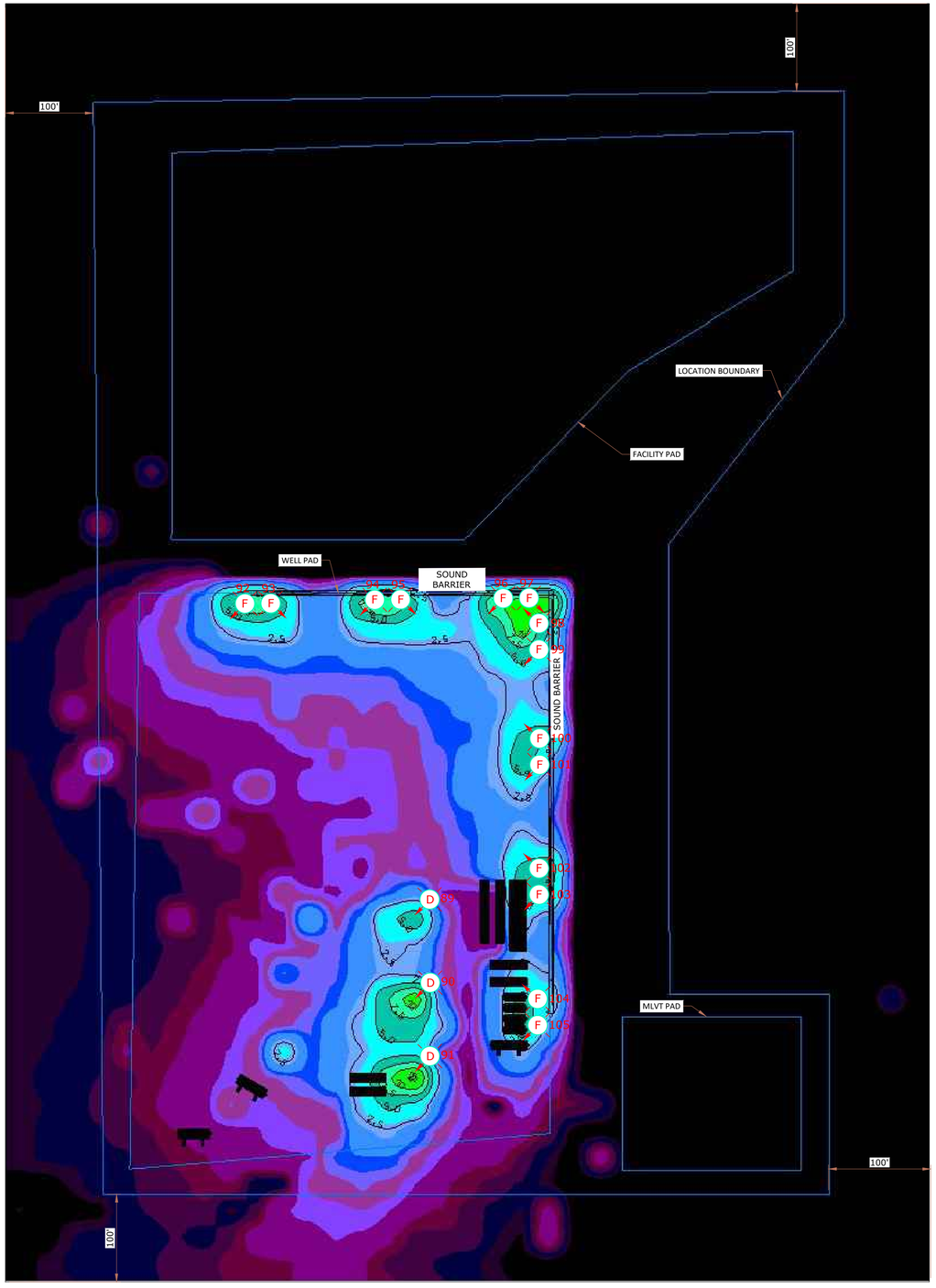
SAMUEL ENGINEERING
WE PROVIDE SOLUTIONS

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

TITLE	PROJECT NUMBER
LIGHTING STUDY WELD COUNTY ELECTRICAL WINDOM PAD PHOTOMETRIC HEAT MAP - DRILLING	21017
	DRAWING NUMBER
	21017-EE-376 REV. 0

CAD File: S:\Projects\21017_PDC_Lighting_Study\CAD\Electrical\Drawings\Physical Plans\21017-EE-376.dwg
Plot Date: Tuesday, April 4, 2023 11:51:32 AM Plotted By: Adam Ramirez
CTB Used: SE_Std_Color_Full_Size.ctb

NORTH



0' 50' 100' 200' 300'

SCALE: 1" = 100'

NOTES:

1. ALL VALUES IN FOOT-CANDLES (FC).
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

REFERENCE DRAWINGS

NUMBER	TITLE

CLIENT | PROJECT MANAGER | PROJECT ENGINEER | CHECK

REVISIONS

NO.	DESCRIPTION	DATE	BY

CLIENT | PROJECT MANAGER | PROJECT ENGINEER | CHECK

REVISIONS

NO.	DESCRIPTION	DATE	BY
0	ISSUED FOR ATTACHMENT TO PERMIT	03/31/23	AR

BP | RM | LO

SCALE:	AS NOTED	DATE
DESIGNED:	A. RAMIREZ	03/31/23
DRAWN:	A. RAMIREZ	03/31/23
CHECKED:	L.OHL	03/31/23
PE APPROVED:	R.MORRIS	03/31/23
PM APPROVED:	B.PRIMEAUX	03/31/23

CLIENT: PDC ENERGY

PROJECT LOCATION: WELD COUNTY, CO

PDC ENERGY

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Greenwood Village, CO 80111
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Web: samuelengineering.com

TITLE

LIGHTING STUDY
WELD COUNTY
ELECTRICAL
WINDOM PAD
PHOTOMETRIC HEAT MAP - COMPLETIONS

PROJECT NUMBER

21017

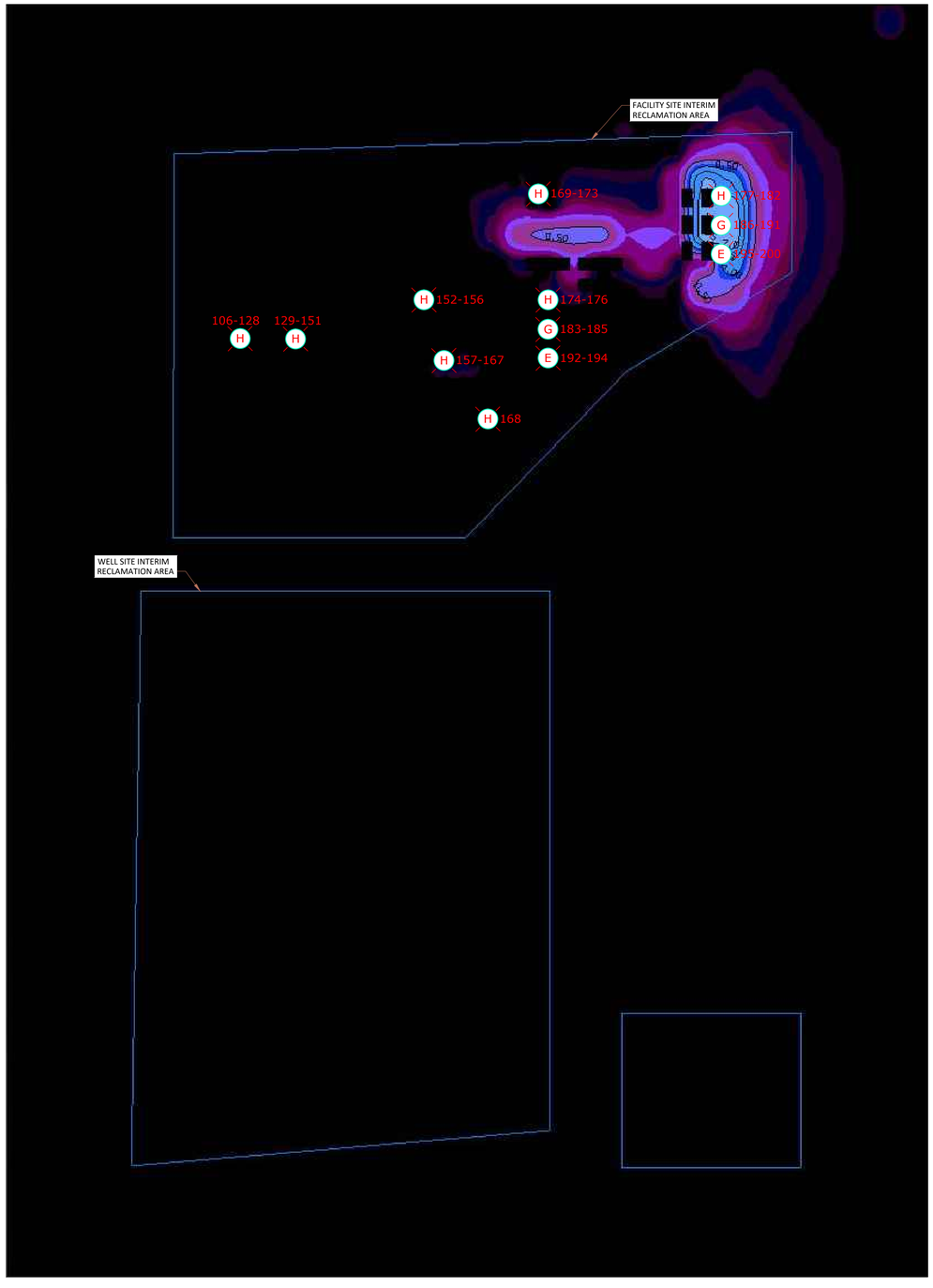
DRAWING NUMBER

21017-EE-377

REV. 0

CAD File: S:\Projects\21017_PDC_Lighting_Study\CAD\Electrical\Drawings\Physical Plans\21017-EE-377.dwg
Plot Date: Thursday, March 30, 2023 9:49:42 AM Plotted By: Adam Ramirez
CTB Used: SE_Std_Color_Full_Size.ctb

NORTH



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.

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

CAD File: S:\Projects\21017_PDC_Lighting_Study\CAD\Electrical\Drawings\Physical Plans\21017-EE-378.dwg
Plot Date: Thursday, March 30, 2023 9:50:24 AM Plotted By: Adam Ramirez
CTB Used: SE_Std_Color_Full_Size.ctb

REFERENCE DRAWINGS

NUMBER	TITLE

REVISIONS

NO.	DESCRIPTION	DATE	BY

REVISIONS

NO.	DESCRIPTION	DATE	BY
0	ISSUED FOR ATTACHMENT TO PERMIT	03/31/23	AR

SCALE:	AS NOTED	DATE
DESIGNED:	A. RAMIREZ	03/31/23
DRAWN:	A. RAMIREZ	03/31/23
CHECKED:	L.OHL	03/31/23
PE APPROVED:	R.MORRIS	03/31/23
PM APPROVED:	B.PRIMEAUX	03/31/23

CLIENT: PDC ENERGY
PROJECT LOCATION: WELD COUNTY, CO

PDC ENERGY

SAMUEL ENGINEERING
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Web: samuelengineering.com

TITLE

LIGHTING STUDY
WELD COUNTY
ELECTRICAL
WINDOM PAD
PHOTOMETRIC HEAT MAP - PRODUCTION

PROJECT NUMBER

21017

DRAWING NUMBER

21017-EE-378

REV. 0

SAMUEL ENGINEERING
WE PROVIDE SOLUTIONS

8450 E. Crescent Parkway, Suite 200
Greenwood Village, Colorado 80111

Phone: 303-714-4840
Fax: 303-714-4800

ATTACHMENT B

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

LIGHTING MITIGATION PLAN

FOR

PDC ENERGY

WINDOM PAD

Project Number: 21017

FIXTURE CUT SHEET TYPE A

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.

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

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)

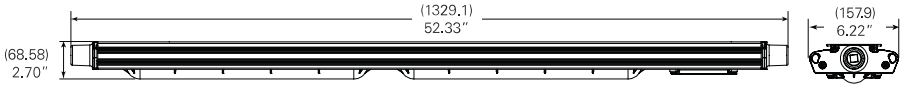
Emergency back-up	
BLANK	Standard model (no battery back-up)
EM1[C]	Integrated emergency battery back-up
EM	Remote emergency kit

Accessories (ordered separately):

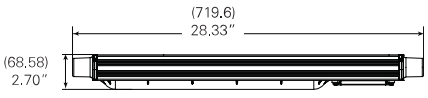
Description	Cat. #
• Flush/back mount back plate *Compatible with DuraPro*	**DP1057MTK**
• Ceiling/swivel mount *Compatible with DuraPro*	**DP1050MTK**
• Ceiling/wall mount offset *Compatible with DuraPro*	**DP1053MTK**
• Ceiling mount bracket and adapter kit *Compatible with MagnaPro*	**MP1054MTK KIT**
• Offset wall mount *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



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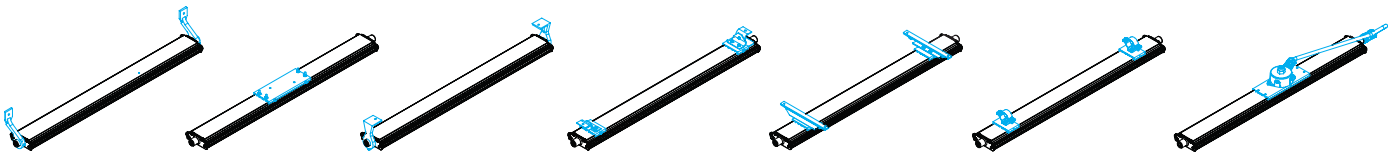


Offset wall
DP1052MTK

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.

Pauluhn DLL LED luminaires

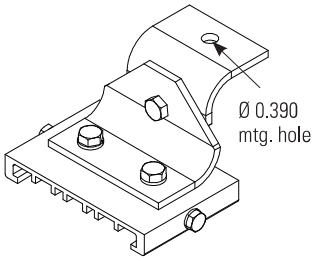
For land-based drilling

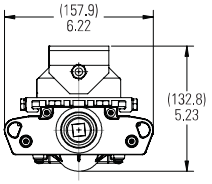
Cl. I, Div. 2, Groups A, B, C, D
Cl. I, Zone 2
Cl. II, Div. 2, Groups F, G
Cl. III

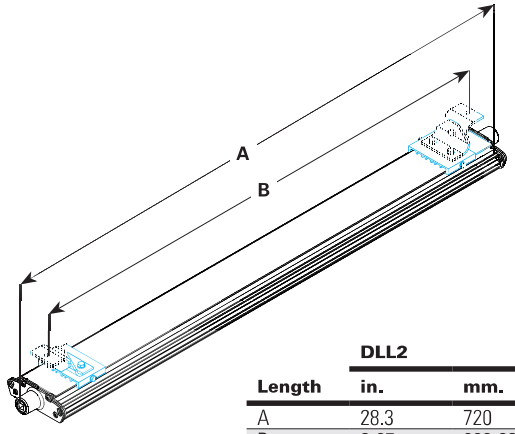
UL Listed
CSA Certified
Marine & Wet Locations
NEMA 4X; IP66

Mounting options:

Ceiling/swivel mount
DP1050MTK

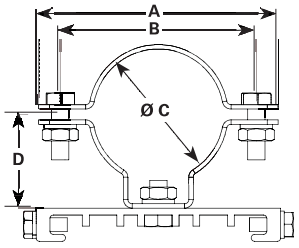




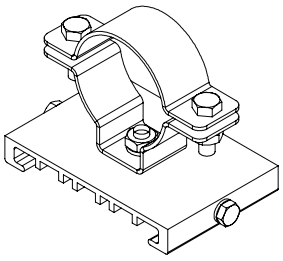


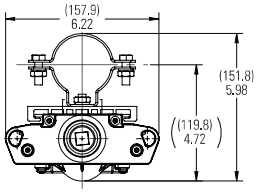
	DLL2		DLL4	
Length	in.	mm.	in.	mm.
A	28.3	720	52.3	1329
B	9-27	222-681	9-51	222-1289

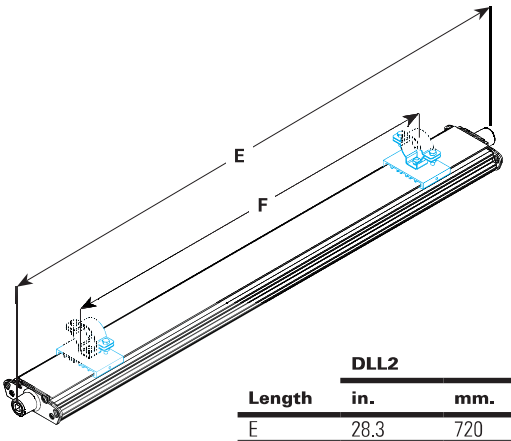
Pole mount
PM KIT 1.25/1.5/2.0



	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

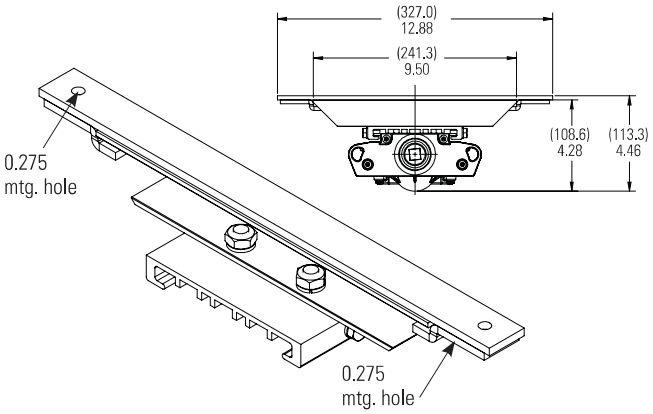


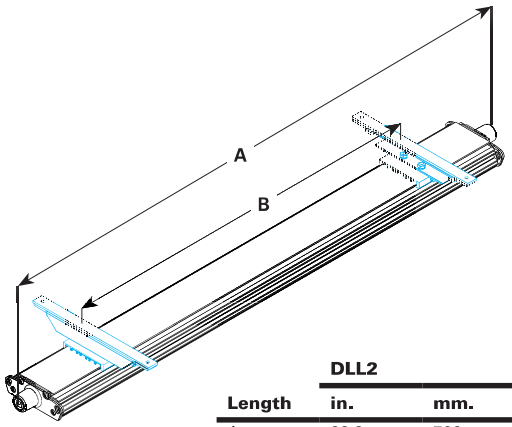




	DLL2		DLL4	
Length	in.	mm.	in.	mm.
E	28.3	720	52.3	1329
F	12-21	305-533	24-45	610-1143

MagnaPro mount
MP1054MTK KIT

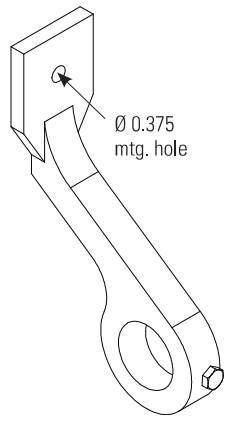


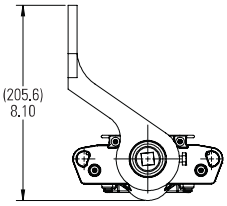


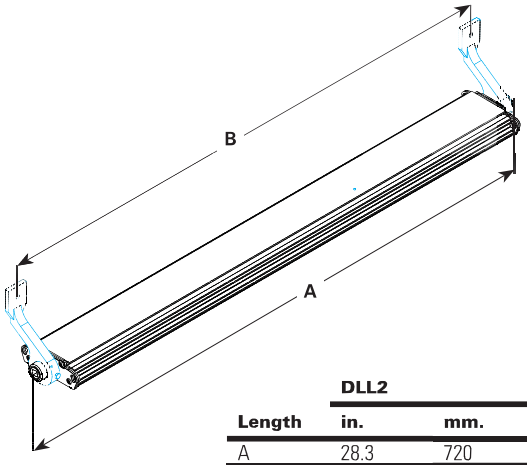
	DLL2		DLL4	
Length	in.	mm.	in.	mm.
A	28.3	720	52.3	1329
B	12-22	305-559	24-46	610-1168

Mounting options (continued):

Offset wall
DP1052MTK

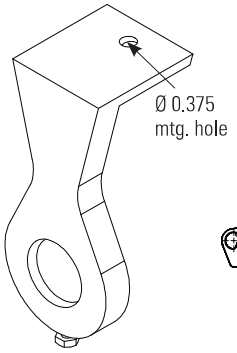


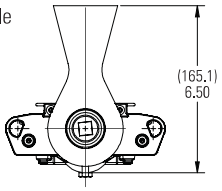


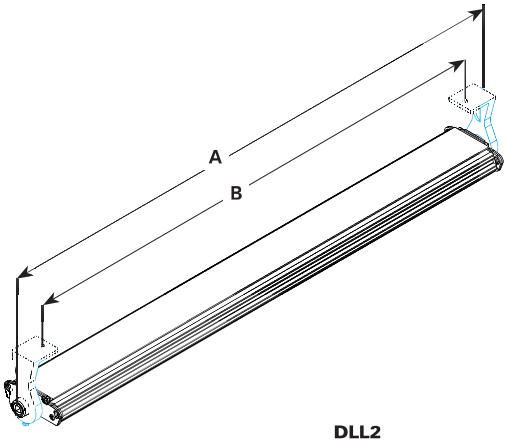


	DLL2		DLL4	
Length	**in.**	**mm.**	**in.**	**mm.**
A	28.3	720	52.3	1329
B	26.3	669	50.3	1278

Offset ceiling/wall mount
DP1053MTK

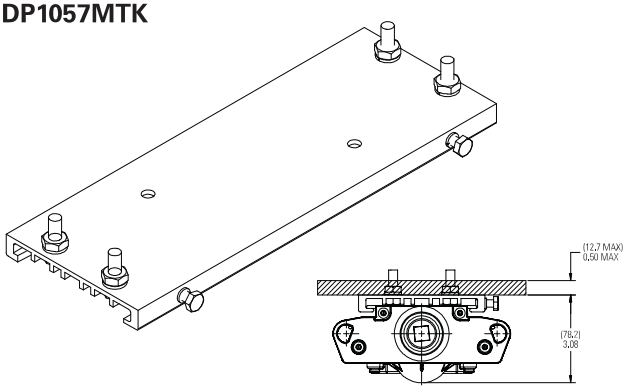


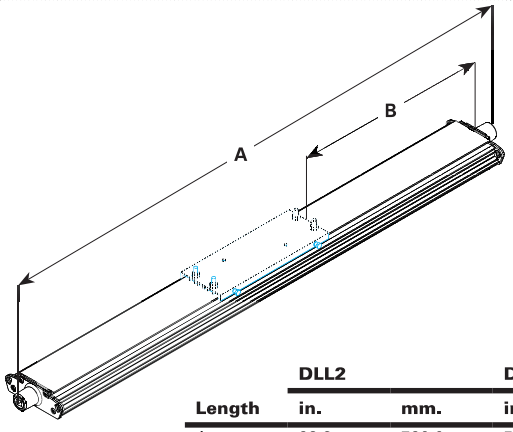




	DLL2		DLL4	
Length	**in.**	**mm.**	**in.**	**mm.**
A	28.3	720	52.3	1329
B	26.3	584	47.0	1194

Flush ceiling
DP1057MTK

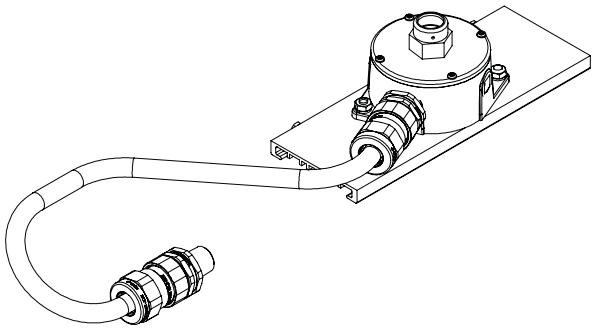


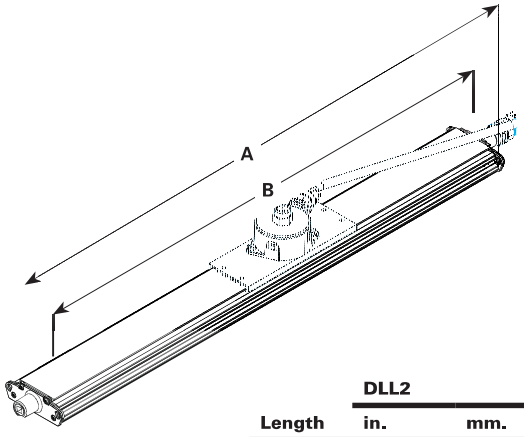


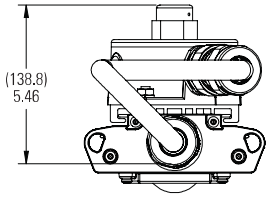
	DLL2		DLL4	
Length	**in.**	**mm.**	**in.**	**mm.**
A	28.3	720.0	52.3	1329.0
B	6.2	157.5	18.2	462.0

Mounting options (continued):

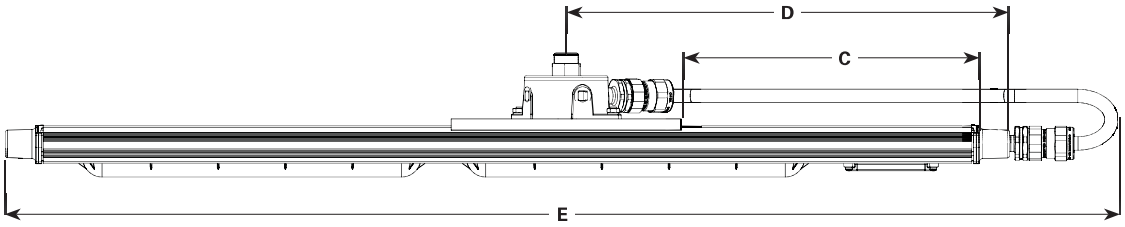
Pendant mount – Class I, Division 2 only
PEND HAZ KIT







Length	DLL2 in.	DLL2 mm.	DLL4 in.	DLL4 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



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

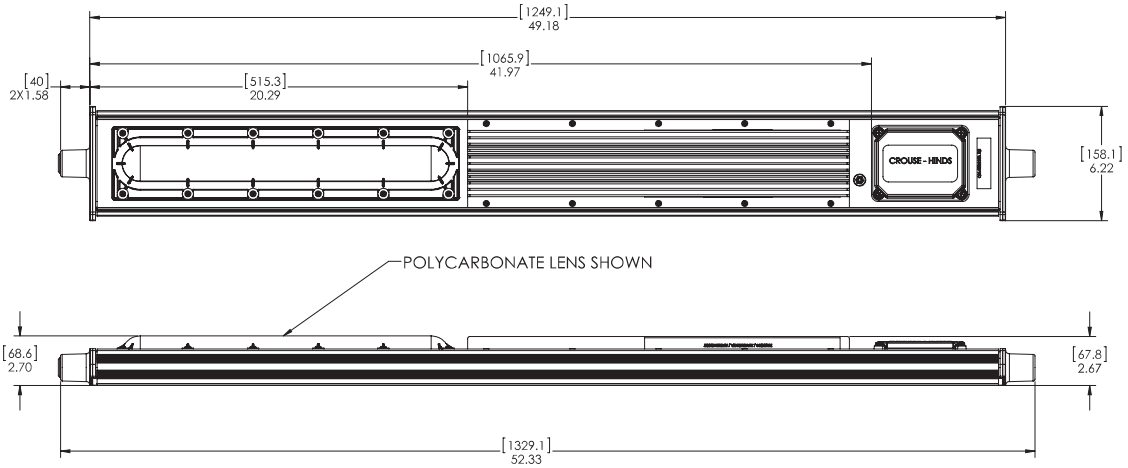
Temperature performance data:

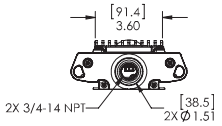
				Simultaneous rating
Ambient temp. °C	**Min. temp. supply wire °C**	**Class I, Div. 2**	**Class II, Div. 2**	**Class I, Div. 2; Class II, Div. 2**
40	60	T5	T6	T5

Photometrics:

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

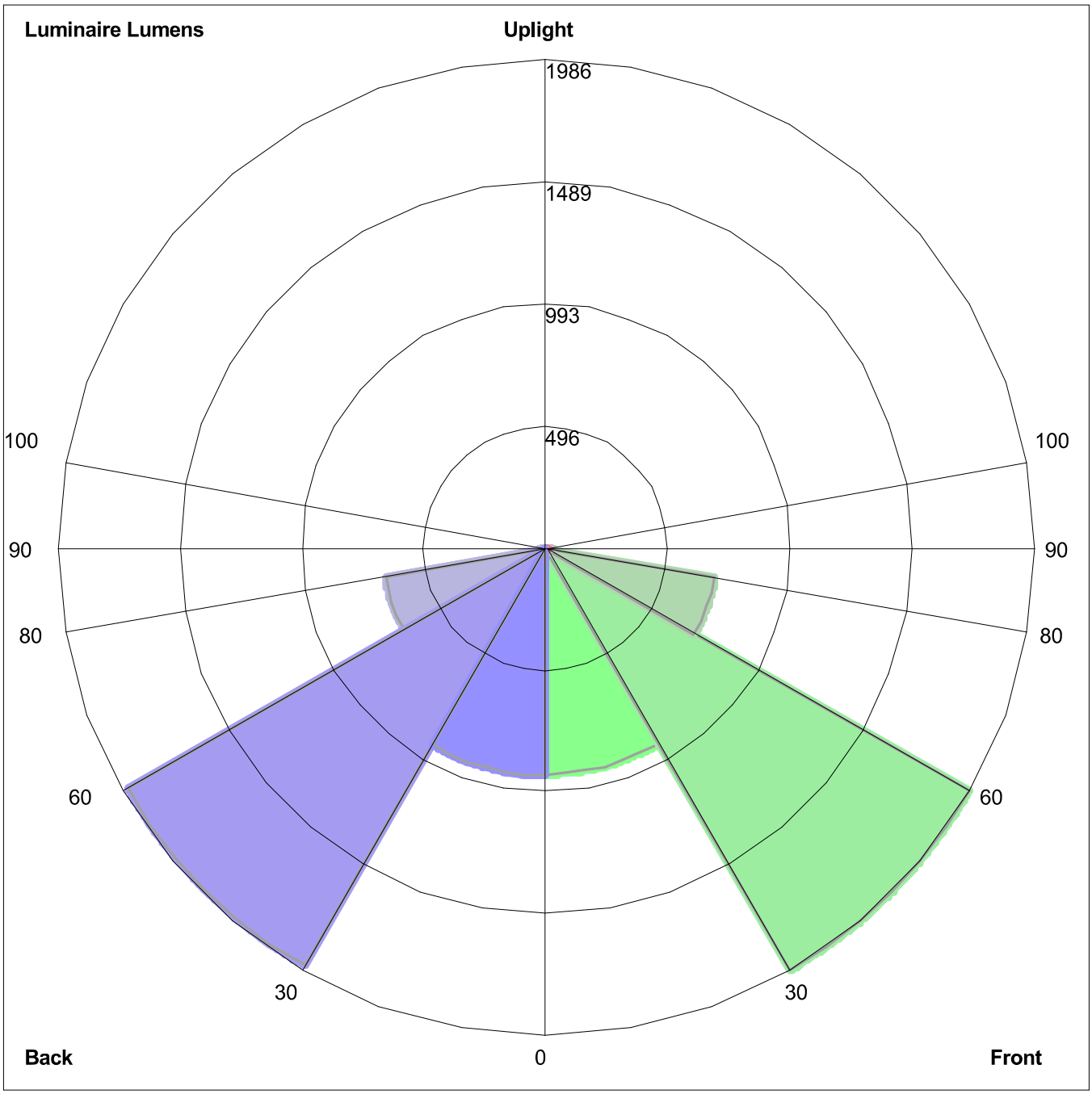
Dimensions:





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

FIXTURE CUT SHEET TYPE B

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.

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	

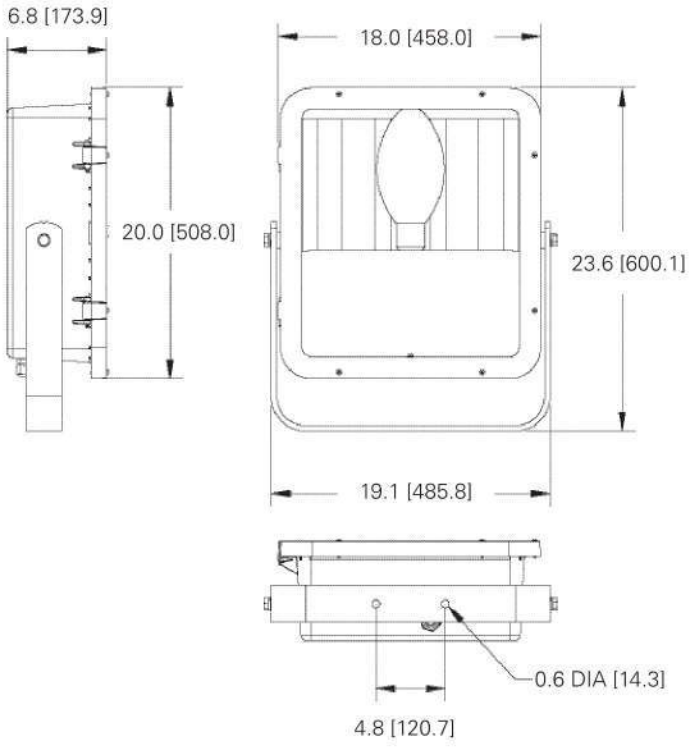
Accessories (ordered separately):

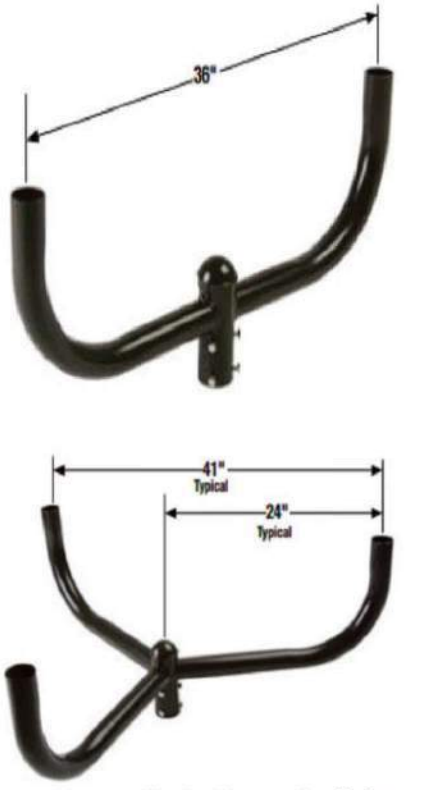
Description	Cat. #
• Pole mount slipfitter adapter	SFA6
• Wall mount bracket adapter	SWB6
• Bull horn, 2 tenon, gray	BLHN2
• Bull horn, 3 tenon, gray	BLHN3

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):



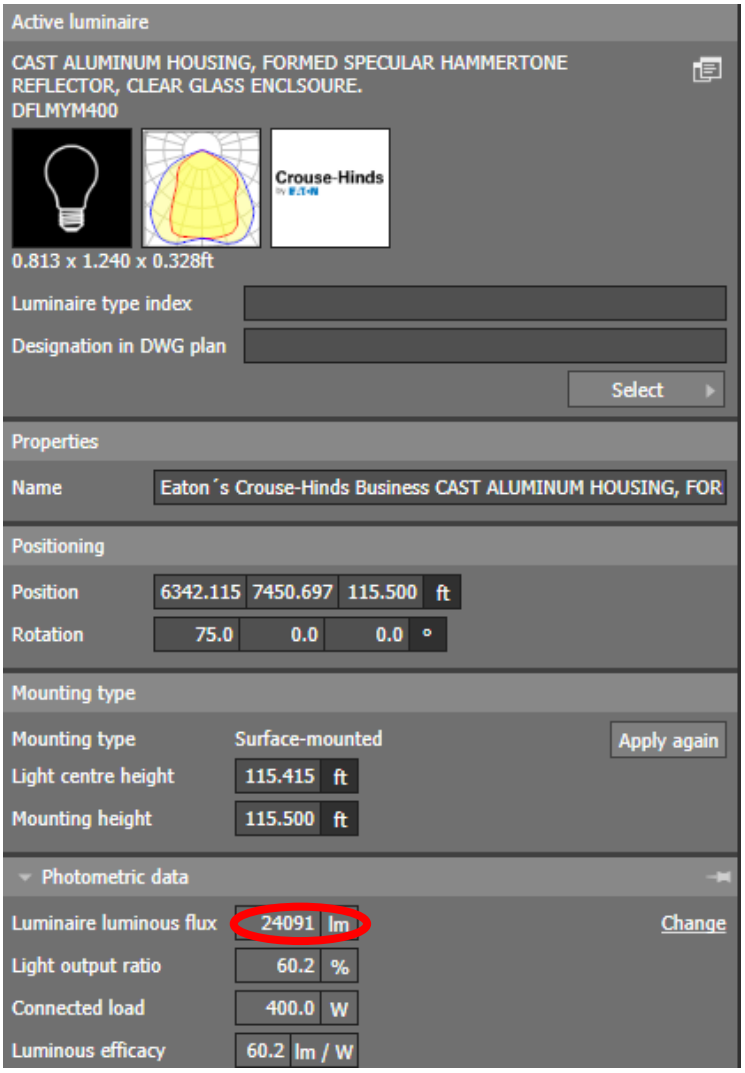


Bull horns – provided with 2 3/8" pole tenon

[B] Lamp is not included unless option 'L' is selected.
[C] Not available in the U.S.

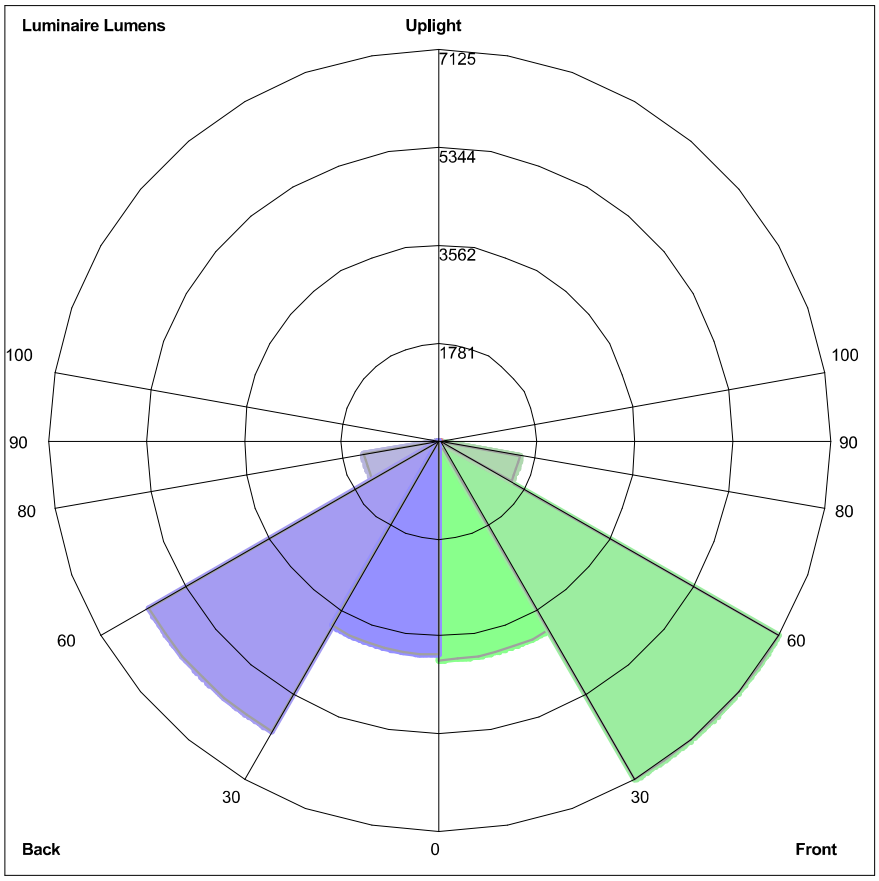
Pauluhn DFL HID
hazardous area floodlight

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

FIXTURE CUT SHEET TYPE C

Dialight

Dialight® LED High Bay & Low Bay

Technical Specification Sheet - Americas

FEBRUARY 2021

Vigilant® LED High Bay - UL / CSA

Corded Model & Integrated Wiring Box Model

Corded Model

Mechanical Information:

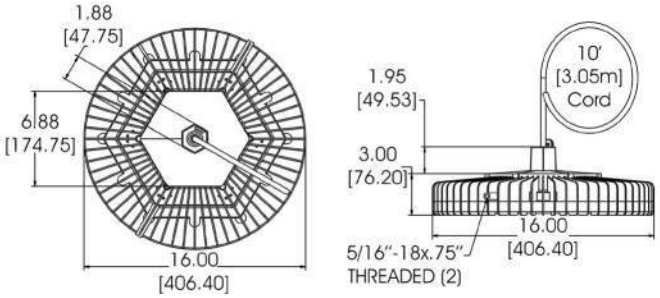
Fixture weight:
18 lbs (8.16kg)

Shipping weight:
24 lbs (10.8kg)

Mounting:
3/4" NPT - top
Various Kits

Power Cord:
10' 18 AWG STOOW

Patent pending



Integrated Wiring Box Model

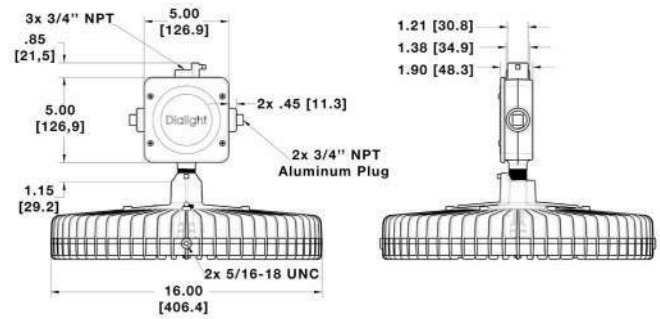
Mechanical Information:

Fixture weight:
20 lbs (9 kg)

Shipping weight:
26 lbs (12 kg)

Mounting:
3/4" NPT or Hook

Wiring Box Cable Entries:
(2x) 3/4" NPT



Dimensions in inches (mm)

Certifications & Ratings:

10 year warranty

UL 1598/A	CSA C22.2 No. 250.0-08
UL 8750	NEMA 4X
IP66/67	L70 rated for >150,000 hours

Variable Dimming:

Variable Dimming Control:	0-10 VDC
Dimming Range:	10 VDC = 100% light output 0 VDC = <10% light output

Occupancy Sensor:

Mounting Height:	Up to 40ft
Ingress Protection:	IP66

Electrical Specifications:

Operating Voltage:	100-277 VAC, 120-250 VDC 347-480 VAC
Total system power consumption:	See table
Operating Temp:	-40°F to +149°F (-40°C to+65°C)
Harmonics:	IEC 61000-3-2 Class C
Noise requirement /EMC:	FCC Title 47, Subpart B, Section 15, class A device. RF Immunity; 10V/m, 80MHz-1GHz
Transient protection:	100-277 VAC models tested to withstand up to 8kV/4kA per IEEE C62.41. 347-480 VAC models tested to withstand up to 6kV/3kA per IEEE C62.41
THD:	<20%
Power Factor:	>0.9
Fusing:	Internal

Construction:

Housing:	Copper free aluminum
Finish:	Superior dual coat finish Sealed polyester topcoat Chemical-resistant epoxy primer
Lens:	See table

Photometric Information:

CRI:	80
CCT:	5000K (cool white) 4000K (neutral white)

All values typical unless otherwise stated (tolerance +/- 10%)

Vigilant® LED High Bay - UL / CSA

Corded & Integrated Wiring Box

Project Information		
Part Number:		
Project:		
Fixture Type:		Date:

Specifications

Ordering Information

	-	U	-		-		-		-		-		-		-		-		-	N	-	G	-	N
Product Code		Cert.		Lens Material		Beam Dist.		CCT & CRI		Oper. Voltage		Lumen Type		Controls		Mounting Options		Power Cable		Elect. Access.		Coatings		No Option

Product Code

HC	High Bay Integrated Pendant Wiring Box
HE	High Bay 3/4" NPT

Certification

U	UL 1598/A, CSA

Lens Material

2	Acrylic - Clear (dry location only)
4	Polycarbonate - Clear
7	Glass - Clear
L	Polycarbonate Dome - Diffused
R	Power Wash Glass, Clear

Beam Distribution

E	Oval
M	Medium
N	Narrow
W	Wide

CCT & CRI

C	Cool White 5000K - 80 CRI
N	Neutral White 4000K - 80 CRI

Operating Voltage

2	100-277 VAC / 120-250 VDC
5	347-480 VAC

Lumen Type

A	11,600 Lumens
B	14,900 Lumens
C	19,800 Lumens
E	27,500 Lumens

Controls

D	Dimming (0-10V)
N	No Dimming (HE only)
M	Occupancy Sensor (HC only)

Mounting Options

H	Hook
N	Pendant 3/4" NPT
P	Pendant 3/4" NPT with Safety Retention Tabs
R	Safety Retention Tabs with Hook

Power Cable

N	No Cord (HC only)
W	10' [3 meter] Power Cable (HE only)

Electrical Accessories

N	No Plug

Coatings

G	Gray (RAL 7040)

Option

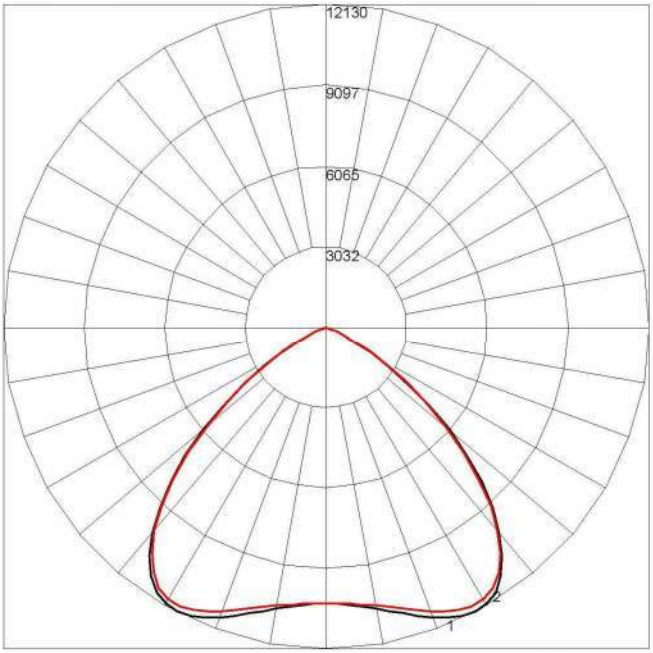
N	No Option

Notes
1) Lumen type based on using a glass lens. See tables for lumens when changing lenses.
2) When ordering occupancy sensor, use prefix **HC**.
3) When ordering option **HC**, Controls = (**D**) Dimming or (**M**) Occupancy Sensor.

Beam Distribution

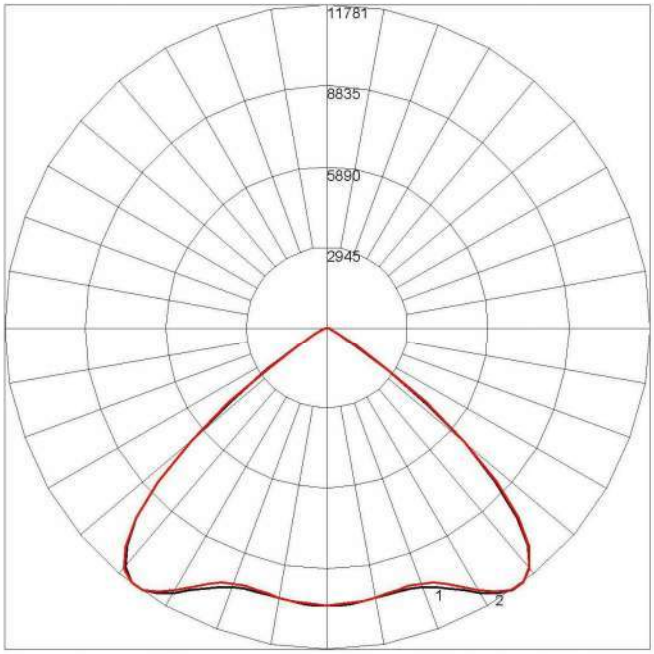
= 0°
= 90°

High Bay Medium



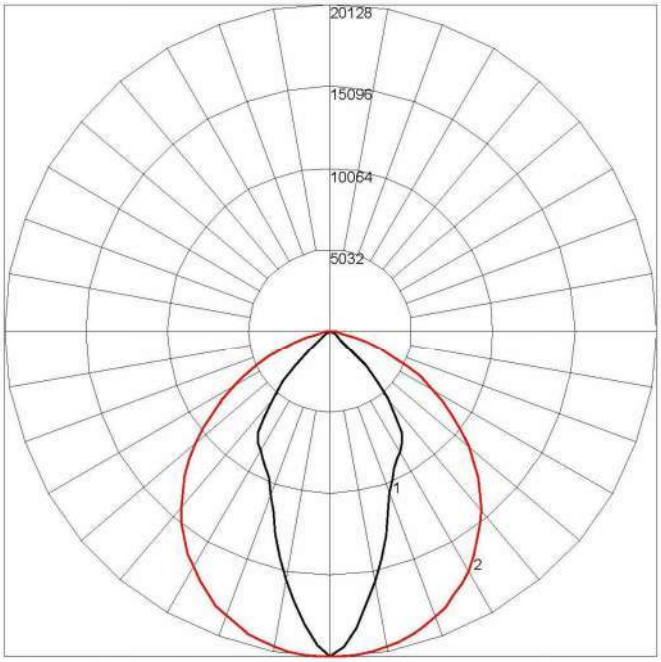
Maximum Candela = 12129.5 Located At Horizontal Angle = 0, Vertical Angle = 27.5
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

High Bay Wide



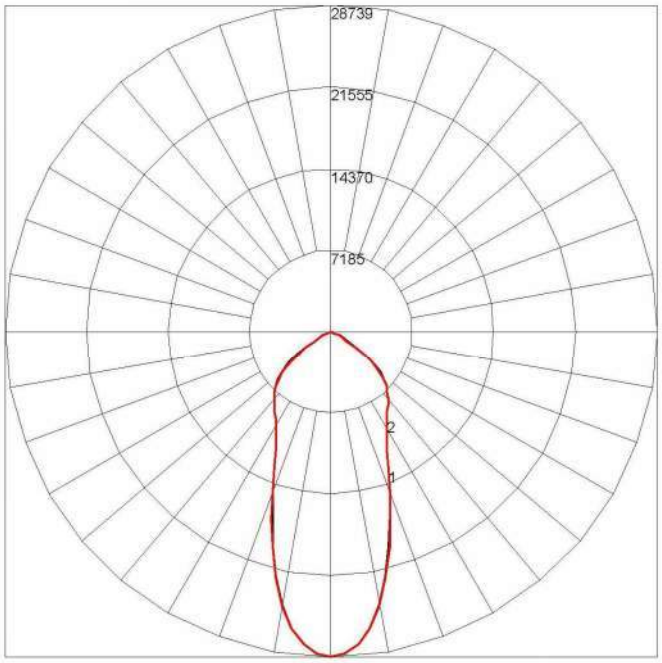
Maximum Candela = 11780.5 Located At Horizontal Angle = 90, Vertical Angle = 37.5
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

High Bay Oval



Maximum Candela = 20128.4 Located At Horizontal Angle = 85, Vertical Angle = 2.5
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

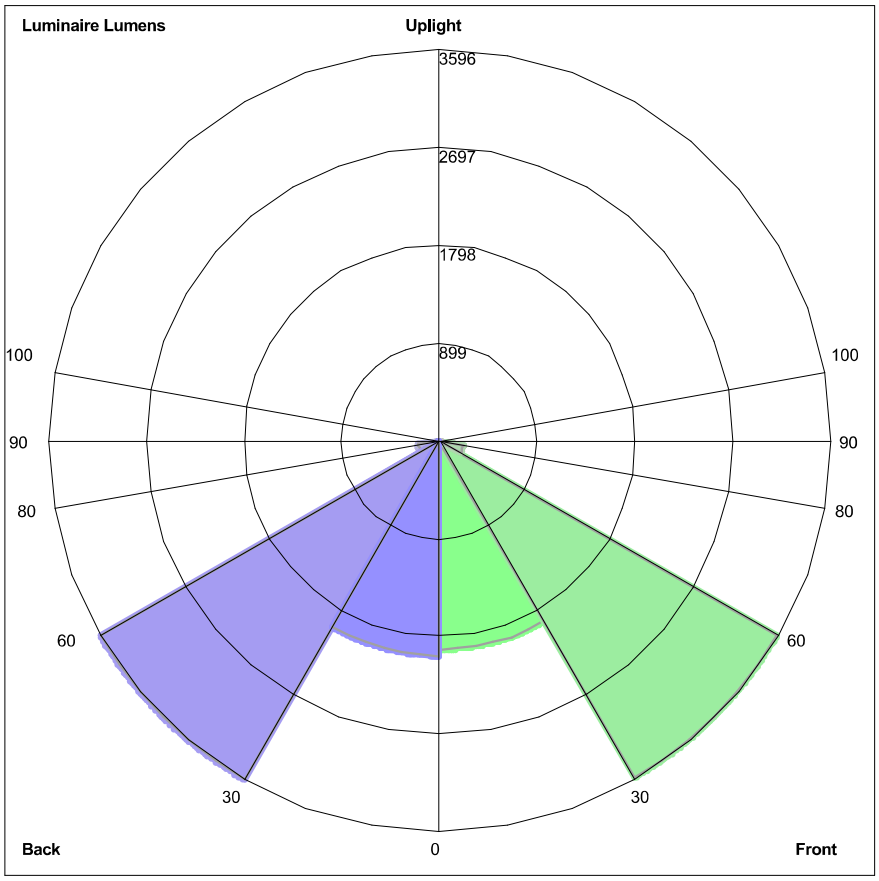
High Bay Narrow



Maximum Candela = 28739.4 Located At Horizontal Angle = 0, Vertical Angle = 0
1 - Vertical Plane Through Horizontal Angles (0 - 180)
2 - Vertical Plane Through Horizontal Angles (90 - 270)

IES ROAD REPORT
PHOTOMETRIC FILENAME : DIALIGHT - HXU4MC2AXXXXXX_VIGILANT LED HIGH BAY_UL_POLYCARB LENS_MEDIUM_CW_11500 LUMENS_2.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=1920.3, Medium=3580.5, High=221.0, Very High=4.4
Back: Low=1974.5, Medium=3596.1, High=199.5, Very High=3.8
Uplight: Low=0.0, High=0.0

BUG Rating : B3-U0-G0

FIXTURE CUT SHEET TYPE D

Notes for Type D.

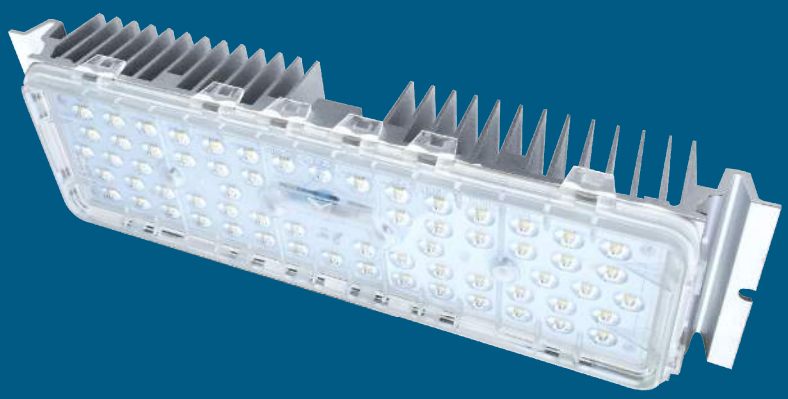
1. Type D fixtures are portable construction light towers with vertical masts. These units vary significantly depending on supplier, rental agency, inventory, and current market available fixtures. HP Winner M4 Model was selected for this analysis based on site inspections and current available units, 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 (Type D) indicated.

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

3. 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 15 degrees from horizontal (with 0 degrees indicates a fixture facing directly downward).

TYPE D Model
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	**49** 49PCS	**1324** Type II Short	**1325** 25 DEG	**7030:** Ra≥70, 3000K	**LU:** Lumileds
			C: PSE	**63** 63PCS	**2322** Type II Short (V)	**2360** 60 DEG	**8040:** Ra≥80, 4000K	**SN:** Sanan
			H: UL		**5321** Type II Short	**5340** 40 DEG	...	**XX:** Others
			X: Others		**2321** Type II Short	**5390** 90 DEG		
					1321 Type III Medium	**1310** Lambert Type		
						1390 Tunnel Lighting		

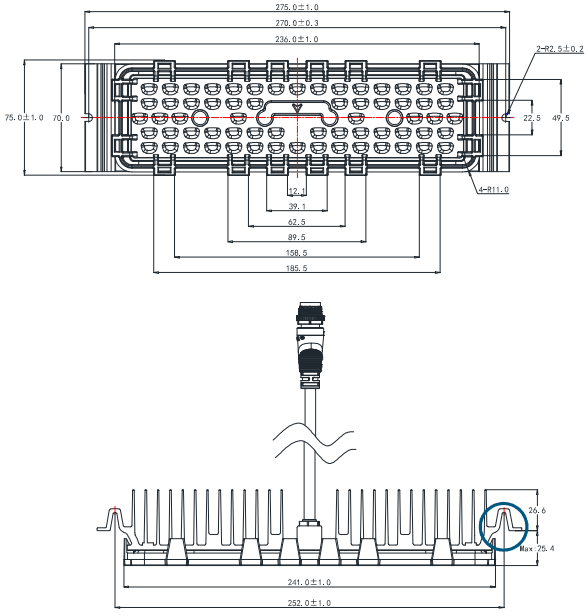
Performance

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.

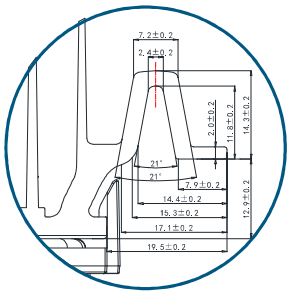
Dimensions



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

The height of the module is the maximum value.

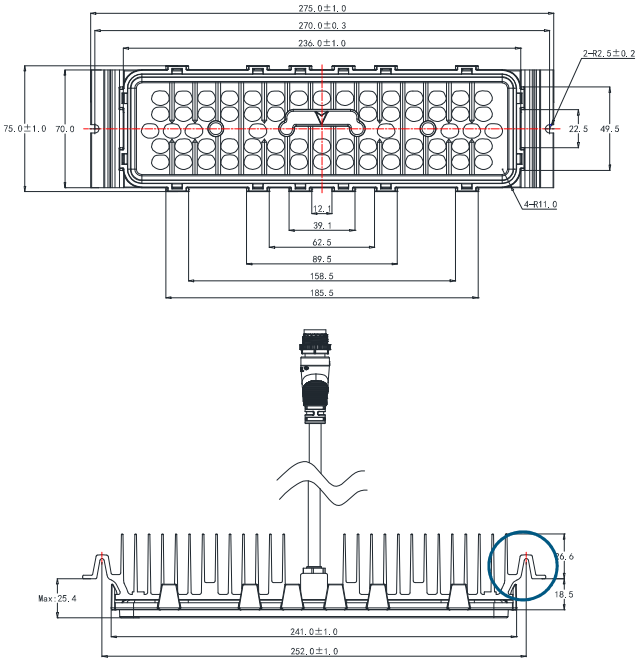
Tolerance: ±0.5mm



Available Lens Model

1321	1324	1390
1232	2322	5321

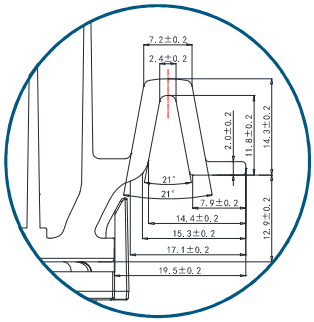
Dimensions



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

The height of the module is the maximum value.

Tolerance: ±0.5mm



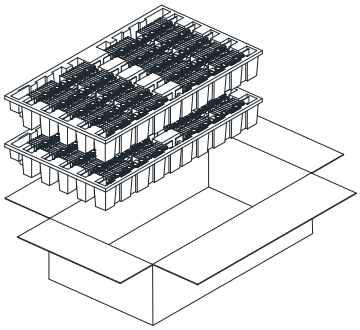
Available Lens Model

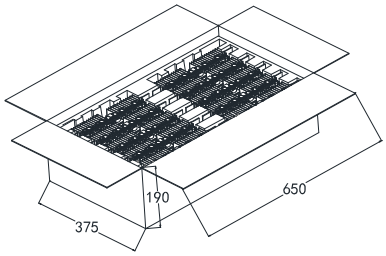
1310	1325	5340	2360
5390			

Package Information

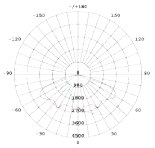
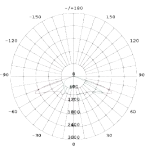
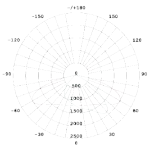
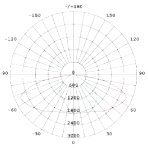
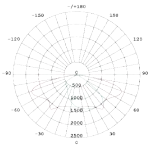
L (mm)	W (mm)	H (mm)	Module pcs/carton (PCS)	Package weight (kg)
650	375	190	20	14.9

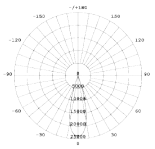
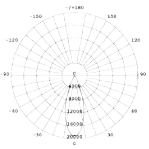
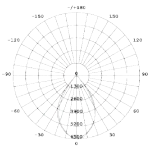
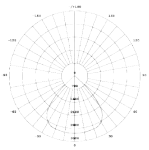
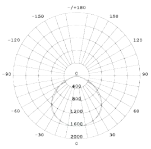
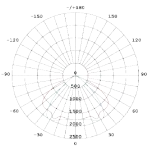
Values shown are subject to ±5% tolerance.





Lighting distributions

T2S1324	T2S(V)2322	T2S5321	T2S2321	T3M1321
				

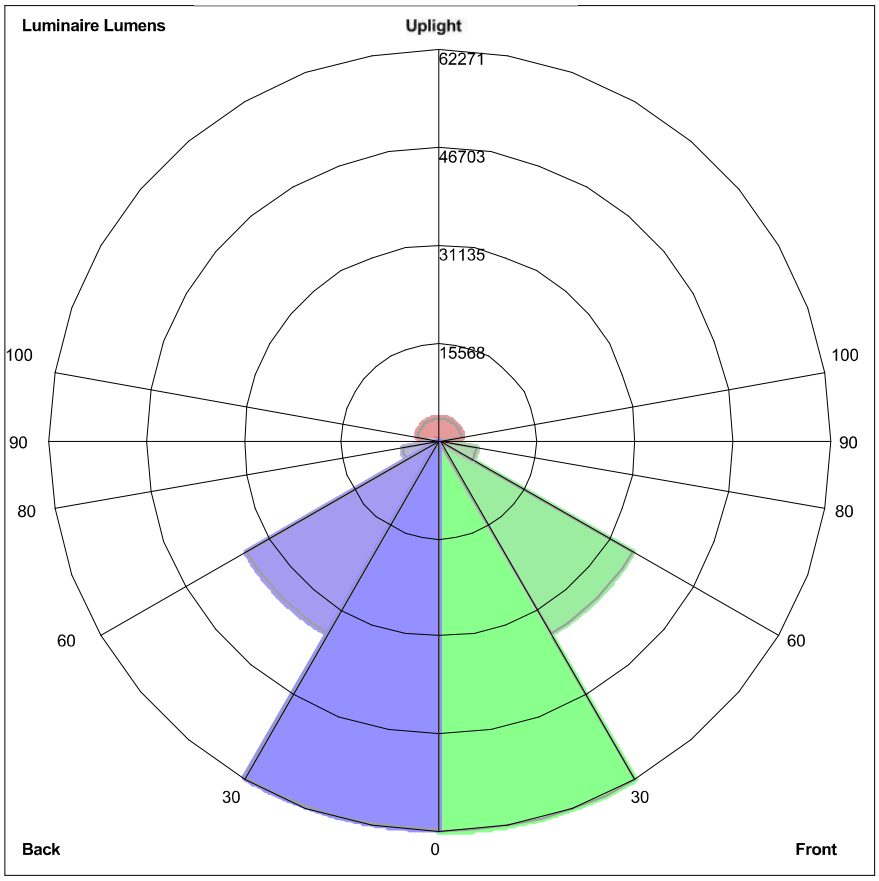
25D1325	40D5340	60D2360	90D5390	LBN1310	Tunnel lighting 1390
					

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

FIXTURE CUT SHEET TYPE E

Champ CPMV LED wall pack light fixtures

Cl. I, Div. 2, Groups A, B, C, D
Cl. II, Div. 1, Groups E, F, G
Cl. III & Simultaneous Presence

Marine & Wet Locations
NEMA 4X; IP66

NOTE: LIGHT FIXTURE IS USED EXCLUSIVELY FOR TASK LIGHTING WHEN REQUIRED FOR MAINTENANCE OPERATIONS AT NIGHT FOR SAFETY REASONS. OTHERWISE THESE LIGHTS ARE TO REMAIN OFF.

Rugged wall pack solutions.

Champ-Pak CPMV LED wall packs are engineered to provide maintenance-free illumination, long life and high performance in Class I, Division 2 areas.

The Champ CPMV LED is available from 3,000 to 7,000 lumens and is designed for extreme conditions and hazardous applications.

Model	Nominal lumens[A]	Watts	Lumens per watt	Equivalent MH luminaire
CPMV3L	3,400	30.6	111 Lm/W	70W
CPMV5L	5,200	44.8	116 Lm/W	100W
CPMV7L	6,800	58.9	115 Lm/W	150W-175W

Applications:

- Oil and gas refineries, drilling rigs, petrochemical facilities, food and beverage facilities, platforms, loading docks, tunnels, outdoor wall mounted general area lighting, and where flammable vapors, gases, ignitable dusts, fibers or flyings are present
- Locations requiring continuous and consistent light levels in extreme ambient temperatures
- Extremely corrosive, wet, dusty, hot and/or cold conditions
- NEMA 4X, marine, wet locations and hose down environments
- Classified and hazardous locations

Features:

- Engineered to perform in ambient temperatures from -40°C to +55°C
- Die cast aluminum LED housing provides efficient thermal path to heat sink assembly
- Vertical fin design facilitates air flow and dust shedding
- High efficiency provides up to 116 lumens per watt
- Type 4X rated
- Impact-resistant lens sealed to provide ingress protection against water and dust
- 60,000+ hours of operation at 55°C
- Contractor-friendly design is ideal for both retrofit and new construction
- Available with lever lock connectors
- Clear glass lens standard
- Optional lenses include diffused glass, clear polycarbonate or diffused polycarbonate

Certifications and compliances:

- DesignLights Consortium® Qualified (pending)

NEC/CEC:

- Class I, Division 2, Groups A, B, C, D
- Class II, Division 1, Groups E, F, G
- Class III & Simultaneous Presence
- Marine and wet locations, NEMA 4X, IP66

UL standards:

- UL844
- UL1598
- UL1598A
- UL8750

CSA standard:

- C22.2 No. 137

Standard materials:

- Fixture housing and door frame assembly – die cast aluminum
- External hardware – stainless steel
- Lens – clear glass (standard); diffused glass, clear polycarbonate, diffused polycarbonate (optional)
- Gasket – silicone

Standard finish:

- Aluminum – Corro-free epoxy powder coat

Photometrics:

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

Electrical ratings:

	120V		277V		347V		480V	
Model	Input power	Input amps	Input power	Input amps	Input power	Input amps	Input power	Input amps
CPMV3L	30.6	0.26	30.6	0.11	29.9	0.09	30.3	0.07
CPMV5L	44.8	0.37	43.9	0.16	43.3	0.13	43.7	0.09
CPMV7L	58.9	0.50	57.8	0.23	56.0	0.16	56.2	0.12

All models	
Voltage range, VAC	120-277V at 50/60 Hz, 347-480V at 60 Hz
Voltage range, VDC	125/250 VDC
Power factor	≥0.90
Surge	6kV standard
THD	≤ 20%
Dimming	0-10V

[A] Nominal lumens based on 5000K CCT with clear glass lens. Wattage measured at 120 VAC.

Ordering information:

Part number example
CPMV3LWY-UNV1-S891 PC1

CPMV 3L W _ Y -UNV1 -S891 PC1

Light source / intensity

3L	3,400 nominal lumens
5L	5,200 nominal lumens
7L	6,800 nominal lumens

Color temperature

C	5000K (cool white)
N[B]	4000K (neutral white)
W	3000K (warm white)

Optics

BLANK	White
R5	Narrow

Mounting

BLANK	Wall
H	Hub
Y	Yoke

Voltage

-UNV1	120-277 VAC, 50/60 Hz; 125/250 VDC
-UNV34	347-480 VAC, 60 Hz

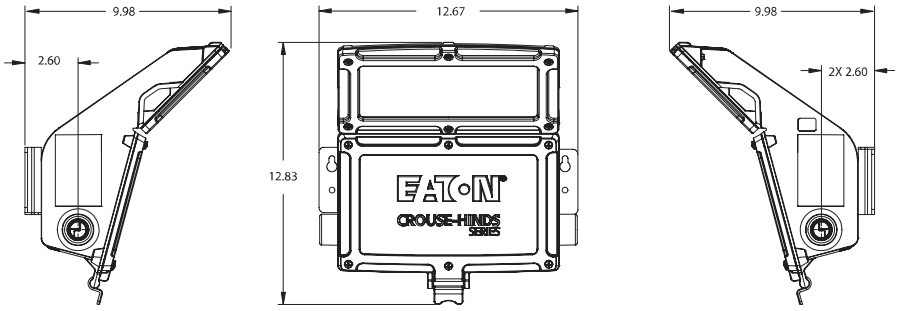
Lens material

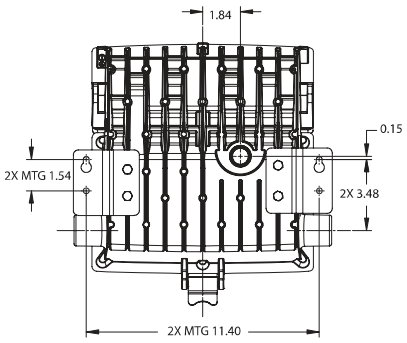
BLANK	Clear glass lens
S891	Diffused glass lens
S903	Clear polycarbonate
S903D	Diffused polycarbonate

Photocell[C]

PC1	120V
PC2	208-277V

Dimensions – standard wall mount:



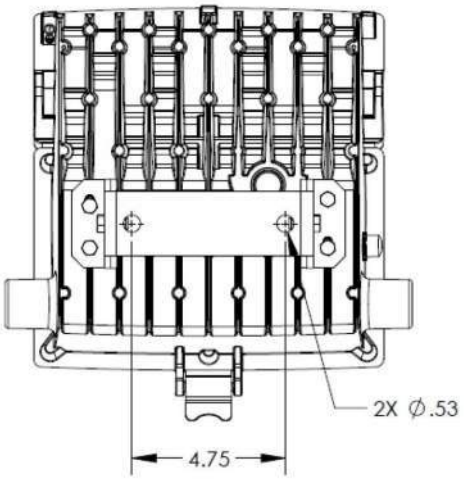


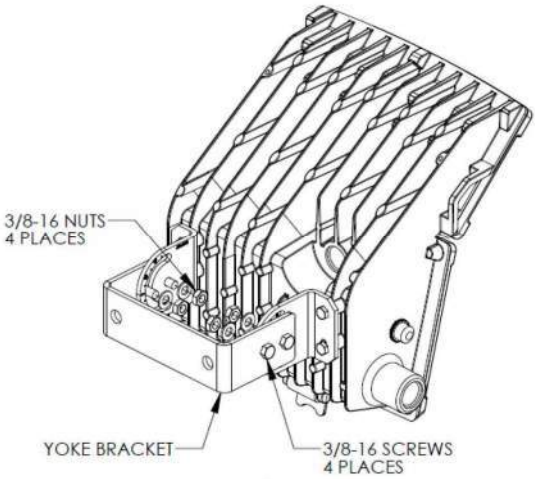
Temperature performance data:

Classified area	40°C	55°C
Class I, Division 2, Groups A, B, C, D	T5	T4A
Class II, Division 1, Groups E, F, G	T4A	T4A
Simultaneous Presence	T3	T3

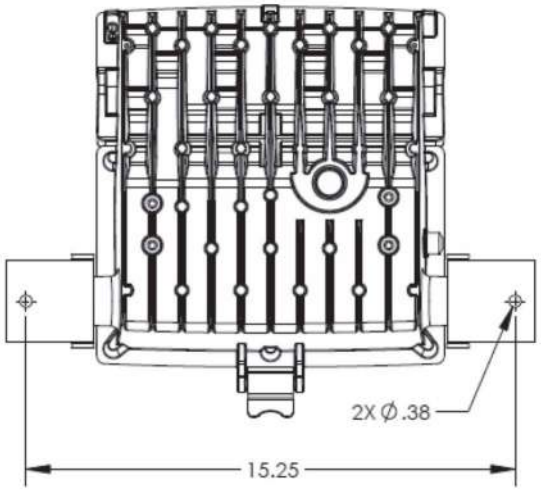
[B] Consult factory for availability.
[C] Class I, Division 2 only.

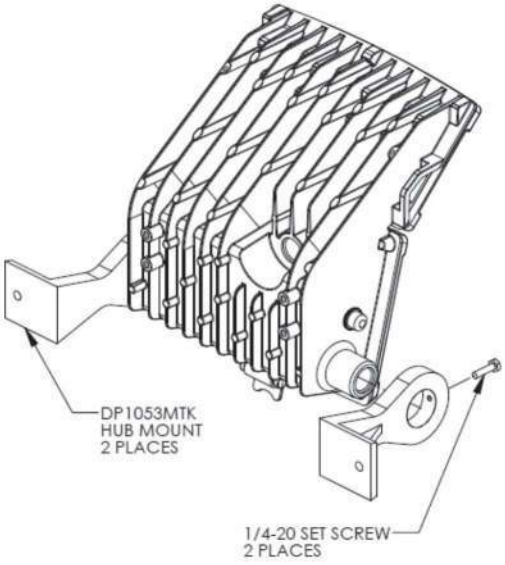
Dimensions – yoke mount:

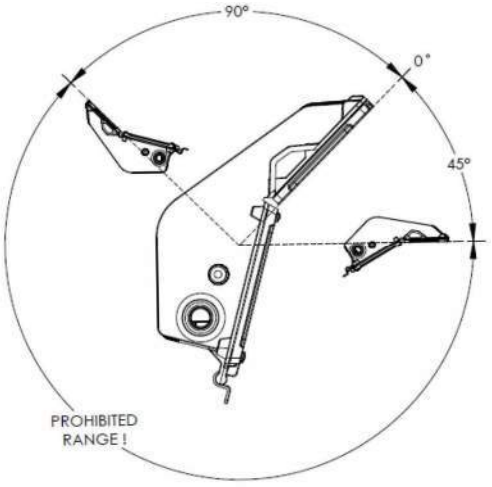




Dimensions – hub mount:







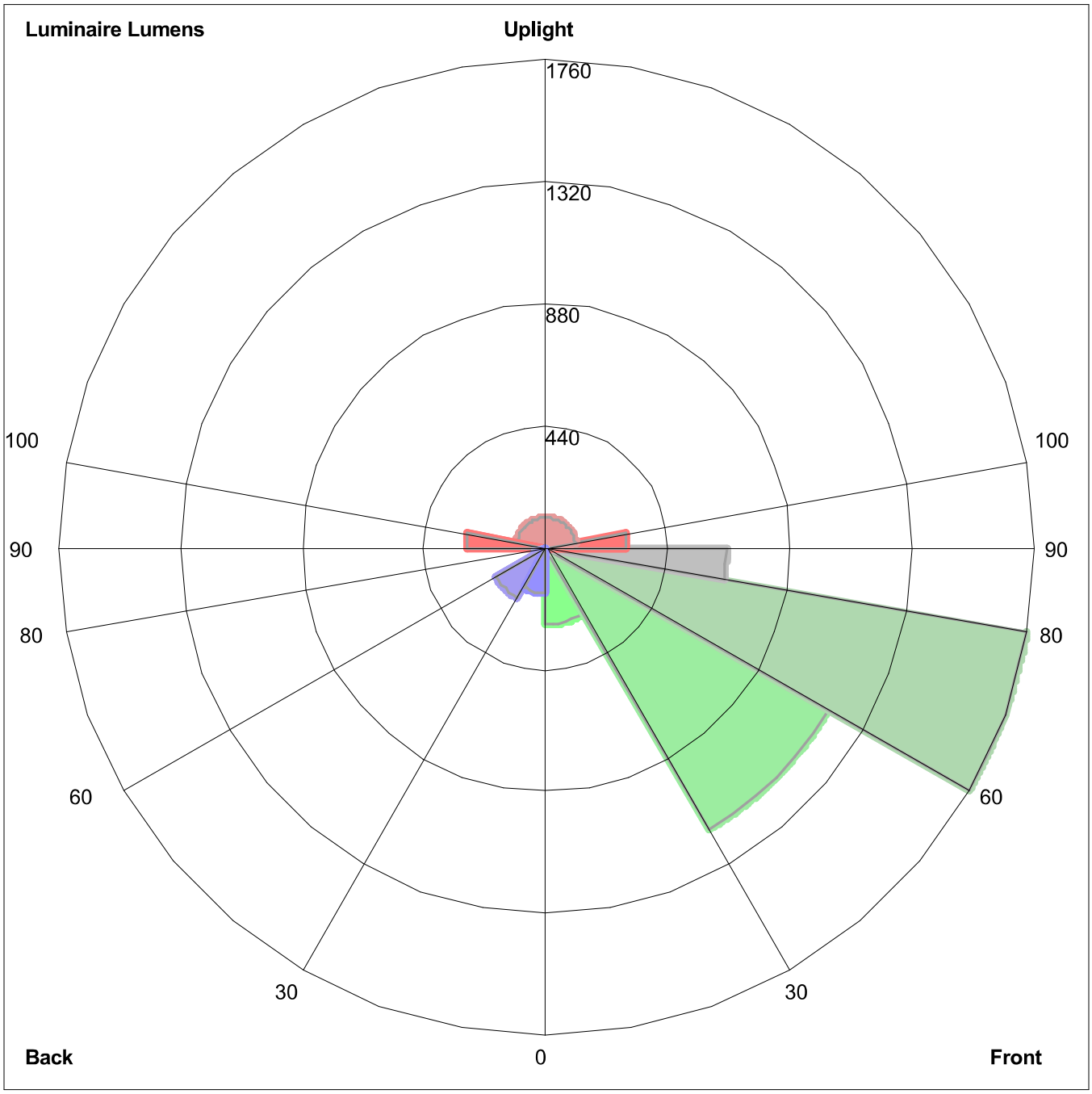
Mounting method	Angle range	Mounting surface
Wall (standard)	Fixed	Wall
Yoke	+45° to -90°	Wall, ceiling, horizontal surface/ground
Hub (DP1053MTK)	+45° to -90°	Wall, ceiling, horizontal surface/ground

Note: Class II, Division 1 and Simultaneous Presence Class I, Division 2 and Class II will be limited to 0° to +45° aiming range only.

NOTE: LIGHT FIXTURE IS USED EXCLUSIVELY FOR TASK LIGHTING WHEN REQUIRED FOR MAINTENANCE OPERATIONS AT NIGHT FOR SAFETY REASONS. OTHERWISE THESE LIGHTS ARE TO REMAIN OFF.

IES ROAD REPORT
PHOTOMETRIC FILENAME : CPMV5L-UNV1.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=276.3, Medium=1174.3, High=1760.1, Very High=651.1
Back: Low=163.6, Medium=209.0, High=46.0, Very High=0.9
Uplight: Low=288.6, High=107.5

BUG Rating : B1-U3-G4

FIXTURE CUT SHEET TYPE F

FXLED300SF

Ultra high output, high efficiency LED floodlight with NEMA Types: 7H x 6V, 6H x 4V, 4H x 6V, 5H x 5V and 3H x 3V. patent-pending "Air-Flow" technology ensures long LED and driver lifespan. Use for general and security lighting for large areas, building façades, signs and landscapes.

Color: Bronze

Weight: 66.1 lbs

Project:	**Type:**
Prepared By:	**Date:**

Driver Info

Type	Constant Current
120V	2.65A
208V	1.59A
240V	1.38A
277V	1.17A
Input Watts	325.9W

LED Info

Watts	300W
Color Temp	5000K (Cool)
Color Accuracy	72 CRI
L70 Lifespan	100,000 Hours
Lumens	45,171
Efficacy	138.6 lm/W

Technical Specifications

Compliance

UL Listed:

Suitable for wet locations. Suitable for ground mounting.

IESNA LM-79 & LM-80 Testing:

RAB LED luminaires and LED components have been tested by an independent laboratory in accordance with IESNA LM-79 and LM-80.

DLC Listed:

This product is listed by Design Lights Consortium (DLC) as an ultra-efficient premium product that qualifies for the highest tier of rebates from DLC Member Utilities. DLC Product Code: PF5PMFXJ

Optical

NEMA Type:

NEMA Beam Spread of 7H x 6V

Performance

Lifespan:

100,000-Hour LED lifespan based on IES LM-80 results and TM-21 calculations

Construction

IP Rating:

Ingress Protection rating of IP66 for dust and water

Maximum Ambient Temperature:

Suitable for use in up to 40°C (104°F)

Effective Projected Area:

EPA = 4

Cold Weather Starting:

Minimum starting temperature is -40°C (-40°F)

Thermal Management:

Superior thermal management with external "Air-Flow" fins

Lens:

Tempered glass lens

Housing:

Die-cast aluminum housing and door frame

Mounting:

Heavy-duty slipfitter for 2 3/8"OD pipe

Reflector:

Specular and semi-specular vacuum-metalized polycarbonate

Technical Specifications (continued)

Construction

Gaskets:

High-temperature silicone gaskets

Finish:

Formulated for high durability and long-lasting color

Green Technology:

Mercury and UV free. RoHS-compliant components.

Tilt Increment:

Rotates in 6 degree increments

LED Characteristics

LEDs:

Multip-chip, high-output, long-life LEDs

Color Consistency:

7-step MacAdam Ellipse binning to achieve consistent fixture-to-fixture color

Color Stability:

LED color temperature is warrantied to shift no more than 200K in color temperature over a 5-year period

Color Uniformity:

RAB's range of Correlated Color Temperature follows the guidelines of the American National Standard for Specifications for the Chromaticity of Solid State Lighting (SSL) Products, ANSI C78.377-2017.

Electrical

Drivers:

Constant Current, 1050mA, 50/60 Hz, 120-277V, 4 kV surge protection, 120V: 2.65A, 208V: 1.59A, 240V: 1.38A, 277V: 1.17A, THD <20%, Power Factor: 99%

THD:

9.26% at 120V, 12.56% at 277V

Power Factor:

99.3% at 120V, 96.6% at 277V

Note:

All values are typical (tolerance +/- 10%)

Other

Equivalency:

Equivalent to 1000W Metal Halide

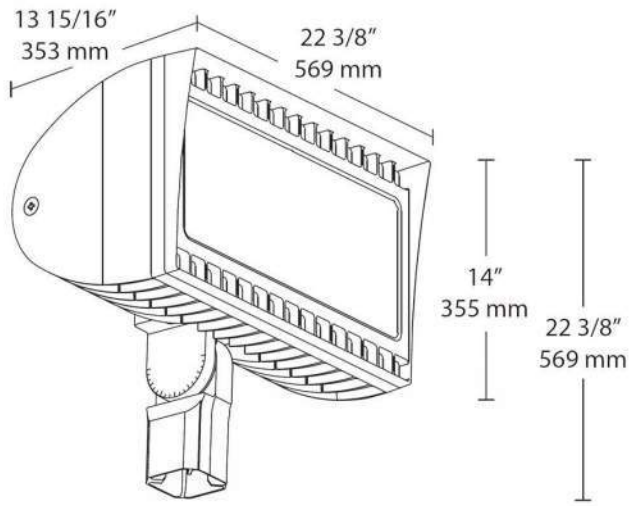
Warranty:

RAB warrants that our LED products will be free from defects in materials and workmanship for a period of five (5) years from the date of delivery to the end user, including coverage of light output, color stability, driver performance and fixture finish. RAB's warranty is subject to all terms and conditions found at rablighting.com/warranty.

Buy American Act Compliance:

RAB values USA manufacturing! Upon request, RAB may be able to manufacture this product to be compliant with the Buy American Act (BAA). Please contact customer service to request a quote for the product to be made BAA compliant.

Dimensions



Features

- 300W replaces 1000 MH floodlights
- 100,000-hour LED lifespan
- 5-Year, No-Compromise Warranty

FXLED300SF

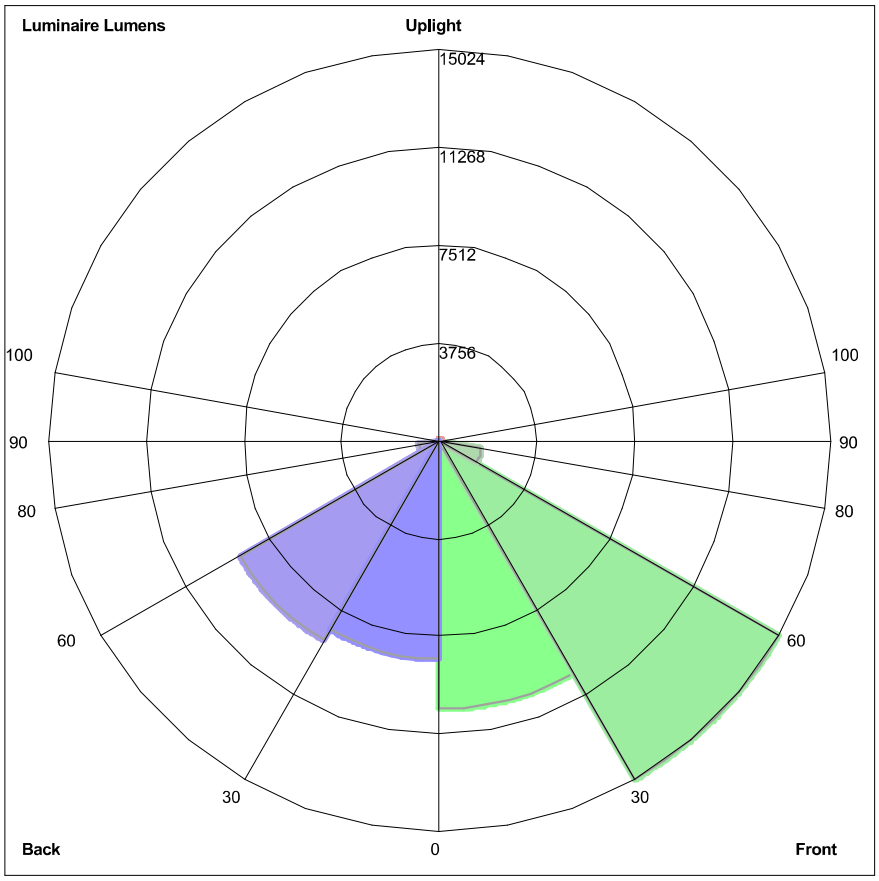
Ordering Matrix

Family	Wattage	Mounting	Color Temp	NEMA Type	Finish	Driver Options	Options	Other Options
FXLED	300	SF						
	200 = 200W **300** = 300W	**SF** = Slipfitter **T** = Trunnion	**Blank** = 5000K (Cool) **N** = 4000K (Neutral) **Y** = 3000K (Warm)	**Blank** = 7H x 6V **B64** = 6H x 4V **B55** = 5H x 5V **B33** = 3H x 3V **B46** = 4H x 6V	**Blank** = Bronze **W** = White	**Blank** = 120-277V **/480** = 480V **/BL** = Bi-Level (Slipfitters only) [1] **/D10** = 0-10V Dimming	**Blank** = No option **/PCS** = 120V Swivel **/PCS2** = 277V Swivel **/PCT** = 120-277V Twistlock **/PCT4** = 480V Twistlock **/PCS4** = 480V Swivel **/LC** = Lightcloud® Controller	**USA** = BAA Compliant **Blank** = Standard

[1] Slipfitter models only

IES ROAD REPORT
PHOTOMETRIC FILENAME : RAB FXLED300SF.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=10319.6, Medium=15024.4, High=1636.8, Very High=9.1
Back: Low= 8373.0, Medium=8865.3, High=802.5, Very High=9.9
Uplight: Low=0.9, High=61.0

BUG Rating : B5-U3-G2

FIXTURE CUT SHEET TYPE G

NOTE: LIGHT FIXTURE IS USED EXCLUSIVELY FOR TASK LIGHTING WHEN REQUIRED FOR MAINTENANCE OPERATIONS AT NIGHT FOR SAFETY REASONS. OTHERWISE THESE LIGHTS ARE TO REMAIN OFF.

Orbit Industries, Inc.

Type: _____ Date: _____
Job Name: _____
Contractor: _____
Catalog No.: _____
Notes: _____

LED WALLPACKS

LWP2-50W

Descriptions

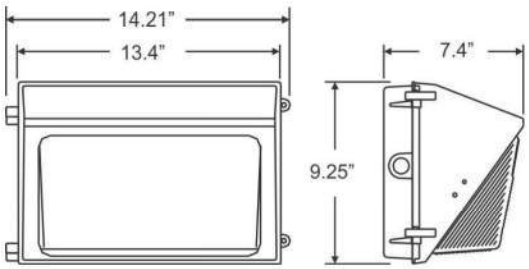
The LWP2 is a traditionally designed LED Wall Pack ideal for commercial areas such as retail centers, loading docks, or warehouses. Its low power consumption makes it a perfect choice for customers looking to upgrade technology while keeping the same classic motif. UL listed for Wet Locations. Photocell Optional.

LWP2-50W-CW

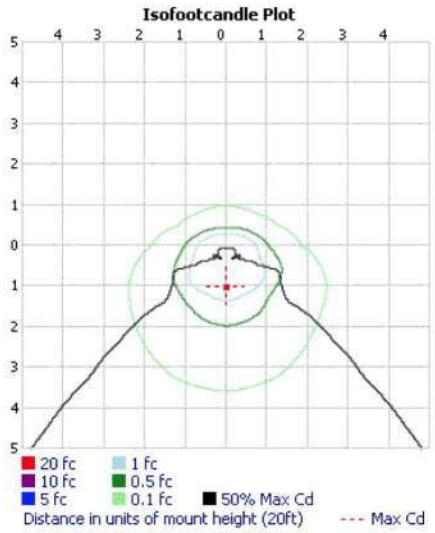
General Specifications

	Spec	LWP2-50W-CW
Electrical	Input Voltage	120~277V
	Input Power	50W
	Power Factor	> 0.9
Light Output	Total Lumens	5969 lm
	Efficacy	124 lm/W
	CRI	70+
	Color Temp.	5000K
	BUG	B1-U4-G4
	Distribution Type	TYPE IV Distribution
	Equivalent	175W
Physical	Housing	ADC12 Die Cast Aluminum
	Finish	UV Resistant Bronze Powder Coat Finish
	Lens Material	Prismatic borosilicate molded lens with weatherproof gasket
	Ambient Operating Temp	-20°C / -4°F to 40°C / 104°F
	Mount	Wall Mount
	Net Weight	3.65 KG
Other	Certification	cULus E335594; DLC 4.2

Dimensions



Photometrics



- LED Brand: **Philips Lumileds**
- Lifespan: **50,000 hrs**
- Warranty: **5 Year Limited Warranty**
- **UL listed for Wet Location**
- Beam Angle: **120°**
- Photocell Optional

Item No.	Description	Std. Pkg.
LWP2-50W-CW	LED WALL PACK 50W 120~277V 5000K CW - BRONZE	1

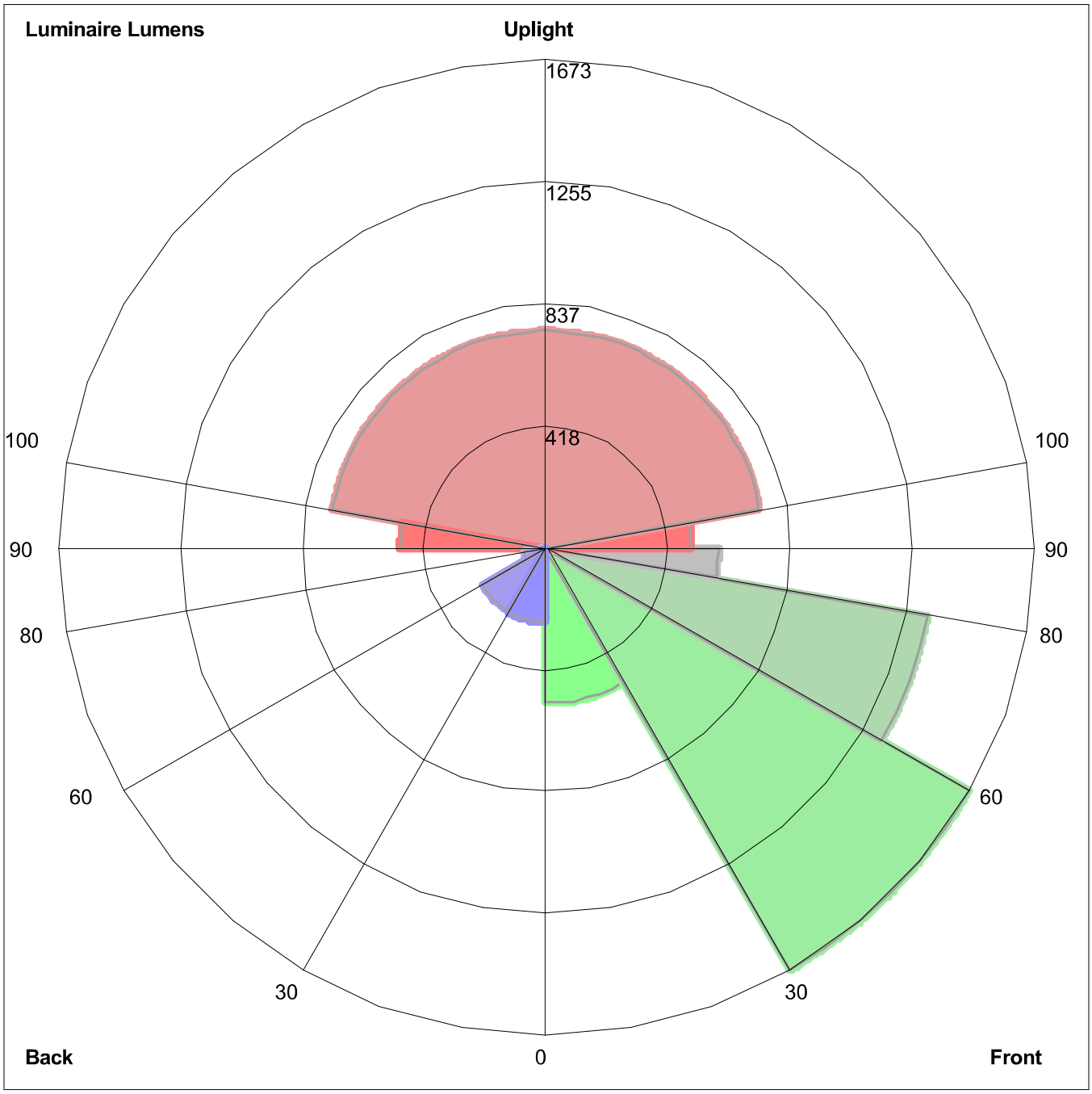
DESIGNED IN THE U.S.A.

1-800-90-ORBIT www.orbitelectric.com

NOTE: LIGHT FIXTURE IS USED EXCLUSIVELY FOR TASK LIGHTING WHEN REQUIRED FOR MAINTENANCE OPERATIONS AT NIGHT FOR SAFETY REASONS. OTHERWISE THESE LIGHTS ARE TO REMAIN OFF.

IES ROAD REPORT
PHOTOMETRIC FILENAME : LWP2-50W.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=533.6, Medium=1673.2, High= 1328.0, Very High=591.8
Back: Low=255.4, Medium=250.5, High=76.3, Very High=18.0
Uplight: Low=499.2, High=742.7

BUG Rating : B1-U4-G4

FIXTURE CUT SHEET TYPE H

Type H

Mounting: Vertical Green LED Heat Trace End Seal Kit

Mounting Height: Piping Height Varies.

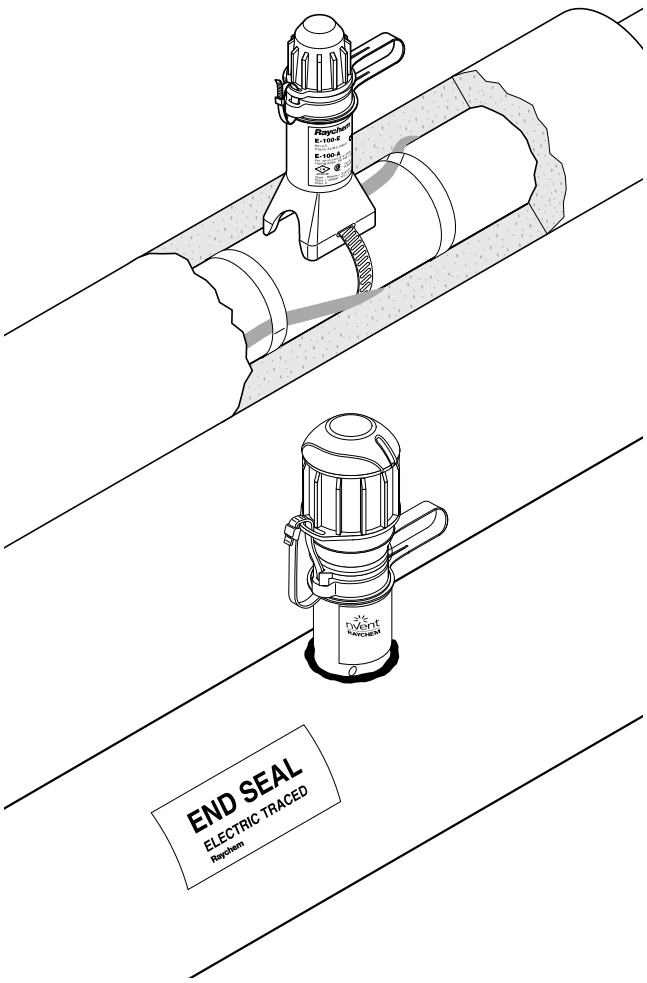
Part Number: E-100-L-A

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 1 cable tie 1 polywater sachet 1 installation instruction	1 end seal with indicator light 1 cable tie 1 polywater sachet 2 insulated parallel crimps 1 core sealer 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 Ⓔx II 2G Ex e II II 2D Ex tD A21 IP66 IECEx PTB 09.0038U Ex e II Ex tD A21 IP66 SP Ex e II T*	Sira 14ATEX3015X Ⓔx II 2GD Ex e mb IIC T* Gb Ex tb IIIC T***°C Db Ta = -40°C to +40°C IECEx SIR 14.0007X Ex e mb IIC T* Gb Ex tb IIIC T***°C Db Ta = -40°C to +40°C FM CLI, ZN1, AEx e mb IIC T* Gb (1) ZN21 AEx tb IIIC T* SP Ex e mb IIC T* Gb 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 Ex e IIC Gb U Ex tb IIIC Db U Ex e mb IIC Gb U Ex tb mb IIIC Db U Ta -55°C...+56°C IP66 ООО "ТехИмпорт"
EAC Ex	TC RU C-BE.МЮ62.B.00054/18 Ex e IIC Gb U Ex tb IIIC Db U Ex e mb IIC Gb U Ex tb mb IIIC Db U Ta -55°C...+56°C IP66 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. 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. 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 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

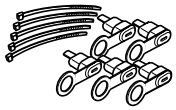
End seal		
Part description	E-100-E	E-100-L-E
PN (Weight)	101255-000 (0.22 kg) Requires one pipe strap (not supplied)	P000001583 (0.63 kg) Requires one pipe strap (not supplied) PTB, DNV and EAC approved product

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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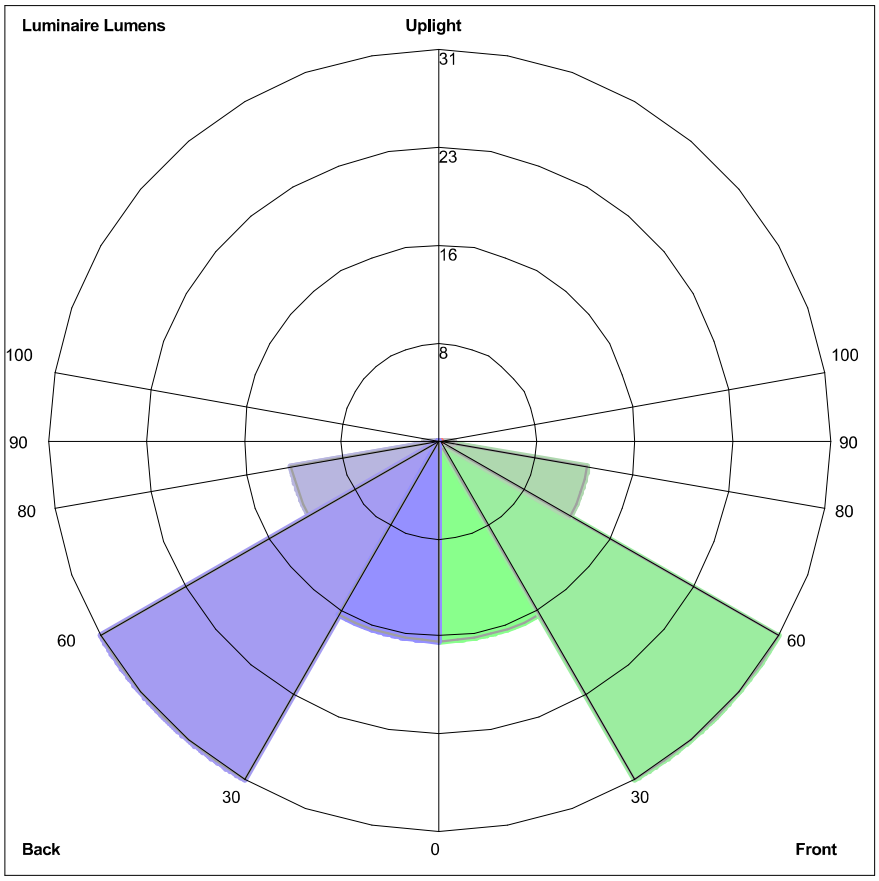
Fax +1.713.868.2333
thermal.info@nVent.com

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