Introduction Overview
LED Lighting, At-A-Glance, Case Studies, Custom and Solar
Since 1953, we’ve built our products to a superior standard of quality and craftsmanship, using only the finest raw materials and components available. We’ve also built our business to a superior standard of consistency and reliability. We inspect every piece we manufacture, multiple times, for fit and finish. Each of our designs is precision engineered, backed by ISO 9001 Certification. And our comprehensive warranties exceed industry standards. But that doesn’t entirely explain how we became the industry leader. There’s another important area where we excel.

**Service.**

Smart. Prompt. And flexible.

At Philips-Hadco, it has to be – because we provide the broadest selection of styles, finishes, and lamping options in the industry. Our superior service helps you navigate the choices and ensures that you’re getting just what you need. When you need it. Even if we have to custom design it.

When you light with Philips-Hadco, you can rest assured it’ll be done right. On time.

That’s why more and more architects and designers depend on Philips-Hadco. Because they know what they’ll get. Satisfaction.
The Philips Lighting Difference

We believe in creating innovative outdoor solutions that beautify and inspire, while making people safer and more comfortable. We believe that environmentally and socially sustainable lighting solutions improve the livability of our world’s cities, while respecting the planet. We believe that making outdoor spaces more sound, secure and engaging, enhances people’s lives.

The Total Philips System

By leveraging the global strength of Philips, we believe Philips Hadco can offer the most vertically integrated product from conception to final assembly including LEDs, platform designs, electronic drivers, and controls.

It is with this One-Philips philosophy that we can ensure our customers will receive the world class products and quality expected, and that these products will outlive those of our competitors.

And, we know you will not find another global company such as Philips with over a century of experience in producing quality lighting products to give you confidence in our designs.

Reliability

All Philips Hadco products are designed and manufactured to the very highest of quality standards in order to create the most reliable lighting products available on the market.

Our engineering and manufacturing facility located in South Central Pennsylvania is fully equipped with state-of-the-art equipment including:
- Photogoniometer
- Hot and cold test chambers
- CNC machine center
- Aluminum foundry
- Ingress protection (IP) testing
- Accelerated aging and UV testing
- Powder coat paint finish system

Innovation

Philips Hadco’s design team utilizes the latest innovations in engineering software to develop all of our new products. Every product is designed and tested first with 3-dimensional software to ensure that the LED manufacturer’s thermal specifications will be met and the products are structurally sound prior to tooling up for production. Not only does this improve speed-to-market, but it also allows engineers to create optimal designs for thermal management which is critical to the life of LED’s.

Who is Philips?

As the global leader in lighting, Philips is spearheading innovative and environmentally progressive solutions for today’s ever-changing demands.

For a century and counting, Philips has been one of the foremost providers of lighting technologies, enabling new and more efficient uses of light that can transform our world both visually and practically.

We’re proud to be a global leader in sustainability. Philips strives toward the ideal of meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.

The Philips family of products delivers complete lighting solutions, from components and lamps to luminaires and integrated systems, providing you with quality, simplicity and innovation.

The Philips Hadco Story

Philips Hadco has been a leader in manufacturing high-performance, exceptional quality lighting products for over 50 years. Philips Hadco serves the Municipal/Utility, Commercial and Residential lighting markets. Our lean, made-to-order philosophy and commitment to providing the lighting industry’s shortest lead times allows us to consistently meet our customers’ needs. Philips Hadco specializes in custom and modified products and utilizes the latest technologies available.

Made In America

Together, we can support your business and help build a stronger American economy. Philips Hadco is positioned to:

• Continue to expand our environmental corporate efforts in order to create a more sustainable future.
• Further our research and development activities to produce the most innovative products available.
• Sustain our business in America by supporting American investments along with workers and their families.

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LED Lighting

Why LED?

Energy Savings
Saving energy is an important factor for many communities and decision makers. LED lighting offers one of the highest energy savings of any lighting source on the market. In comparison to high-intensity discharge (HID) lamps, LED luminaires could save up to 50% in energy consumption.

Sustainability
What does Green really mean? Many think of it in terms of the degree to which we are preserving our planet. One way to accomplish this is to reduce our “carbon footprint”. The carbon footprint is thought of as the amount of carbon dioxide (CO₂) and greenhouse gases released into the atmosphere by human activity or a product lifecycle. By switching to LED, the amount of CO₂ emitted is drastically reduced. In addition, since LEDs are mercury-free and contain no hazardous materials they are environmentally safe and recyclable.

LED Basics
LED lighting is a paradigm shift in the outdoor lighting industry. An LED or Light Emitting Diode is a digital solid-state lighting component that does not need electrical filaments or gas to produce light. The result is a cool (in the beam), energy-efficient and reliable light source that provides at least 70,000 hours of crisp white illumination without the need for lamp maintenance.

How Light is Created
When sufficient voltage is applied to the LED’s semi-conductor chip, current flows and the electrons cross into the junction from the “N” region while holes cross into the junction from the “P” region (see diagram). The attraction of electrons to holes causes recombination. When the electrons recombine with the holes, electromagnetic energy is released as photons – what we see as visible light. The material of the chip and the phosphor used to create white light determines the wavelength of this energy.
LED Luminaire System Reliability

LED luminaires are complex digital systems. Reliability of the electronic components – the LEDs and the drivers – is crucial. So is the reliability of the other components used in the construction of LED luminaires. Overall system reliability also includes consideration of manufacturing and assembly processes (see diagram). The manufacture of the components themselves, soldering LEDs to PCBs, thermally and mechanically constructing thermal management sub-systems, and mechanical assembly from sub-assemblies to the final product are also key factors. Lastly, designing for varying operating environments – including ambient temperatures as well as moisture and dust intrusion – also contributes to the long reliable lifetime of LED luminaires.

Binning for Peak Performance and Consistency

Unlike traditional sources that use gas, LEDs are a solid state lighting source which means they produce light from a solid. The result is a continuous spectrum of light that enables better color rendering across the entire spectrum from cooler blues to neutral greens and yellows to warmer reds.

Starting with a substrate, LED chips are created by depositing layers. While this is a controlled process manufacturing tolerances still remain. Therefore, LEDs are evaluated and grouped in a process called binning. LED manufacturing is a high-speed process and no heat sinks are used so testing and binning occurs very quickly. LEDs are binned for their Correlated Color Temperature (CCT, or “color”) as well as their luminous flux (or “light output”) and forward voltage (Vf). We specify LED bins and account for binning in our LED luminaire design to ensure optimum performance while maintaining the consistency required for outdoor illumination.

Design for LED Luminaires is Critical

In addition to binning, long-term LED luminaire performance is also designed in. Validation of the entire luminaire system design is critical to ensure that the LED manufacturer’s junction temperature limit and the driver manufacturer’s case temperature limit are not exceeded.

Without proper thermal management, the promises of a long useful life (L70) and delivered lumens from an LED luminaire cannot be achieved and premature failure is eminent. We address these important aspects with innovative heat sinking and thermal management, designs that have been thoroughly tested ensuring the most reliable LED luminaire system available.

Benefits of good quality white light

1. White light creates atmosphere and makes our towns look more friendly and lively, and architecture more authentic.
2. White light makes streets feel safer – Drivers can recognize movements on the edge of the road earlier, and from greater distance, giving them more time to react.
3. White light contributes to a social feeling of safety and prevention of crime as it allows people to recognize faces and colors more easily. >80% feel safer with white light.

1 - Source: Chairman of Somusaguas Neighborhood Association, Madrid, Spain.
2 - Source: Lighting Research Center. 3 - Source: Administrative Board Neath Port Talbot, Wales, Great Britain.
At-A-Glance

Whether looking to revitalize economic growth and commerce, increase security in a specific area, or design an enjoyable outdoor space, Philips Hadco is the clear choice. Municipalities must think about more than just aesthetic appeal when selecting luminaires and site amenities. A sound investment, simple maintenance and good quality that lasts are equally as important. Philips Hadco’s line of products speaks to all of those concerns.
Post Tops At-A-Glance

- CS2
- CL32/CLS2
- CS105
- G35
- G63
- R32
- RL32/RL52
- R34/R54
- RL34/RL54
- R65
- V600/V602
- V651/V671/V681
- V70/V71/V72
- V8911/V8915
- UX1
- V102/V103
- V092
- V1503
- R34/R54
- RL32/RL52
- R65
- V2702/V2703/V4800
- R34/R54
- RL32/RL52
- R65
- V21/V25
- T03
- TT3/TT4/TT5
- TW3/TW4/TW5
Pendants At-A-Glance

- CF11/CF12
- CF14/CF15
- CF17/CF18
- CF2
- CF4
- CF5
- CF6
- CF7
- CF71
- CF72
- TF2
- TF3
- TF5
- TF8
- TF9

T14
T20
Arms At-A-Glance

Accessories / Landscape Lighting At-A-Glance

Accessories / Landscape Lighting At-A-Glance

Pier Base

Receptacle

Banner Arm Bracket

Flag Holder Bracket

Flower Pot Bracket

Tie Down Bracket

Button Eye Photocell

Button Eye Photocell

Receptacle

Receptacle

Ladder Rest

Post Adapter

Specification

Grade

Landscape Lighting

Please refer to the “Specification Grade Landscape Lighting” catalog for all of Philips Hadco’s offerings in this area.
Materials and Finishes

We send our products into punishing environments with confidence, because we build them...with the most rugged, high-performance materials available.

Alloys
We supply our proprietary aluminum ingots to our suppliers to keep a close eye on quality control and traceability. Our Philips Hadco-exclusive, low-copper alloys feature superior corrosion resistance, strength, weldability, and ductility. Formulated to resist oxidation, improve paint adhesion, and maximize performance.

Surfaces
We pre-treat every one of our fixtures with a five-stage cleaning process and we shot blast our poles and bases. These processes remove oxides and guarantee a uniform surface—creating a powerful bond between metal and paint that resists abuse, weather, and the effects of age.

Rigorous Testing
We put our materials up against the industry’s most challenging testing standards. And even under thoroughly abusive conditions—from accelerated weathering to salt-spray testing—our products retain their strength and durability.

TGIC Thermoset Polyester Powdercoat Paint and Finish
We electrostatically apply our resilient TGIC thermoset polyester powdercoat paint to every fixture. Specially formulated for Philips Hadco, it provides extended gloss retention, UV protection, and the highest temperature rating in the industry. In addition to the standard color choices shown, a spectrum of custom colors is available. Call or visit our website for more details.

Marine Grade Finishes Also Available
For fixtures and poles susceptible to the most extreme elements—salt, ocean water, or strong winds—our marine-grade finish guarantees extra protection against corrosion. We apply an epoxy primer undercoat to provide maximum bonding for adhesion with the top-color coat. Consult factory for more details.
Optics

Performance
Our dedication to using only state-of-the-art, precision optics means you can plan projects efficiently—knowing you’ll get just the results you need without extra fixtures, extra expense, or wasted light. With our wide variety of superior lamp options, ballasts, and controls—along with innovations like pulse-start metal halide, high-wattage compact fluorescent, LED and long-lasting induction lamps—Philips Hadco optics maximize your high-performance options while minimizing long-term operating costs.

Dark Sky Recommendations
With precise lighting products, specifications and controls, we give lighting designers and contractors the tools they need to follow industry best practices—to conserve energy, address safety concerns, and preserve the natural light environment.

Optical Assembly Types
Each fixture in this book has an Optical Assembly specification, which lets you know which “Type” optics are available for that fixture.

As you consider your options, think about what type of illumination you want your fixture to provide. Should the light go in all directions, or in a specific area? Are you lighting a large parking lot, or a narrow bike path?

The following illustrations show a bird’s-eye view of the approximate photometric pattern you can expect from each optical assembly type.

**Type I**
Recommended Application: Narrow walkways or bike paths.
Recommended Placement: At or near center of pathways.

**Type II**
Recommended Application: Wider walkways, entrance roadways, bike paths and other long and narrow lighting applications.
Recommended Placement: Near the side of roadways.

**Type III**
Recommended Application: Roadways, general parking areas, and other area lighting applications.
Recommended Placement: Near the side of roadways.

**Type IV**
Recommended Application: Wall mounting applications. Illuminating the perimeter of parking areas.
Recommended Placement: Near the side of the lit area.

**Type V**
Recommended Application: General parking and area lighting applications.
Recommended Placement: At or near the center of an intersection or in a large area.

**Forward Throw**
Recommended Application: Perimeter lighting applications for sharp house-side cutoff and minimal spill light.
Recommended Placement: At the building perimeter.

**BUG Rating**
BUG or Backlight, Uplight and Glare Ratings (based upon maximum zonal lumens)

- **A** Backlight 0° - 80° BL, BM and BH zones.
- **B** Uplight 80° forward light up and over the top of the fixture to 80° backlight in the UL, UH, FVH and BVH zones.
- **C** Glare is downward light from 80° forward down and under the fixture to 80° backlight in the FH, FVH, BH and BVH zones.

Optics
Properly placed post-top fixtures provide much more than embellishment; they also serve as beacons to direct visitors to main points of entry. Shown: New Oxford V022, Pole P2165.

In the types of high-traffic locations traditionally lit with cobraheads, our Teardrop fixtures offer an affordable alternative... adding character. Shown: Teardrop TF1.

Our wide variety of Teardrops and Bollards allows you to create your own ensemble—a hardworking, easy-to-maintain system that provides security while accenting its environment. Shown: Teardrop TF3, Pole P195, Arm HFP510 and Bollard CF73.

Consider our Traditional Post-Top fixtures for duty around public-accessible rooftop areas that require lighting for safety; these areas present a perfect opportunity to accent architecture. Shown: Mini Hagerstown V031.

In the Traditional Post-Top installation at right shows an effective approach to providing safety and function—using a daytime profile that harmonizes with its surroundings, with an optically correct nighttime presence that won’t overwhelm the atmosphere with wasted light.

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HID technology requires multiple re-lampings, has a poor CRI, a longer warm-up time and a shorter life than LED.

Shown: RL54 HID

LED technology is proven to be more energy efficient and have a much longer life vs HID. LED allows for lower maintenance costs, higher CRI, crisp white light, instant on and off.

Shown: RL54 LED

A full line of wall mount brackets and arm brackets is available to keep a common theme across an entire application.

Our custom engineering department can help you create unique designs that fit your specific application requirements.

Shown: Teardrop TF9 with custom mounting

In the types of high-traffic locations traditionally lit with cobraheads, our Teardrop fixtures offer an affordable alternative.

Shown: Teardrop TF9
New Brunswick, New Jersey

The City of New Brunswick, considering the revitalization of their streetscape lighting, began to evaluate energy-efficient products. As part of that process, they explored their streetlight inventory (approximately 1,000 lights) paid for on a non-metered system through PSE&G. At the same time, the City received a Middlesex County Sustainability Grant and wanted to capitalize on the opportunity the grant could help deliver. Their thoughts were squarely focused on an environmentally sustainable, fiscally responsible solution for the future.

The Challenges (the opportunity)
Lighting technology was progressing rapidly and there was a lack of detailed specifications and standards for LED streetlights – city leaders knew that research and testing would be needed and that it would be an uphill battle. The complexity was heightened as they began to evaluate roadway (cobra-head) and decorative options which were at different phases of research and testing would be needed and that it would be an uphill battle. The complexity was heightened as they began to evaluate roadway (cobra-head) and decorative options which were at different phases of documentation. The central goal was to maintain light levels and reduce energy consumption.

The Solution
After deciding to focus initially on their George Street streetscape, the City determined that the Philips Hadco LumiLock LED post top was a perfect fit for this decorative project. Fully tested and complete with photometric documentation, the central goal was to maintain light levels and reduce energy consumption.

The Benefits
The LumiLock LED post top enabled the City of New Brunswick to convert 175W MH twin mounts to a single mount LED solution – saving more than 50% cost per pole (energy and maintenance). Chris Butler, Management Specialist, City of New Brunswick said, “we are seeing such significant savings, and not losing any level of safety or comfort.” The city is very pleased with the quality of the crisp white light.

Overpeck Park, New Jersey

Overpeck County Park, located in Bergen County, New Jersey, spans several hundred acres of donated land from parts of neighboring Leonia, Palisades Park, Ridgefield Park, and Teaneck. The dream of creating a central recreational and cultural haven was more than 50 years in the making and only recently realized. A landfill as late as the mid-1970s, it is now as of September 2009, a family destination.

The Challenges (the opportunity)
Use of Overpeck Park would be variable and dynamic – a home to football, baseball and soccer fields, an equestrian center, walking trails, recreational areas, parking lots and a community entertainment venue. Several events may be happening one night, while only the walking trails would be used the next night. This posed a complex lighting challenge, with a single solution required to illuminate the park to current standards with a sense of safety and environmental sustainability. And, we could achieve all this while saving energy and maintenance costs at the same time.”

The Benefits
Reclaimed from a former landfill, Overpeck County Park is a vast greenspace in the heart of one of the most urban and densely populated states in the US. John mentioned that the people of Bergen County enjoy this park and the lighting is a big part of that experience. “I have received several emails from people who tell me how great this park is and how they feel very safe on the walking trails.”

The Solution
Philips Hadco’s LumiLock LED Reflective Globes were chosen for their decorative appeal as well as modular features and benefits. The luminaires are powered through several circuits, leveraging LED’s exceptional manageability. Further, this manageability allowed several areas within the park to be turned off when not needed. John said “Going to LED was a no-brainer. It is a great thing to deliver useful uniform light in a public space that is not overwhelming, providing our park visitors with a sense of safety and environmental sustainability. And, we could achieve all this while saving energy and maintenance costs at the same time.”

Case Studies

“We are seeing such significant savings, and not losing any level of safety or comfort.”
Chris Butler, Management Specialist, City of New Brunswick, New Jersey

“Going to LED was a no-brainer. It is a great thing to deliver useful, uniform light in a public space that is not overwhelming, providing our park visitors with a sense of safety and environmental sustainability. And, we could achieve all this while saving energy and maintenance costs at the same time.”
Senior Project Coordinator, John Biale
The installation of all 74 fixtures proved to be very simple and was completed in half the time expected. The lighting levels and uniformity have met or exceeded our initial expectations, while receiving many positive reviews. As the City of Concord advances its “Green Initiatives” we will continue to seek out quality products, such as the Philips Hadco LED fixture, to help us reach our environmental and energy cost containment goals.

City of Concord NC Electrical Systems Manager, Scott Chunn

Concord, North Carolina

Background
The City of Concord decided it was time to upgrade to LED lighting and modernize the city. Eager to replace the HID lamping modules installed in 1990, the city applied for and received a government grant to fund the project.

The Challenges (the opportunity)
One challenge was to increase efficiency and light levels without having to add additional fixtures and poles. This is one of the main reasons Concord decided to use the Philips Hadco LumiLock LED engine. This engine was designed to work in existing Hadco Refractive Globes and would not require the city to install any additional fixtures. The city was able to meet and exceed light level and uniformity requirements with this LED engine.

The Solution
The retrofit was simple. Philips Hadco LumiLock LED Engines were installed resulting in 54% energy savings. The longer rated life of LEDs will also save the city money on lamps and maintenance costs to re-lamp. The city looks forward to further expanding their retrofit project at a later date. Using less energy, saving on maintenance and gaining a longer life demonstrates that the City of Concord is moving forward with sustainable technology and confidently looks towards a brighter future with LED lighting.

The Benefits
Scott Chunn, Electrical Systems Manager for the City of Concord, said that as the City of Concord progresses in their efforts to reduce energy cost, as well as to reduce their own environmental impact, they are continually looking for innovative, cost effective solutions to implement. “The initial project in solid state lighting involved a retrofit of 150W HPS post top fixtures. These fixtures had been in service for approximately 15 years as part of a downtown streetscape project.” The city chose Philips Hadco’s LumiLock engine to retrofit the existing Philips Hadco Refractive Globe fixtures. “This installation proved to be very simple and was completed in half the time expected. The lighting levels and uniformity have met or exceeded our initial expectations, while receiving many positive reviews. As the City of Concord advances its “Green Initiatives” we will continue to seek out quality products, such as the Philips Hadco LumiLock LED Engine, to help us reach our environmental and energy cost containment goals.”

Pompton Lakes, New Jersey

Background
The Borough of Pompton Lakes, New Jersey, known for its country beauty, committed itself to being environmentally and fiscally conscious. Understanding it was time to make an investment in their historic downtown, and that lighting would play a major, visible role in the redevelopment plan, the Borough desired an environmentally sustainable solution. Collaborating with local businesses within the Business Improvement District to offset some initial investment, Vito Gadaleta, Borough Administrator, embarked on a journey that would satisfy the need for an aesthetically pleasing, unique downtown streetscape while delivering a fiscally sound lighting solution.

The Challenges (the opportunity)
Create a lighting solution that is 1) historically relevant, 2) aesthetically appealing and 3) fiscally responsible, while maintaining or improving current light levels, significantly reducing energy usage and costs, increasing maintenance efficiency (lowering maintenance costs) over the long run and reflecting the community’s desire to be environmentally conscious.

The Solution
After much evaluation, the LumiLock LED Refractive Globe Luminaires by Philips Hadco was the clear choice. The LED engine and the refractive globe provided superior lighting characteristics, while the quality craftsmanship of the luminaires satisfied the aesthetic and historic needs. The modular construction allowed for customization, thus creating a unique solution that met the maintenance challenges. Philips Hadco’s performance, reliability, warranty and dedicated solution providers were all key components of the decision.

With the Philips Hadco solution, The Borough of Pompton Lakes will enjoy energy savings of nearly 50 percent and an estimated reduction of future maintenance costs of nearly 75 percent—all with a response rate to the community’s passion for embracing and, in fact, being leaders in green technology deployment. Vito Gadaleta, sensitive to balancing up front investment and ongoing operating costs, says “A complex project like the Downtown Streetscape must be responsibly designed for the future, while considering current fiscal constraints and the needs of the community”.

The Benefits
According to Mayor Katie Cole and Administrator Vito Gadaleta, local businesses are already seeing the benefits of the investment. The downtown businesses have begun to expand hours of operation and improve their own storefronts consistent with the new streetscape. Additionally, local residents are commenting that the light seems brighter and crisper while local officials are realizing reduced energy and maintenance costs. The streetslight, now a town standard is also being used in a local park. In fact, other towns are beginning to look to Pompton Lakes as an example of environmentally sustainable advancement. Mayor Katie Cole mentioned that as you drive down the street you will now see people enjoying dinner at outdoor tables and walking around and shopping at night because it feels safe. “Our community came together to move forward and we are so proud of the work of our great team. The Business Improvement District leaders and the entire community have been supportive from the beginning.”

Mayor of Pompton Lakes, Katie Cole

Client
Borough of Pompton Lakes, New Jersey

Project
Downtown Streetscape

Location
Pompton Lakes, New Jersey

Luminaires and Controls
Philips Hadco’s LumiLock LED Refractive Globe

Light Source
LED

Lighting Effect
LED Decorative Lighting

Lighting Support
Philips Hadco, Dave Murphy & Associates

Case Studies
Mass. Maritime Academy, MA

The Challenges (the opportunity)

The lighting project was largely funded by a $325,000 state renewable energy grant to Mass. Maritime, supplemented by a $181,000 rebate from the Commonwealth Solar program managed by the Mass. Technology Collaborative. The balance of the funding was provided by the Massachusetts State College Building Authority and other Mass Maritime funds. Ming-Jay Erland Construction was the General Contractor for the project and said the lighting project provides energy savings, as evidenced by this month’s National Geographic cover article (November issue, 2008). The softer, white directional LED lamps provide exceptional clarity and visibility on areas that require light, without sending stray light into areas that are best left dark. The result is an enhanced night-time setting, with marked reduction in light pollution and energy usage.

The Benefits

There has been an increased amount of positive activity in the area as a result of the lights, but beyond the practical use, Hansen said the project helps students think about how they use energy. “When you walk down that path, you know you’re using it responsibly,” Hansen said. “You’re being conscious of where your money is going.” The long-lasting LED lights significantly reduce maintenance, and perform well in cold temperatures. The lighting project was largely funded by a $325,000 state renewable energy grant to Mass. Maritime, supplemented by a $181,000 rebate from the Commonwealth Solar program managed by the Mass. Technology Collaborative. The balance of the funding was provided by the Massachusetts State College Building Authority and other Mass Maritime funds. Ming-Jay Erland Construction was the General Contractor for the project and said the lighting project provides energy savings, as evidenced by this month’s National Geographic cover article (November issue, 2008). The softer, white directional LED lamps provide exceptional clarity and visibility on areas that require light, without sending stray light into areas that are best left dark. The result is an enhanced night-time setting, with marked reduction in light pollution and energy usage.

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Introduction Overview

The Plainfield

Since 1685, when the first seven families settled there, the city of Plainfield, New Jersey, has had a strong sense of identity. So when it came time to update the city’s outdoor lighting, we knew the project deserved a signature style... and we built them a custom streetlight they could call their own.

As illustrated, we used a 6˝ flat flute pole with an additional steel insert for structural integrity. We then created straight and shepherd’s crook arms with custom-cast aluminum scrolls and filigrees. Because of the fixture’s large size, we welded together two separate halves to construct the straight-arm scroll. And, as a finishing touch, we created a 20˝ diameter two-piece, heavy-duty cast aluminum Madison-style base.

As a result, the Plainfield design does more than illuminate the city’s streets; it reflects the city’s heritage.

Custom and Modification

We help you build your vision

Every Philips Hadco creation—and, really, our company itself—has grown out of our close interaction with lighting design professionals.

Along the way, we’ve learned a lot... in particular, we’ve learned that no two projects are exactly alike. So for us, new ideas and special projects are standard procedure.

In fact, custom and modified products make up a significant portion of our sales. We welcome questions and can offer advice about application, lamp placement and lighting objectives. And our team of custom engineers and technical specialists responds quickly and expertly to new ideas. Using powerful engineering and drafting software, they can create custom cutsheets to help you envision your ideas.

Once your design is perfected, we’ll use the latest manufacturing techniques to build it to your specifications, and on time.

So if you’re thinking about modifying an existing design or building something new, we’d love to hear about it. Don’t hesitate to contact us.
Decorative lighting alone can make an immediate and significant change in your environment. Philips Hadco’s decorative cage can be customized to fit your communities’ needs.

Philips Hadco’s customized logos are designed to meet your customer’s specifications. The logos are computer generated and transferred to durable Commercial Quality Contact Vinyl for adhesion to a white opal acrylic mounting insert.

The logos above are just a few examples of design that could personalize a fixture in your community. Below are a few color selections for the cage band.

**Logo and Band Color**

<table>
<thead>
<tr>
<th>White</th>
<th>Green</th>
<th>Blue</th>
<th>Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>AO</td>
<td>VO</td>
<td>BT</td>
<td>RT</td>
</tr>
<tr>
<td>WO</td>
<td>WT</td>
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<tr>
<td>GO</td>
<td>HT</td>
<td>JT</td>
<td>RT</td>
</tr>
<tr>
<td>YO</td>
<td>T</td>
<td>JT</td>
<td>RT</td>
</tr>
</tbody>
</table>

1. **Letter/Shape** – specify color, opaque, or translucent.
2. **Background** – specify color, opaque, or translucent.
3. **Base Material** – translucent white opal.
Solar LED

Efficiency, ease of installation and reduced impact on the surrounding environment are all reasons to consider an integrated Solar/LED solution from Philips Hadco.

On the following page, we’ve included some examples of the LED and solar-capable fixtures currently available. As you can see from these few selections, we are dedicated to offering devices that blend seamlessly into any project you may be planning.

Our traditional shapes of the Pendant and Post Top series provide “off grid” lighting, so there is no need to trench for electrical lines. This offers flexibility to provide lighting without the extra cost of materials and labor to build or increase wired infrastructure, much less the recurring cost of utility power.

The Benefits of Solar LED

LEDs are fundamentally compatible with solar energy. On a very conceptual basis an LED is the inverse of a solar cell. A solar cell is a semi-conductor device that converts light to electricity, while an LED is a semi-conductor device that converts light to electricity to light. LEDs’ “control-ability” enables them, through intelligent controls, to adapt to the ebb and flow of the solar energy through changing weather patterns and seasons. Like solar cells, LEDs offer “solid state” reliability—lasting at least a decade. If not longer. LEDs efficiency and lifetime improves under colder conditions—when the system needs it the most. And then of course, well designed LED lighting systems can reduce the number of lighting systems on a project by 20% or more and still achieve exceptional lighting results.

Consult factory for the latest Solar LED product specifications.
At times when an H.I.D. Lighting System becomes inoperative, a complex, thorough, trouble-shooting procedure may prove overly time consuming. In these instances, a simple check of the power switches, when a bank of fixtures becomes inoperative, or a visual check of the lamp, when a singular fixture becomes inoperative, may provide the quickest response to the problem. At other times, when individual isolated fixtures are involved, it may be necessary to systematically isolate the problem and perform complete electrical tests in order to properly restore the lighting.

The four basic trouble-shooting methods outlined in this booklet offer procedures which can be applied to cover virtually all situations:

1. VISUAL INSPECTION CHECK LIST – Quick visual checks for normal end-of-lamp life and application irregularities not requiring electrical testing.

2. QUICK FIX FOR RESTORING LIGHTING – Where lighting must be immediately restored.

3. TROUBLESHOOTING FLOW CHARTS – Simplified diagrams to quickly locate the problem in any given lighting circuit on the lamp characteristics.
   A. Lamp will not start
   B. Lamp cycles
   C. Lamp too bright or dim

4. ELECTRICAL TESTS – In-depth check of system by performing electrical tests.

---

1. VISUAL INSPECTION CHECK LIST – NORMAL END OF LAMP LIFE

Mercury and Metal Halide Lamps
These lamps at end-of-life are characterized by low light output and/or intermittent starting. Visual signs include blackening at the ends of the arc tube and electrode tip deterioration.

High Pressure Sodium Lamps
Aged HPS lamps will tend to cycle at end-of-life. After start-up, they will cycle off and on as the aged lamp requires more voltage to stabilize and operate the arc than the ballast is capable of providing. Visual signs include a general blackening at the ends of the arc tube. The lamp may also exhibit a brownish tinge (sodium deposit) on the outer glass envelope.

Low Pressure Sodium Lamps
At end-of-life, these lamps retain their light output but starting first becomes intermittent and then impossible. Visual signs include some blackening of the ends of the arc tube.

ADDITIONAL CHECKS

Lamps
• Broken arc tube or outer lamp jacket.
• Lamp broken where glass meets the base.
• Broken or loose components in lamp envelope.
• Arc tube end blackening.
• Deposits inside outer glass envelope.
• Lamp-type (H, M, S, or L number) and wattage must correspond to the required ballast label.
• Lamp orientation designation (BU or BD) incorrect.
• Damaged ignitor.
• Evidence of moisture or excessive heat.
• Loose, disconnected, pinched or frayed leads.
• Incorrect wiring.
• Swollen or ruptured capacitor.
• Damaged ignitor.

Component Replacement Where No Visual Defects Appear
Visual signs include some blackening of the ends of the arc tube. If out of spec:
• Replace both ballast and capacitor.

Lighting System Components
• Charred ballast coils.
• Damaged insulation or coils on ballast.
• Evidence of moisture or excessive heat.
• Loose, disconnected, pinched or frayed leads.
• Incorrect wiring.
• Swollen or ruptured capacitor.
• Damaged ignitor.

2. QUICK FIX FOR RESTORING LIGHTING

Visual Inspection
• Visually inspect lamp, ballast, capacitor, and ignitor (where used) for physical signs of failure, replacing any apparently defective components.

Component Replacement Where No Visual Defects Appear
• Verify that the correct line voltage is being supplied to the fixture.
• Check power switches, circuit breakers, fuses, photo control, etc.
• Replace lamp.
• Replace ignitor (where used).
• Replace both ballast and capacitor.

3. FLOW CHARTS (see below)

A. Lamp will not start (Step 1)

Visual inspection for normal end-of-life failure and physical damage.

Check breakers, fuses, photo control, etc.

If conforming: Perform tests on lamp, ballast and capacitor.

If not conforming: Electrical problems exist outside of fixture.

Perform capacitor tests.  Measure Short Circuit Current.

If out of spec:
• Replace inoperative ballast (also replace capacitor to assure proper performance).

Also:
Make further spot checks for probable cause to prevent recurrence.

A. Lamp will not start (Step 2)

Visually inspect and verify use of proper combination of lamp, ballast, capacitor, ignitor and associated wiring in system.

If out of spec:
• Replace both cap and coil ballast and the capacitor if either appears damaged.

Visually inspect ballast, capacitor, ignitor and socket for physical damage and signs of failure.

Correct if out of spec.

Measure Open Circuit Voltage at lamp socket.

If within spec: Continue testing.  See Step 2.

If out of spec: Replace lamp with known good lamp.  If lamp does not start, perform Capacitor and Ignitor (if used) testing.  See Step 3.

Visually inspect lamp for normal end-of-life failure and physical damage.

Replace inoperative lamp.

Perform ignitor testing.

Measure line voltage at ballast input and verify conformance with ballast label.

If conforming: Perform tests on ballast and capacitor.

If not conforming: Electrical problems exist outside of fixture.

Perform capacitor tests.  Measure Short Circuit Current.

If out of spec:
• Replace inoperative ballast (also replace capacitor to assure proper performance).

Also:
Make further spot checks for probable cause to prevent recurrence.

Open circuit voltage measurement out of spec.

If within spec: Replace lamp with known good lamp.  If lamp does not start, perform Capacitor and Ignitor (if used) testing.  See Step 3.

4. ELECTRICAL TESTS

Measure line voltage at ballast input and verify conformance with ballast label.

If conforming: Perform tests on ballast and capacitor.

If not conforming: Electrical problems exist outside of fixture.

Perform capacitor tests.  Measure Short Circuit Current.

If out of spec:
• Replace inoperative ballast (also replace capacitor to assure proper performance).

Also:
Make further spot checks for probable cause to prevent recurrence.

Open circuit voltage measurement out of spec.

If within spec: Replace lamp with known good lamp.  If lamp does not start, perform Capacitor and Ignitor (if used) testing.  See Step 3.

Visually inspect lamp, ballast, capacitor, and ignitor (where used) for physical signs of failure, replacing any apparently defective components.

Component Replacement Where No Visual Defects Appear

Verify that the correct line voltage is being supplied to the fixture.

Check power switches, circuit breakers, fuses, photo control, etc.

Replace lamp.

Replace ignitor (where used).

Replace both ballast and capacitor.

Visually inspect lamp for normal end-of-life failure and physical damage.

Replace inoperative lamp.

Perform ignitor testing.

Measure line voltage at ballast input and verify conformance with ballast label.

If conforming: Perform tests on ballast and capacitor.

If not conforming: Electrical problems exist outside of fixture.

Perform capacitor tests.  Measure Short Circuit Current.

If out of spec:
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Measure line voltage at ballast input and verify conformance with ballast label.

If conforming: Perform tests on ballast and capacitor.

If not conforming: Electrical problems exist outside of fixture.

Perform capacitor tests.  Measure Short Circuit Current.

If out of spec:
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Also:
Make further spot checks for probable cause to prevent recurrence.

Open circuit voltage measurement out of spec.

If within spec: Replace lamp with known good lamp.  If lamp does not start, perform Capacitor and Ignitor (if used) testing.  See Step 3.
4. ELECTRICAL TESTS

NOTE: Voltage and current measurements present the possibility of exposure to hazardous voltages and should be performed only by qualified personnel.

The following equipment is recommended for Testing H.I.D. fixtures:
- RMS Voltmeter
  - Ranges: 0-150-300-750 Volts AC
- Ammeter (Clamp-on type acceptable)
  - Ranges: 0-1-5-10 Amperes AC
- Multi-meter (with voltage and current ratings shown above)
- Ohmmeter
- Line Voltage

Measure the line voltage at input to fixture to determine if the power supply conforms to the requirements of the lighting system. For constant wattage ballasts, the measured line voltage should be within 10% of the nameplate rating. For high reactance or reactor ballasts, the line voltage should be within 5% of the nameplate rating.

If the measured line voltage does not conform to the requirements of the lighting system as specified on the ballast or fixture nameplate, electrical problems exist outside of the fixture which can result in non-starting or improper lamp operation.

B. Lamp cycles

Visually inspect lamp for normal end-of-life failure and physical damage.

Interchange with known good lamp. Replace non-starting lamp when required.

Visually inspect and verify use of proper combination of lamp, ballast, and capacitor in system.

Visually inspect ballast, capacitor, and socket for physical damage and signs of failure.

If not conforming: Electrical problems exist outside of fixture.

Measure Open Circuit Voltage at Lamp Socket.

If out of spec: Replace inoperative ballast (also replace capacitor to assure proper performance).

Check photocell orientation per manufacturer’s instructions.

Visually inspect and verify use of proper combination of lamp, ballast, and capacitor in system.

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If out of spec: Replace inoperative ballast (also replace capacitor to assure proper performance).

Replace any apparent or damaged components.

Supply voltage to fixture may be too high or too low.

Load fluctuations on same circuit may cause variable supply voltage conditions. Replace inoperative lamp.

If out of spec: Replace inoperative ballast (also replace capacitor to assure proper performance).

If not conforming: Electrical problems exist outside of fixture.

C. Lamp too bright or dim

Lamp appears too bright or too dim.

Interchange with known good lamp. Replace non-starting lamp when required.

Visually inspect ballast, capacitor, and socket for physical damage and signs of failure.

If out of spec: Replace inoperative ballast (also replace capacitor to assure proper performance).

Replace any apparent or damaged components.

Supply voltage to fixture may be too high or too low.

Load fluctuations on same circuit may cause variable supply voltage conditions.

Discharge capacitor by shorting between terminals and test with capacitor meter or ohmmeter.

Measure line voltage at lamp socket to verify conformance with ballast label.

If not conforming: Electrical problems exist outside of fixture.

Discharge capacitor by shorting between terminals and test with capacitor meter or ohmmeter.

Replace when necessary.

Measure open circuit voltage at lamp socket.

If out of spec: Replace inoperative ballast (also replace capacitor to assure proper performance).

If not conforming: Electrical problems exist outside of fixture.

D. Lamp too bright or dim

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Visually inspect ballast, capacitor, and socket for physical damage and signs of failure.

If out of spec: Replace inoperative ballast (also replace capacitor to assure proper performance).

Replace any apparent or damaged components.

Supply voltage to fixture may be too high or too low.

Load fluctuations on same circuit may cause variable supply voltage conditions. Replace inoperative lamp.

If out of spec: Replace inoperative ballast (also replace capacitor to assure proper performance).

If not conforming: Electrical problems exist outside of fixture.

Discharge capacitor by shorting between terminals and test with capacitor meter or ohmmeter.

Measure line voltage at lamp socket to verify conformance with ballast label.

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Replace when necessary.

Measure open circuit voltage at lamp socket.

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Decorative Pole Windloading

The Effective Projected Area or EPA is a wind resistance rating given for fixtures, brackets, and accessories. The total of all accessory EPA ratings must not exceed the pole capacity EPA for the wind zone where it is installed.

There may be more than one wind velocity in any geographical area, such as the greater Tampa, Florida, area which has three different wind zones. Lighting poles must also be selected that can withstand the additional stresses caused by weight. Please check local ordinances/building codes for up-to-date requirements.

Pole Banner Loading

The largest EPA addition to any pole will be from single or double rectangular shaped decorative banners and street signs. The surface area exposed to the wind creates a high EPA value when compared to fixtures and arm brackets and a larger pole diameter or thicker wall may be required. Always contact the factory whenever banners are used.

Philips Hadco poles are designed to meet industry accepted wind-loading practices for decorative street lighting standards. State or federal lighting projects may require decorative poles to meet specifications established by the American Association of Street and Highway Traffic Officials (AASHTO). Consult the factory for separate EPA capacities according to AASHTO recommendations.
## Lighting Terminology

Like any other industry, lighting has a language of its own. Listed below are some of the most common words and terms used within the lighting industry.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>Blackbody / Blackbody Radiator</td>
<td>An object that absorbs all electromagnetic radiation falling on it. Because it reflects no light, a blackbody appears black. A blackbody is heated to incandescence, which radiates light in a sequence of colors, from red to orange to yellow to white to blue, depending on its temperature. This color sequence describes a curve within a color space, known as the blackbody curve.</td>
</tr>
<tr>
<td>Brightness</td>
<td>The subjective impression of the intensity of a light source. Often used incorrectly as a synonym for luminous flux, an objective measurement of the visible power of a light source.</td>
</tr>
<tr>
<td>BUG Rating</td>
<td>A rating for outdoor luminaires that defines the amount of maximum zonal luminas in the Backlight (B), Uplight (U), and Glare (G) zones as designated per the Luminance Classification System (LCS) in IES TM-15.</td>
</tr>
<tr>
<td>Candela (cd)</td>
<td>The fundamental unit of luminous intensity (in a particular direction). One candela is one lumen per steradian (lm/sr).</td>
</tr>
<tr>
<td>Candela Power (cp)</td>
<td>Luminous intensity (in a particular direction) expressed in candela.</td>
</tr>
<tr>
<td>Candlepower Distribution Curve</td>
<td>A curve showing the variation of luminous intensity (in cp) of a lamp or luminaire at various angles.</td>
</tr>
<tr>
<td>CCT - Correlated Color Temperature</td>
<td>The Color Rendering Index (CRI) - A device to redirect or scatter light from a source, such as those used in outdoor lighting.</td>
</tr>
<tr>
<td>CIE - See International Commission on Illumination (CEI) Commission Internationale de l'Éclairage (CIE)</td>
<td></td>
</tr>
<tr>
<td>CIE 1931 color space</td>
<td>A color space created by the International Commission on Illumination (CEI) in 1931 to define the entire gamut of colors visible to the average viewer.</td>
</tr>
<tr>
<td>CIE Standard Chromatic Diagram</td>
<td>One in which the x and y chromaticity (color) coordinates are plotted in rectangular coordinates.</td>
</tr>
<tr>
<td>Coefficient of Utilization (CU)</td>
<td>The percentage of light from a luminaire which reaches the target task. It is a function of the luminaire, each having its own set of CUs for a wide range of factors.</td>
</tr>
<tr>
<td>Collimator</td>
<td>Term used to describe the secondary lens that aligns and shapes an LED’s beam of light.</td>
</tr>
<tr>
<td>Color Rendering</td>
<td>General expression for the effect of a light source on the color appearance of objects when compared with their color appearance under a reference light source.</td>
</tr>
<tr>
<td>Color Rendering Index (CRI)</td>
<td>Measures the ability of a light source to reproduce the colors of various objects faithfully in reference to an ideal light source. The best possible faithfulness to the reference source has a CRI of 100.</td>
</tr>
<tr>
<td>Color Temperature</td>
<td>Correlated Color Temperature.</td>
</tr>
<tr>
<td>Compact Fluorescent Lamp (CFL)</td>
<td>A type of fluorescent lamp with relatively low power draw that is often designed to replace an incandescent lamp. Generally, it includes an amalgam to stabilize light output over a broad range of ambient temperatures.</td>
</tr>
<tr>
<td>Correlated Color Temperature (CCT)</td>
<td>Describes whether white light appears warm (reddish), neutral, or cool (bluish), based on the appearance of the light emitted by a black body heated to various temperatures. CCT is expressed in Kelvin (K).</td>
</tr>
<tr>
<td>Cosine Law</td>
<td>A law stating that the illuminance on any surface varies as the cosine of the angle of incidence θ. The angle of incidence is the angle between the surface and the direction of the incident light. The inverse-square law and the cosine law can be combined as E = I cos θ/W.</td>
</tr>
<tr>
<td>Cut-off Angle (of luminaire)</td>
<td>The angle, measured up from the horizontal and vertical axes and the first line of sight at which the bare source is not visible.</td>
</tr>
<tr>
<td>Delivered Light</td>
<td>The amount of light a luminaire or lighting installation delivers to a target area or task surface, expressed in footcandles (fc) or lux (lx).</td>
</tr>
<tr>
<td>Diffuse</td>
<td>A device to redirect or scatter light from a source, primarily by the process of diffuse transmission.</td>
</tr>
<tr>
<td>Efficiency</td>
<td>The amount of light produced (in lumens) per unit amount of energy consumed (in watts), expressed in lm/W. Not to be confused with luminaire efficiency.</td>
</tr>
<tr>
<td>Efficiency (IEC)</td>
<td>The amount of light produced (in lumens) per unit amount of energy consumed (in watts), expressed in lm/W.</td>
</tr>
<tr>
<td>Efficacy (ANSI)</td>
<td>The method for determining light output.</td>
</tr>
<tr>
<td>Eye-sensitivity Curve</td>
<td>Spectral Luminous Efficiency (V(λ)) Function for Photopic Vision.</td>
</tr>
<tr>
<td>Field Angle</td>
<td>The angle between the two directions (horizontal and vertical) for which the intensity is 10% of the maximum intensity as measured in a plane through the nominal beam centerline. Note that in certain fields of application, the angle of 10% of maximum directions was formerly called beam angle.</td>
</tr>
<tr>
<td>Field Luminance</td>
<td>The total flux in the beam where the intensity exceeds 10% of the maximum intensity.</td>
</tr>
<tr>
<td>Fixtures</td>
<td>The areal density of luminous flux falling on a surface. Measured in footcandles (fc) or lux (lx). An alternative term is Illumination.</td>
</tr>
<tr>
<td>Footcandle (fc)</td>
<td>A unit of illuminance that measures the intensity of light falling on a surface area measured in square feet. One footcandle is one lumen per square foot (lm/ft²). One footcandle = 10.76 lux.</td>
</tr>
<tr>
<td>Forward Voltage (Vf)</td>
<td>Occurs when a negative charge is applied to the top side of an LED, allowing current to flow from the negatively-charged area to the positively-charged area. Applying rated forward voltage causes LEDs to emit light.</td>
</tr>
<tr>
<td>Glare</td>
<td>The sensation produced by luminaires within the visual field that are sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort, or loss in visual performance or visibility. Note: The magnitude of the sensation of glare depends upon such factors as the size, position and luminance of a source, the number of sources and the luminance to which the eyes are adapted.</td>
</tr>
<tr>
<td>Glare, Direct</td>
<td>Glare resulting from high luminances or insufficiently shielded light sources in the field of view. A direct glare source may also affect performance by distracting attention.</td>
</tr>
<tr>
<td>Glare, Disability</td>
<td>Glare resulting in reduced visual performance and visibility and often accompanied by discomfort.</td>
</tr>
<tr>
<td>Glare, Discomfort</td>
<td>Glare producing discomfort. It does not necessarily interfere with visual performance or visibility.</td>
</tr>
<tr>
<td>Goniospectrophotometer</td>
<td>A photometric device for testing the luminous intensity distribution and luminous flux of luminaires.</td>
</tr>
<tr>
<td>HB-LEDs</td>
<td>High brightness LEDs. A synonym for illumination-type LEDs such as those used in outdoor lighting.</td>
</tr>
<tr>
<td>Heat Sink</td>
<td>A feature or device that conducts and radiates heat away from sensitive components, such as LEDs and electronics.</td>
</tr>
<tr>
<td>H.I.D.</td>
<td>High Intensity Discharge.</td>
</tr>
<tr>
<td>High Intensity Discharge (H.I.D.)</td>
<td>High intensity discharge lighting, including mercury vapor metal halide and high pressure sodium light sources. Although high pressure sodium lamps are not H.I.D. sources, they are often included in the H.I.D. category.</td>
</tr>
<tr>
<td>HP-LEDs</td>
<td>High-power LEDs. A synonym for illumination-type LEDs such as those used in outdoor lighting.</td>
</tr>
<tr>
<td>IEC - See International Electrotechnical Commission (IEC)</td>
<td></td>
</tr>
<tr>
<td>IES - See Illuminating Engineering Society of North America (IES)</td>
<td></td>
</tr>
<tr>
<td>IESNA - The Illuminating Engineering Society of North America (IESNA)</td>
<td></td>
</tr>
<tr>
<td>Illuminance (IEC)</td>
<td>The area density of luminous flux falling on a surface.</td>
</tr>
<tr>
<td>Illuminating Engineering Society of North America (IES)</td>
<td></td>
</tr>
<tr>
<td>Induction</td>
<td>Lighting system consisting of a lamp, power coupler, and HF generator (the electronics that regulate and convert incoming power for system starting and operation). Another type of “light source” used in outdoor luminaires.</td>
</tr>
</tbody>
</table>
Lighting Terminology

Infrared (IR) – Electromagnetic radiation with wavelength longer than that of visible light.

Lamp – A light source. Lamps are used for outdoor lighting include HIDs, incandescent (including tungsten-halogen), and fluorescent.

Lamp Lumen Depreciation (LLD) – A factor used in lighting calculations to account for the light loss that takes place in a lamp due to the gradual decay in lumen output over a designated period of burning time. The LLD is contingent upon relamping schedules and the specific lamp involved.

LED – See Light Emitting Diode.

LED Driver – An electronic circuit that converts input power into a current source — a source in which current remains constant despite fluctuations in voltage. An LED driver protects LEDs from normal voltage fluctuations, overvoltages, and voltage spikes.

Lens – A transmitting element used to change the direction and control the distribution of light rays. The shading or diffuser portion of a luminaire made of plastic or glass through which the light passes on its way to the light task.

Light Emitting Diode (LED) – A semiconductor device that emits visible light of a certain color or for white LEDs, light of a certain CCT.

Lighting Distribution – Luminaries are classified according to the manner in which they control or distribute the luminous flux.

Light Loss Factor (LLF) – A factor used in lighting calculations of a specific lamp involved.

Light Trespass – A situation which occurs when, due to lack of adequate beam control, light from a source is distributed onto areas and the specific lamp involved.

Nanometer (nm) – The most common unit to describe the wavelength (“color”) of light, equal to one billionth of a meter.

N-type Material – In an LED’s p-n semiconductor junction, n-type material is negatively charged. Atoms in the n-type material have extra electrons.

Ocular System – The point source having a uniform luminous intensity of one candela.

Overhang – A luminaire designed, tested and USL, 2008, p. 4948.

Overshoot – The vertical distance between a vertical line passing through the luminaire and the curb or edge of the roadway.

Paraboloid – The term applied to certain low brightness louver and reflector shapes as derived from the geometric shape (curve) called a parabola. A parabola is a plane curve where a point, called the focus, is equidistant from the parabola’s geometric axis.

Phosphor – A coating of phosphorescent material that absorb light from a blue or UV LED chip and emits most of its output in the yellow range. The proper combination of a blue or UV LED phosphor coating provides light source.

Photometer – The measurement of quantities associated with light.

Power Factor (PF) – A measure of how effectively a luminaire’s power source converts electric power to useful power output. The further the power factor is from the ideal PF (1.0), the less effectively the power conversion resulting in more wasted power.

Pulse Width Modulation (PWM) – A dimming method that regulates the amount of power to LEDs. PWM turns LEDs on and off at high frequency reducing total CN output time to achieve a desired dimming level.

Refraction – The process by which the direction of a ray of light changes as it passes obliquely from one medium to another in which it travels.

Reflector – A device used to redirect the flux (or light) from a source by the process of reflection.

Relative Photometry – The method for determining light output and light distribution of luminaries where the performance of the luminaire is measured relative to the performance of its lamp(s).

Remote Phosphor – A technique that separates the phosphor from the chip in a white-light LED, improving the extraction efficiency of emitted light.

SDCM – See Standard Deviation of Color Matching.

Setback – The distance that the center of the luminaire is behind the light array to be lighted by that luminaire.

Shading Angle (of a luminaire) – The angle between a horizontal line through the light center and the line of sight at which the bare source first becomes visible.

Silk – A luminaire designed, tested and approved for installation in wet locations (such as outdoors) per UL standards. It can also be described as “enveloped and gasketed.”

Spectral Luminous Efficiency V(λ) – Function for Photopic Vision.

Ultraviolet (UV) – Electromagnetic radiation with wavelength shorter than that of visible light.

U.S. Laboratory (UL) – The length of time it takes an LED light source to reach a certain percentage of its initial lumen output. Commonly defined as luminaire maintenance thresholds L70 (70% of initial lumen output) and L80 (80% of initial lumen output).

Useful Life – The amount of light a lighting luminaire delivers in an application minus any wasted light.

Useful Light – A luminaire that is hung from a ceiling by supports (chains, hangers, stems, etc.).
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A. Philips Hadco warrants that its products (other than ballasts, lamps, photoelectric controls and emergency battery packs) are free of defects in workmanship and materials for a period of three (3) years except as indicated below:
1. Ten (10) year extended warranty for all grade mounted composite, copper & transformers.
2. Lifetime warranty for cast bronze and stainless steel.
3. Five (5) year extended warranty for LED engines & drivers.

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C. Philips Hadco will not be responsible for any products subjected to inappropriate application or installed or modified in any way that is not in accordance with Philips Hadco’s instructions.

D. No agent, employee or representative of Philips Hadco has any authority to bind Philips Hadco to any other affirmation, representation or warranty concerning goods sold by Philips Hadco.