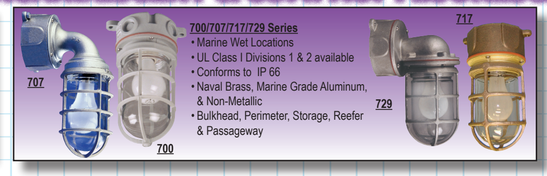
INCANDESCENT & COMPACT FLUORESCENT

1440/1449
- Marine Outside Type Saltwater
- Conformas to IP 66
- Cargo Hold/Pit Light

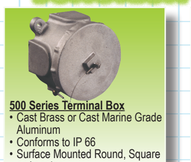


700/707/717/729 Series
- Marine Wet Locations
- UL Class I Divisions 1 & 2 available
- Conforms to IP 66
- Naval Brass, Marine Grade Aluminum, & Non-Metallic
- Bulkhead, Perimeter, Storage, Reefer & Passageway

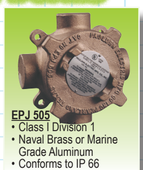
EP Series
- Incandescent
- Naval Brass
- Explosive Gas & Dust Areas
- UL Class I Divisions 1 & 2
- Conforms to IP 66
- Fuel Handling Areas

1017B
- Marine Inside Type
- Permanent Table Mount
- Polished Naval Brass Column

JUNCTION BOXES



500 Series Terminal Box
- Cast Brass or Cast Marine Grade Aluminum
- Conforms to IP 66
- Surface Mounted Round, Square or Angular



EPJ 505
- Class I Division 1
- Naval Brass or Marine Grade Aluminum
- Conforms to IP 66

HID, FLOODLIGHTS, INCANDESCENT & QUART HALOGEN

Quartz Light
- Stainless Steel or Marine Grade Aluminum
- Wet Locations
- Conforms to IP 66
- 300-1500W

HAZCOR Series
- Stainless Steel or Marine Grade Aluminum
- HID & Compact Fluorescent
- UL Class I Division 2
- Conforms to IP 66

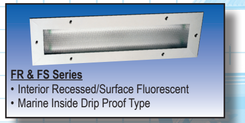
NHID
- Outside Flood Light
- UL Class I Division 2
- Conforms to IP 66
- Stainless Steel or Marine Grade Aluminum
- 150-1000W

RBF
- Outside Flood Light
- UL Class I Division 2/Zone 2
- Restricted Breathing T3
- IP 66 & IP 67
- Stainless Steel
- 150-400W

746 Series
- Flood Light
- Naval Brass or Marine Grade Aluminum
- UL Class I Division 2
- Conforms to IP 66

Downlight
- Marine Inside Drip Proof Type
- IP 45 with sealed diffuser
- Integral Vibration Dampening
- Low Profile

FRD & FDA Series
- FRD B-15 Fire Rating
- FRD Unique Design installs parallel or perpendicular
- Marine Inside Type



FR & FS Series
- Interior Recessed/Surface Fluorescent
- Marine Inside Drip Proof Type

FCM
- Cornice Mount
- Marine Inside Drip Proof Type

FLC
- Low Profile Mount
- Marine Inside Drip Proof Type

Pauluhn
A Full Package Supplier

Pauluhn Electric Manufacturing, LLP. has been synonymous with true marine grade lighting since 1923. It's what we do! Our designs are made to withstand the rigors of the marine industry and the great oceans of the world.

Pauluhn offers:

- *In-house engineering design, photometric layout and technical expertise.*
- *Materials specifically for use in corrosive and harsh environments.*
- *Custom designed and manufactured lampholders for use in luminaires that withstand the extreme vibration of marine environments.*
- *A 5 year warranty.*
- *A broad and experienced sales force and network.*
- *Approval with the American Bureau of Shipping for products and facility.*
- *U.S. Coast Guard vendor approved products.*

AREAS FOR PAULUHN LUMINAIRES & WIRING DEVICES

Hospital/Gymnasium/ Theatres/Recreation Areas
- FR
- FRD
- FT
- DOWNLIGHT
- FE215

Staterooms/Cabins
- FRD/FDA
- FR
- FT
- FN
- F1061/F1062

Engine Room/Workshops
- FAS/FPS/FSS
- FWFN

Heli-Port Deck
- FWN
- 1157
- 1158/1159

Galley/Mess Room
- DOWNLIGHT
- FRD/FDA
- FR
- FT

Food Storage/Store Rooms/ Lockers
- FPS
- 700 Series
- FF

Refrigeration
- 700 Series
- 1136/1140

Wheel House/Pilot House/Bridge
- FR
- FRD
- FT
- Downlight with optional Red Lens

Cargo Handling/Weather Deck
- RBF
- NHID
- 746
- QUARTZ

Entrances/ Passage Ways
- DOWNLIGHT
- FCM
- FRD/FDA
- FR
- IF/F17 Exit

Offices/Laundry
- FRD/FDA
- FR
- FT
- FCM

Battery Room/HVAC Room
- FEPR
- FPS-D2

Cargo Holds
- HAZCOR Series
- 1140
- FAS/FPS/FSS with T5 or Compact Fluorescent
- FWFN

Interior Switches/Receptacles
- 27
- 27B

Exterior Switches/Receptacles/Boxes
- 25/25B Series
- 26/26B Series
- 261/262/263/264
- 833/834
- 862
- 2100

Hazardous Areas
- HAZCOR Series
- RBF
- NHID
- FEPR
- 746D2
- FPSD2

Security Areas
- RBF
- NHID
- 746

FLUORESCENT & COMPACT FLUORESCENT

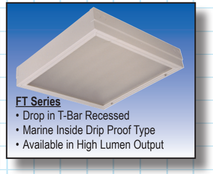
FWFN
- Stainless Steel or Marine Grade Aluminum
- UL Class I Division 2
- IP 66
- Stainless Steel Lens Frame and Latches
- Custom Manufactured Lampholders

FPS/FAS/FSS
- Glass Reinforced Polyester/Marine Grade Aluminum /Stainless Steel Housings
- UL Class I Division 2 Available
- IP 66
- Stainless Steel Latches
- Custom Manufactured Lampholders
- Cold Start

Image Courtesy of Totem Ocean Trailer Express.

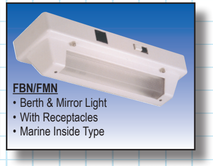
FEPR
- Naval Brass or Marine Grade Aluminum
- UL Class I Division 1
- Conforms to IP 66
- Explosive Gas & Dust Areas
- Field Replaceable Globe Assembly

FE215/FE28
- Desk & Chart Light
- Marine Inside Type



FT Series
- Drop in T-Bar Recessed
- Marine Inside Drip Proof Type
- Available in High Lumen Output

F1061 & F1062
- Berth & Mirror Light
- With Receptacles
- Marine Inside Type
- Adjustable Lamp Shade



FBN/FMN
- Berth & Mirror Light
- With Receptacles
- Marine Inside Type

FB Series
- Uniquely Designed Recessed Berth & Mirror Luminaire
- Marine Inside Type

IF & F17 Series
- Exit Lighting
- Inside Type

INTERIOR / DECORATIVE FLUORESCENT

833/834
- General Alarm Contact Maker
- Conforms to IP 66
- Type 4X

27B

Plugs, Receptacles & Switches **580**
- Interior & Exterior
- Naval Brass or Marine Grade Aluminum
- UL Class I Division 1 available
- Interior Drip Proof
- Exterior Wet Location

25B
- Corrosion Resistant Enclosures
- Heavy Naval Brass or Marine Grade Aluminum
- Type 4X
- Conforms to IP 66

PLUGS, RECEPTACLES & SWITCHES

1158D2
- Naval Brass or Cast Marine Grade Aluminum
- Helideck Marker Lighting
- UL Class I Division 2
- Type 4X
- Conforms to IP 66

1157D2
- Recessed Helideck Lighting
- UL Class I Division 2
- Conforms to IP 66

FWN-Helideck
- UL Class I Division 2
- Conforms to IP 66
- Wash Deck

STROBES, MARKER LIGHTS & BEACONS

Marine lighting has many unique requirements such as confined space, weight minimization, the ability to withstand shock and vibration, extreme temperatures, radio frequency interference, corrosion, and hazardous locations. We have developed the following recommendations by drawing from our considerable marine experience, along with the guidelines and standards published by IESNA, ANSI, API, and UL. ***These recommendations are intended for reference only and are not a substitute for professional engineering services.***

Marine & Offshore Lighting Levels

Task Areas	Foot-candles	Lux
Access and Casing	10 - 15	100 - 150
Baths	15 - 20	150 - 200
Battery/HVAC room (C1 D1)	15 - 20	150 - 200
Boiler rooms	15 - 20	150 - 200
Cabins and State rooms	10 - 15	100 - 150
Cargo holds	3 - 30	30 – 300
Chart room	15 – 20	150 – 200
Conference rooms	20 - 50	200 - 500
Control stations	20 – 30	200 – 300
Day rooms	15 – 20	150 – 200
Engine rooms	20 - 30	200 - 300
Fan rooms	10 - 15	100 - 150
Food storage	15 – 20	150 – 200
Galley	50 - 75	500 - 750
Gymnasiums	30 - 50	300 - 500

Task Areas	Foot-candles	Lux
Gyro room	15 - 20	150 - 200
Hospital, General/Dr's Office	30 – 50	300 – 500
Laundries	20 – 30	200 – 300
Lockers	10 - 15	100 - 150
Mess and Dining rooms	10 – 50	100 – 500
Motor rooms	15 - 30	150 - 300
Offices	15 – 20	150 – 200
Paint Booths	100 - 150	1000 - 1500
Passage ways and Entrances	8 - 15	80 – 150
Passenger/Service Counter	40 - 50	400 - 500
Pilothouse, Bridge	15 - 20	150 - 200
Pump room (C1 D2)	20 - 30	200 - 300
Radar room	15 - 20	150 -200
Radio room	50 - 75	500 - 750
Recreation Areas/Lounges	10 - 15	100 - 150

Task Areas	Foot-candles	Lux
Refrigerated spaces	8 - 10	80 - 100
Sculleries	20 - 30	200 - 300
Shaft alley	3 - 10	30 - 100
Shopping/Merchandising Areas	20 -150	200 - 1500
Stairs	15 - 20	150 - 200
Steering gear room	20 - 30	200 - 300
Store rooms	5 - 10	50 - 100
Switchboards	20 - 30	200 - 300
Thaw room	20 - 30	200 - 300
Theatre/Auditorium	0.1 – 10	1 – 100
Toilets	15 - 20	150 - 200
Trunks	5 - 8	50 - 80
Wards	10 – 15	100 – 150
Workshops/Machine Shops	20 – 30	200 – 300

Heliport Lighting

Pauluhn clients often reference either the API RP 2L or the CAP 437 as a guideline for offshore helidecks (see References). The following design recommendations are based on these two standards and Pauluhn experience:

- Delineate the heliport flight deck with **(A)**, visible from on or above the flight deck elevation.
- Spacing around the flight deck should be equal, and distance between individual marker lights should not exceed **(B)**.
- Light intensity should fall within **(C)**.
- Use a minimum number **(D)** of perimeter marker lights along each side with one in each corner.
- Mount lights no more than **(E)** above the deck surface.
- Install surface flush all lighting within the flight deck perimeter.
- All lights should include a guard, have no exposed wiring or cable, and be located so as not to themselves be an obstruction.
- To avoid dazzling the pilot, shield or otherwise aim floodlighting and other point light sources away from primary approach and departure flight path.
- Floodlighting should be capable of being switched off at the pilot's request.
- Obstructions:
  - Visually identify all potential flight path obstructions with omnidirectional red obstruction lights of at least **(F)**.
  - Install additional omnidirectional red obstruction lights at the top of any structure with an elevation that exceeds that of the flight deck by more than **(G)**.
  - Install additional obstruction lights at minimum intervals **(H)** down to the elevation of the fight deck, on multiple sides of the obstruction if necessary for visual indication from all directions.
- All flight deck, obstruction lights, heliport access and egress routes should be wired to an Uninterruptible Power Supply (UPS) in the event of loss of primary power.

	API RP 2L	CAP 437
(A) Omnidirectional Perimeter Lights	Alternating blue and yellow	Green
(B) Spacing	10 feet	3 meters
(C) Light Intensity	30-60 watts	60 cd max, main beam 30 cd
(D) Minimum Number	8	12
(E) Maximum Height	6"	0.25 meters
(F) Obstruction Lights	30 watts	10 cd
(G) Obstruction Height	50 feet	No minimum, all to be marked.
(H) Min. Obstruction Light Spacing	35 feet	10 meters

Security Lighting Considerations

Vessel or platform security lighting is an important consideration in many port facilities during approach and departure, and while such assets are docked or otherwise moored in a stationary location.

- Complete coverage of the waterline is recommended.
- Permanently affixed luminaires can be complimented with temporary or portable floodlights attached to perimeter railing.
- Floodlights mounted on the asset should be aimed away from the sentry's primary line of sight.

Pauluhn recommends the following minimum light levels be considered:

Area	Foot-candles	Notes
Open dock areas	5-20	Maintain 8:1 illuminance ratio, secure area to surrounding area.
Port buildings	5-20	Vertically on façade.
Vessel waterline	5-20	Adjacent to vessel at distance equal to fixture mounting height.
Perimeter fence	5	On ground and either side of fence.
Entrances	100+	On ground and in inspection area.
Gate houses	300	Dimmable at night.

NEC/CEC Types vs. IEC Ingress Protection (IP) Codes

Pauluhn luminaires and associated products are manufactured compliant with multiple standards, including UL1598A-Marine, American Bureau of Shipping, and NEC/CEC Type 4X, suitable for outdoor corrosive environments. Consult your Pauluhn catalog for more information.

NEC/CEC *Type*	IEC *IP Code*
1	IP10
2	IP11
3	IP54
3R	IP14
3S	IP54
4, 4X	IP56
5	IP52
6, 6P	IP67
12, 12K	IP52
13	IP54

References And Applicable Standards

- *Recommended Practice for Marine Lighting,* Publication No. RP-12-97, Illuminating Engineering Society of North America, 120 Wall Street, 17th Floor, New York, NY 10005
- *Cap 437 Offshore Helicopter Landing Areas - Guidance on Standards,* Flight Operations Department, Safety Regulation Group, Civil Aviation Authority, Aviation House,Gatwick Airport South, West Sussex, RH6 0YR
- *Recommended Practice for Design and Installation of Electrical Systems for Offshore Production Platforms,* Publication No. API RP 14F, American Petroleum Institute, 1220 L Street NW, Washington, DC 20005-4070
- *Recommended Practice for Planning, Designing and Constructing Heliports for Fixed Offshore Platforms,* Publication No. API RP 2L, American Petroleum Institute, 1220 L Street NW, Washington, DC 20005-4070
- *Supplemental Requirements for Luminaires for Installation on Marine Vessels,* UL1598A, Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096
- *Emergency Lighting and Power Equipment,* UL924, Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096
- *Design: Interior and Exterior Lighting and Controls, Unified Facilities Criteria* (UFC-3-530-01An), Department of Defense, Office of the Secretary of Defense (Public Affairs), Room 2E565 The Pentagon, 1400 Defense Pentagon, Washington, DC 20301-1400

United States:
1-800-826-5890
Ph. 281-412-3339
Fx: 281-412-9559
1616 North Main Street
Pearland, TX 77581

COOPER Crouse-Hinds PAULUHN
1-800-826-5890
www.pauluhn.com

Canada:
1-888-675-5483
Ph. 708-955-8097
Fx: 708-955-8754
1000 - 14th Avenue
Nisku, Alberta T9E 8J5

Lighting Solutions
For Harsh Marine Environments

For over 75 Years Pauluhn Electric Manufacturing, LLP has been providing marine, offshore and industrial lighting products with innovative solutions for hazardous locations and corrosive environments. Pauluhn is a leading supplier of a wide range of specialized area lighting and connecting products used in offshore and onshore drilling, shipbuilding, mining, petrochemical and other industrial applications involving harsh and corrosive environments.

For a comprehensive guide to Pauluhn fixtures and electrical devices please consult our catalog or visit us online at www.pauluhn.com.

ABS is a not-for-profit corporation whose mission is to serve the public interest as well as the needs of clients by promoting the security of life, property and the natural environment primarily through the development and verification of standards for the design, construction and operational maintenance of marine-related facilities. For more information visit the ABS website: www.eagle.org

UL Listing Mark: If a product carries this Mark, it has been certified by Underwriters Laboratories to meet certain safety requirements. These requirements are primarily based on UL's own published Standards for Safety. For more information visit the UL website: www.ul.com

CSA for the U.S. and Canada: A CSA mark with the indicators "C" and "US" or "NRTL/C" means that the product is certified for both the U.S. and Canadian markets, to the applicable U.S. and Canadian standards. If a product has features from more than one area, the mark indicates compliance to all applicable Standards. For more information visit the CSA website: www.csa-international.org

Represented/Distributed By:

COOPER Crouse-Hinds PAULUHN