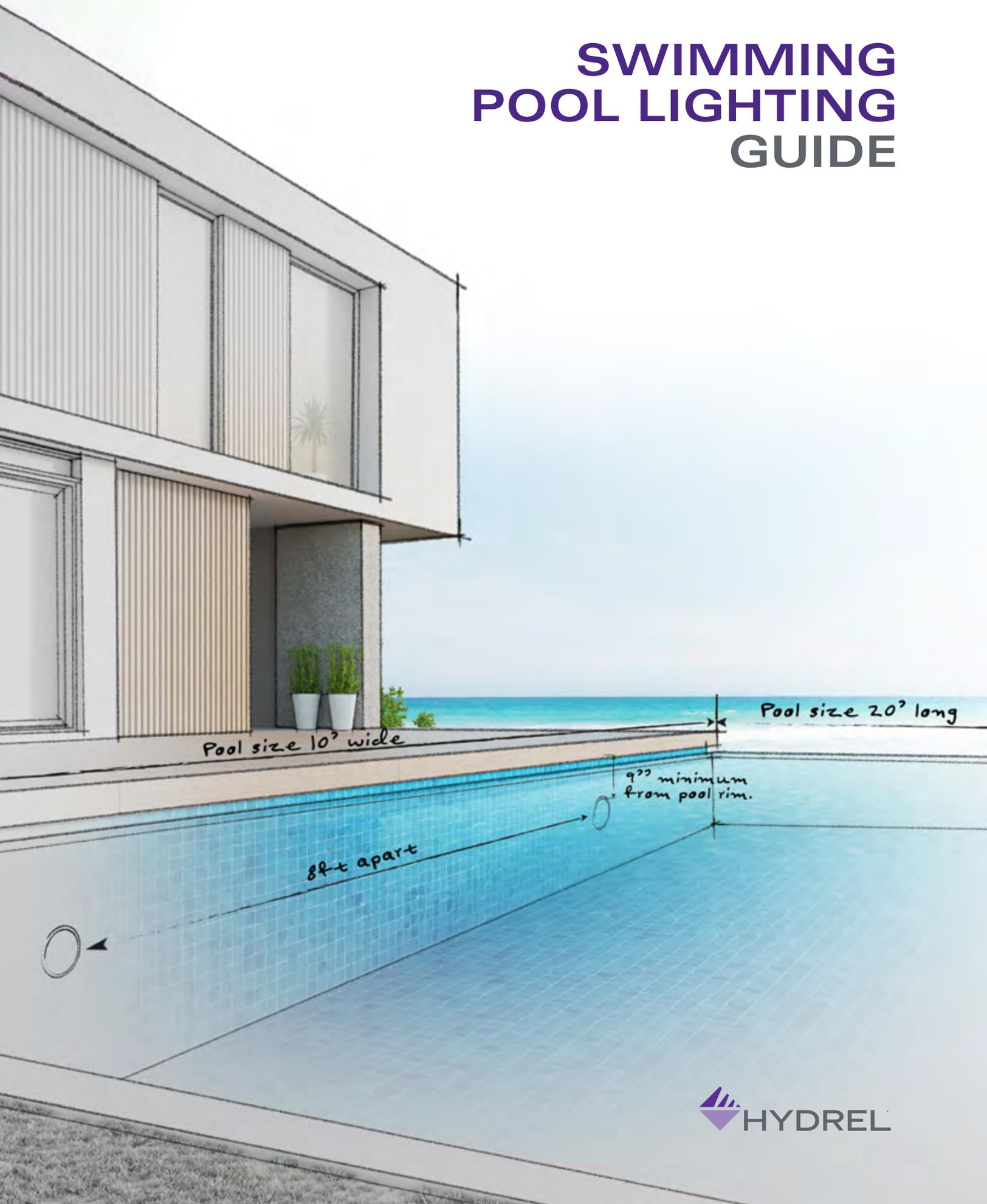


# SWIMMING POOL LIGHTING GUIDE



TURNING THE  
ORDINARY EVENING  
EXTRAORDINARY



Formula  
Pool Size: 12' x 32' = 384 sq ft  
(384 x 10 CPSF) / 1328 = 3 fixtures  
3840 / 1328 = 3 Fixtures  
The pool requires three 4800 LED, 554 Lumens

## ABOUT HYDREL

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Bringing people and communities together, Hydrel turns the ordinary evening extraordinary and makes icons iconic. It is a premier brand of outdoor architectural and landscape lighting products.

Committed to lighting performance for over six decades, Hydrel utilizes the most advanced sources and optics to create a wide variety of lighting effects. It incorporates innovative sealing capabilities, superior materials, and long-lasting finishes. The result – luminaires that withstand decades of use with minimal maintenance and unmatched structural integrity.

Combining today's smaller, more efficient sources with precision optical platforms, Hydrel achieves photometric performance seldom experienced in outdoor lighting – a soft, uniform illumination that is noticeably superior.

Visit at [www.hydrel.com](http://www.hydrel.com)





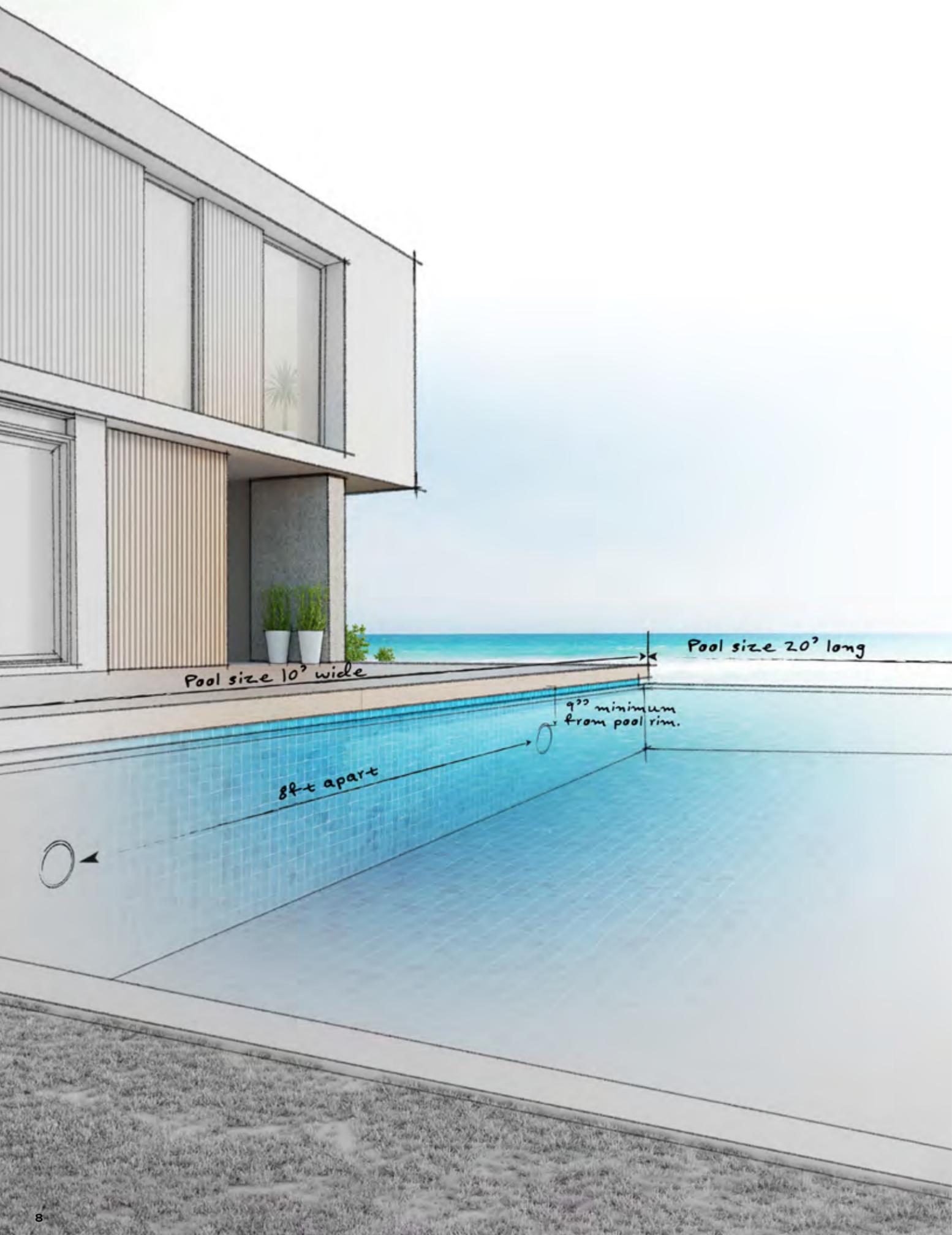
Formula  
28 ft long x 12 ft wide = 336 Sq Ft  
336 x 15 CPSF = 5040  
5040 / 1407 = 4 fixtures  
4 fixtures of 4421C, 54W, Wide Flood

## ABOUT THIS GUIDE

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This guide aims to provide recommendations, formulas and select swimming pool fixtures to help lighting designers and pool builders with lighting concepts to illuminate even the most complex pools. The guide is also updated to meet the growing demands for indoor and outdoor pools, and lighting is a cost-effective way to extend hours of play.

While this guide will make lumens to candelas conversion as easy as a day at the pool, we recommend working with a lighting designer to ensure safety and code compliance are met. Don't hesitate to contact us with further questions at [productsupport@hydrel.com](mailto:productsupport@hydrel.com).



## GENERAL LIGHTING PRINCIPLES

A lighting design aims to eliminate dark spots, avoid hot spots, and create a beautiful, even glow in the pool. As such, installing lower wattage lights is better than higher ones and although the total wattage will be similar, adding more lights helps create that desired, even glow throughout the pool.

Material finish, surface turbulence, water clarity and pool depth will all effect lighting characteristics. An initial concept plan created by a professional swimming pool lighting designer is highly recommended. Factors in deciding lighting placement and quantity are:

- Position of the residence or commercial building to the pool
- Size & shape of the pool
- Color of the pool finish
- Features
- Intended use

### Lighting Design Tips

- Rough and dark pool finishes require more fixtures and rounding up is recommended
- Wide flood or very wide flood are preferred by lighting designers as it ensures even distribution
- Increase lighting requirements when pool wall color is other than white
- For all pool application needs, contact Hydrel

## POOL UNDERWATER LIGHTS FAQ

There are no established methods of instrumentation to evaluate a light source underwater. The performance of underwater fixtures is always specified in terms of performance in air.

### What is a wet niche luminaire?

A luminaire intended for installation in a forming shell mounted in a pool or fountain structure where the luminaire will be surrounded by water.

### What is a niche mounted luminaire versus nicheless pool light?

Niche refers to the pool light housing. Niche-mounted pool lights are generally larger in size and require advanced planning for placement during the rebar installation phase. Fixtures without niche are smaller and don't require a niche or special accommodation with the rebar.

### Where are pool lights installed?

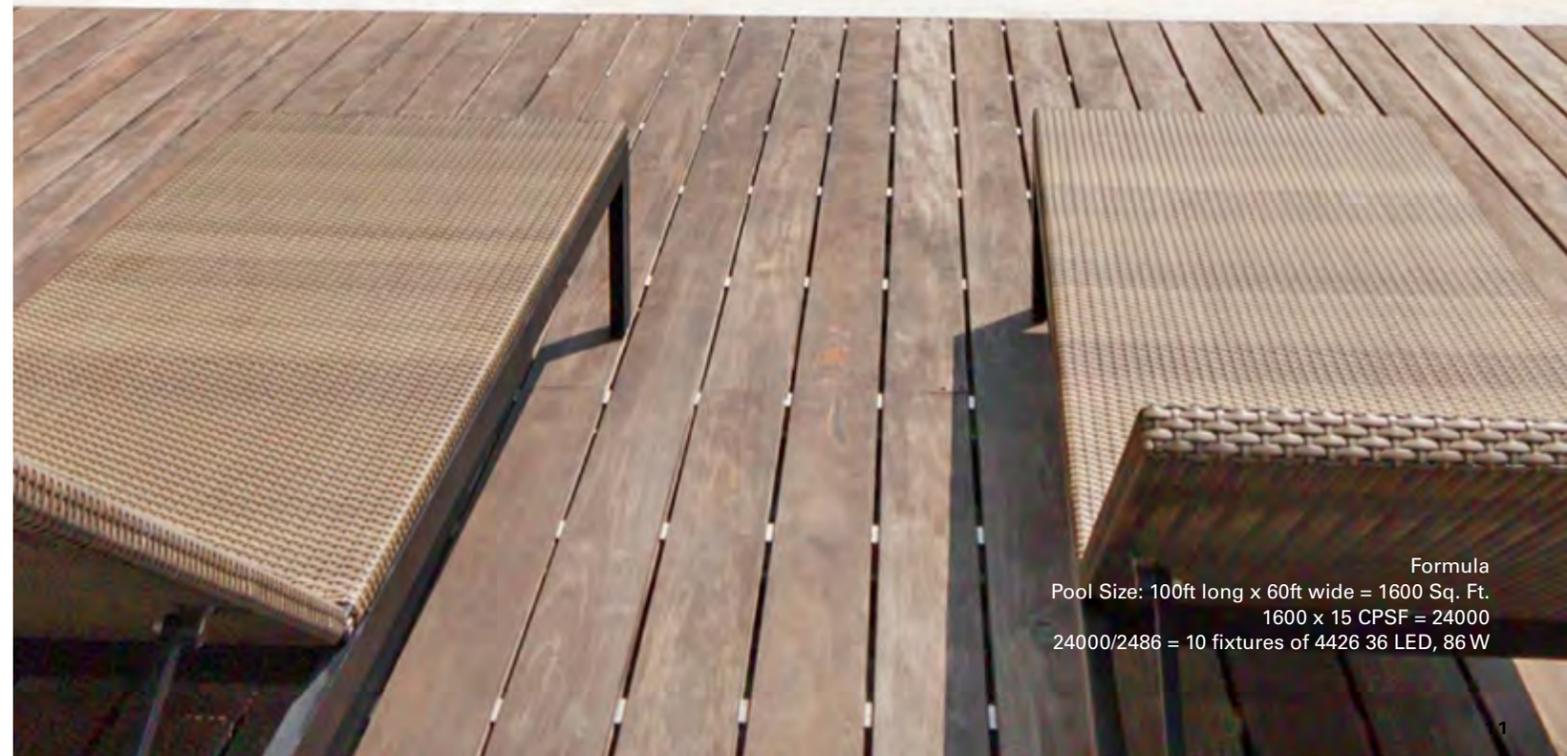
For residential installation, it is best to install underwater lights aimed away from the home. For hotel or commercial buildings due to the high traffic of guests, place lights at a uniform dept, generally between 9 to 12 inches below waterline and throughout the pool.

### How far apart should pool lights be?

Generally, it is one fixture for roughly every 8 feet of pool to allow even light distribution and ensures an even glow without hot spots or dark spaces. Example 32-foot-long pool would require 4 underwater lights.

### How deep should we install a pool light?

Section 680.23(A)(5) from the NEC addresses underwater luminaire location. It requires the luminaire to be at least 4 inches below the normal water level and not more than 18 inches below the normal water level. Work with knowledgeable pool designers to ensure a beautifully crafted and customized aquatic project.



Formula  
Pool Size: 100ft long x 60ft wide = 1600 Sq. Ft.  
1600 x 15 CPSF = 24000  
24000/2486 = 10 fixtures of 4426 36 LED, 86 W

# UNDERWATER POOL LIGHTING GUIDE

The following information will help to determine the lighting requirements for commercial swimming pools and wet-niche mounted fixtures. Use the LED Fixture Calculator to establish the number of fixtures and spacing required, based on the size of the pool and recommended candelas.

**INTERACTIVE CALCULATOR\*** \*Please use Adobe Acrobat or other applicable software to use the calculator.

**A: LED FIXTURE CALCULATOR**

Pool Length x Width OR Pool Total Sq. Ft. Required CPSF =  $\frac{\text{Pool Total Sq. Ft.} \times \text{Required CPSF}}{\text{Fixture Candelas}}$  = Fixt. Qty

Diagram showing the calculation: Pool Length x Width OR Pool Total Sq. Ft. Required CPSF =  $\frac{\text{Pool Total Sq. Ft.} \times \text{Required CPSF}}{\text{Fixture Candelas}}$  = Fixt. Qty

**B: SURFACE AREA CALCULATOR**

Pool Total Sq. Ft. Required CPSF =  $\frac{\text{Pool Total Sq. Ft.} \times \text{Required CPSF}}{\text{Fixture Candelas}}$  = Fixt. Qty

Diagram showing the calculation: Pool Total Sq. Ft. Required CPSF =  $\frac{\text{Pool Total Sq. Ft.} \times \text{Required CPSF}}{\text{Fixture Candelas}}$  = Fixt. Qty

Once the fixture quantity is known:

- Select the Hydrel swimming pool fixture from Table C that comes to meeting wattage requirements.
- Use the next highest wattage or increase the number of fixtures for in-between wattages.

**C: SWIMMING POOL FIXTURE**

Fixture	Wattage	Lumens	Candelas
4800 LED	9W	554 Lumens	1328
4426 18LED	44W	4357 Lumens	1270
4426 36LED	86W	8626 Lumens	2486
4421C	53.5W	5103 Lumens	1407

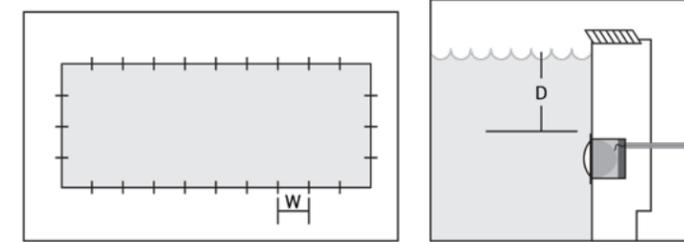
# RECOMMEND LUMINANCE AT POOL SURFACE

The following table shows the recommended luminance based on the pool water surface area with the candela per square foot (cpsf) needed for each application. It includes lighting applications for outdoor, indoor, commercial, residential and competition pools.

OUTDOOR & INDOOR POOLS	Recommended luminance @ pool surface (cpsf)	Max spacing pool depth over 5ft	Max spacing pool depth under 5ft	D" = Fixture depth below water
<b>*RESIDENTIAL:</b>	5 cpsf	14ft	16ft	18"
<b>*COMMERCIAL:</b>				
Hotel/motel/private clubs				
OUTDOOR POOL	5 cpsf	14ft	16ft	18"
<b>COMPETITION:</b>				
<b>CLASS I</b>				
INDOOR	35 cpsf	14ft	16ft	18"
<b>CLASS II</b>				
INDOOR	25 cpsf	14ft	16ft	18"
OUTDOOR POOL	15 cpsf	14ft	16ft	18"
<b>CLASS III</b>				
INDOOR	15 cpsf	14ft	16ft	18"
OUTDOOR POOL	10 cpsf	14ft	16ft	18"
<b>CLASS IV</b>				
INDOOR	15 cpsf	14ft	16ft	18"
OUTDOOR POOL	5 cpsf	14ft	16ft	18"
<b>DIVING POOL</b>				
INDOOR	35 cpsf	14 ft		18/36"

Based on Illuminating Engineering Society of North America RP-6 Pool

\*For indoor pools, increase Indoor by 1.25%



SWIMMING POOL

**Classification of Play**

<b>Class I:</b>	Facilities with spectator capacity over 5,000
<b>Class II:</b>	Facilities with spectator capacity under 5,000
<b>Class III:</b>	Facilities with some provision for spectators
<b>Class IV:</b>	Facilities with limited or no provision for spectators



Formula  
Pool Size: 35ft long x 60ft wide = 2100 Sq. Ft.  
2100 x 10 CPSF = 21000  
21000 / 2486 = 8 fixtures of 4426, 36 Watt LED

## CONTROLS SYSTEM DESIGN

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Knowing the basic principles of optimizing the performance of LED lighting makes all the difference in pool illumination. Control your pool lighting with a variety of options. Wet-niche fixtures are available in cool white to warm white and RGB.

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### On/Off Switch

- Place all lights on the same on/off circuit.
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### DMX/RDM Controller

- Control colored lights with the DMX512 Controller. The 4426 RGB has a DMX input. The RDM enabled DMX input permits easier and faster installation, and the LED board incorporates a microprocessor handling and communicating data such as Device ID, DMX Address, color, intensity, temperature, humidity, duty hours & status.
  - Each colored light can be controlled individually
  - All DMX wiring must follow the DMX512-A/RDM standard (ANSI E1.1). It must be daisy chained and terminated per the standard.
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### Transformer

- Always upsize the transformer with at least a 20% buffer to ensure it can handle surges. For example: if you're installing four 24-watt LED lights, use a 300-watt transformer instead of a 100-watt unit.

## RECOMMENDED DMX/RDM CONTROLLERS

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### EASYI™

**EasyI™ Solo:** Is a standalone entry-level controller enabling show creation and playback directly at the LCD touchscreen.

**EasyI™ Touch:** Control features an astronomic time clock for automating shows and expands the controller's features by accepting inputs from remote button stations, and button station contact closure inputs.

**EasyI™ Pro:** EasyI Pro is further enhanced by using EasyI Studio™ computer software to create multi-zone shows, and EasyI Pro features a 20-hour DMX512 capture from a theatrical console.

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### FRESCO

- Create and edit 36 lighting scenes including intensity, color, and color temperature
- Integral astronomic timeclock with battery backup for system scheduling
  - Direct DMX control for 1 universe (512 slots)
  - Internal Bluetooth® radio for wireless App control

# POOL FIXTURE GUIDE\*



**4421C LED SWM**

4421C is a static white, wet niche swimming pool fixture. The fixture will accentuate pools with breathtaking color temperatures, offering the latest LED innovations and advanced energy-saving technology.



**4426 LED SWM**

44- and 86- watt LED Niche Mount luminaire with superior lumen maintenance and optimized energy performance. Applicable for wet niche mounted fresh and saltwater swimming pool applications.



**4426 LED RGB SWM**

For dynamic color-changing pools, the 4426 RGB provides superior lumen maintenance and optimized energy performance for wet-niche-mounted swimming pools. RGBW is available as custom.



**4800 LED SWM**

The 4800 Series fixture is a wet niche-mounted pool light with temperature-sensing low water cut-off. The unit is smaller in size than conventional units. It uses 120- or 12-volt LED.

Material	Bronze	Bronze, Saltwater Bronze, Stainless Steel		Bronze, Stainless Steel
Lumens	Up to 5343	Up to 10985	Up to 10985	Up to 554
Wet Niche	✓	✓	✓	✓
Cord length	35'-120' of cord available in 5' increments			
4 color temperatures and 4 colors (white, blue, green, red, phosphor converted amber)		120 Volt	120 Volt	120 or 12 Volt
5 color temperatures via 12 VAC	✓			
Amber 590nm (Turtle-friendly)				✓
Wide number of dynamic color shows via 120 VAC operation			✓	
In-line Dimming (to 40%)		✓		✓
In-line Dimming (Dim to Dark)	✓			
Distribution	Flood	Narrow spot, Medium flood, Flood, Wide flood, Very wide flood (no optics), Horizontal spot, Horizontal flood	Narrow spot, Medium flood, Flood, Wide flood, Horizontal spot, Horizontal flood	Narrow Spot, Medium Flood
Accent lighting (water features, steps, shelves and more)	✓	✓	✓	✓
cCSAus listed, submersible luminaire suitable for swimming pools, certified to UL Standards UL-676 & UL-8750	✓	✓	✓	✓
Power Consumption	54W	18LED/44W and 36LED/86W		9W
Warranty	5 years	5 years	5 years	5 years
Pool Type	Commercial and Residential Pools   Gunite			
Pool Stage	New construction, Renovation or Replacement/Repair			

## LIGHTING CONTROLS AND TRANSFORMERS

Hydrel offers luminaires and lighting controls for maximum features and endless possibilities.

DMX/RDM			✓	
On/Off	✓	✓	✓	✓
Dimmer	✓	✓		✓
T1900 Isolated transformer				✓

\*Note: Performance color will vary based on color temperature and distribution. Please refer to spec sheets for complete product details.



Formula  
Pool Size: 75ft long x 28ft wide = 2100 Sq. Ft.  
2100 x 15 CPSF = 31500  
31500 / 1328 = 24 fixtures, 4800 LED, 9W, 554 Lumens

## **DISCLAIMER**

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Every effort has been made to ensure the accuracy of the above statements and formula. However, Hydrel makes no warranty to the accuracy of this information and cannot be held liable for any errors, problems, delays, or mistakes caused by such errors.

Please ensure that all underwater lighting projects are specified and installed per National Electric Code (NEC), Article 680 and all local codes. A qualified electrician should perform all electrical installations. Please consult a professional fountain or swimming pool lighting designer or Hydrel Technical Support for all your underwater lighting requirements.



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