Lighting A to Z

A Reference guide to Philips Lighting products and product knowledge

PHILIPS

sense and simplicity

Index

The world of lighting today has become complex and technical. Trends toward miniaturization, energy efficiency, ease of use, light and well being, quality of light, personalization, mood and emotion all drive new product developments. All Philips innovations are based on extensive knowledge of these trends and market insights.

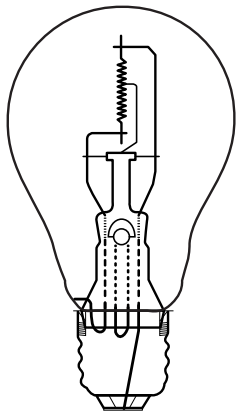
At Philips, we are committed to making our products easier to experience. We are also committed to understanding current and future trends by listening to our business partners and customers. Together we can develop lighting solutions of the highest quality and originality that meets their needs and expands their possibilities.

Quick Guide

Incandescent Lighting

Incandescent Operation

In an incandescent bulb, a tungsten filament is heated by an electric current until the filament becomes incandescent or gives off light. The intense heat causes the tungsten filament to slowly evaporate. This filament evaporation causes two things to happen. First, it causes the bulb to get blackened over time. The blackening of the bulb causes the bulb to become slightly dimmer over time. Second, as the filament evaporates, it gets thinner and thinner until finally it gets so thin, it breaks and the bulb fails. This is the normal end of life for an incandescent bulb. The life of a bulb depends on the thickness of the tungsten filament, a thick filament will last longer than a thin one. But a thick filament does not get as hot so it produces less light. That's the trade-off—if you want more life, you get less light and vice versa. A standard bulb's life is 750–1000 hours and longer life bulbs last 1000–1500 hours. People often ask what causes a bulb to burn out prematurely. One reason is over-voltage. If an incandescent bulb is subjected to a higher than rated voltage or even a surge or spike, it will cause the filament to overheat and it will evaporate at a much faster rate, the result—short life. Another reason for short life is shock and vibration. If the bulb's filament is not a rough service design with filament supports, shock and vibration may shorten its life.



Incandescent Lamp Parts

Filament
Coil of tungsten wire. Tungsten is used because it has the highest melting point of any metal.

Lead-In Wires
Conduct the current from the base through the glass bulb to the filament. The part exposed to the inert gas is made of nickel. The part embedded in the glass is made of dumet and the part connected to the base is made of copper.

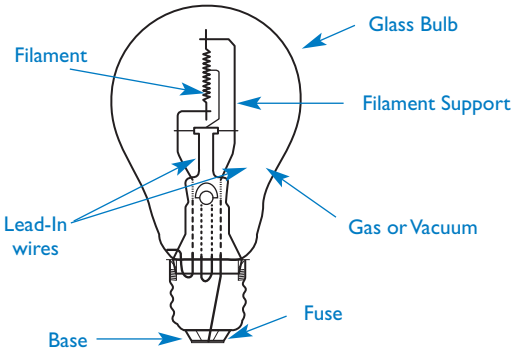
Filament Support
This part protects the filament from shock and vibration.

Glass Bulb
Prevents oxygen from attacking or oxidizing the filament. The glass bulb will contain a vacuum or an inert gas.

Gas or Vacuum
Inert gas contained in the bulb is usually a mixture of nitrogen and argon. Krypton is also used. A vacuum is used in low wattage bulbs.

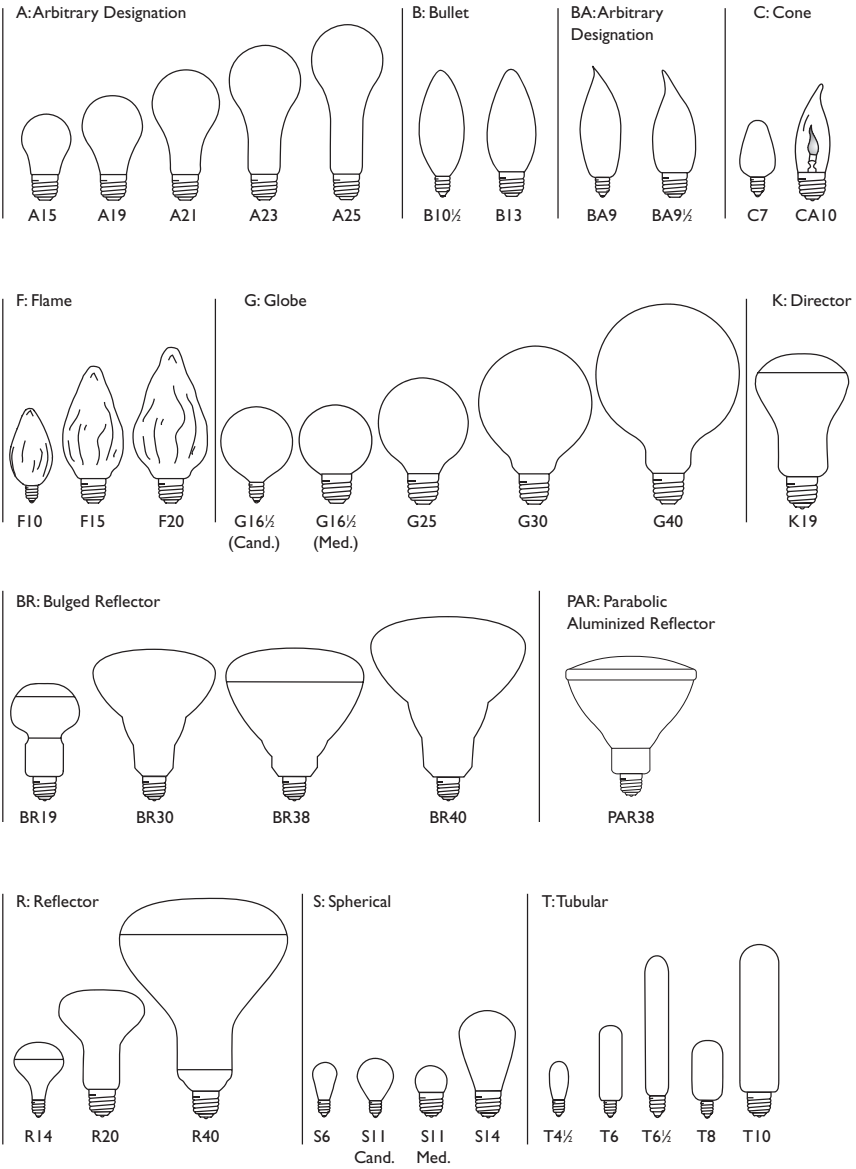
Base
Provides a means of connecting the bulb to the socket. Bases are made of aluminum or brass. Brass bases are anti-corrosive. The bases are attached to the bulb with basing cement.

Fuse
Usually an arc forms when the filament fails which could trip the circuit breaker in the lighting circuit. The fuse prevents the filament from drawing excess current when it fails.

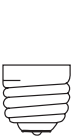


Incandescent Bulb Shapes

- Letters designate the shape of the glass bulb.
- Numbers indicate the diameter of the bulb in eighths of an inch.
- For example, "A19" indicates an Arbitrary Designation shaped bulb having a diameter of 1⅞ or 2 ⅜ inches.

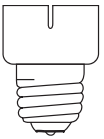


Incandescent Bases

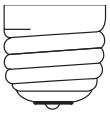


Medium
Med.

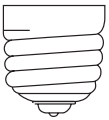
Three Contact
Med. 3C Med.



Medium Skirted
Med-Skt.



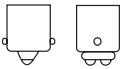
Mogul



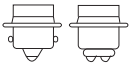
Three Contact
Mogul 3C Med

Miniature
Candelabra

Candelabra
Can.



Candelabra
Bayonet Style (S.C. Bay.)
or Double Contact
(D.C. Bay.)

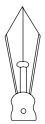


Candelabra
Prefocus
S.C.Pf., D.C.Pf.

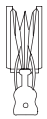
Intermediate
Inter.

Incandescent Filaments

Filament designations consist of a letter or letters to indicate how the Tungsten wire is coiled, and an arbitrary number to indicated the arrangement of the filament on the supports. C=Coiled Filament—filament in a single coil CC=Coiled Coil— filament is coiled and then coiled again, reducing its length. Filament supports are elements that protect the filament from shock and vibration. The more filament supports a bulb has the more shock resistant it is. A RoughHouse™ or a Tough Bulb™ has many filament supports that cushion and protect the filament from shock and vibration.



C-2V
CC-2V



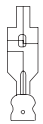
C-5

C-6
CC-6

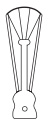
2CC-6

C-7A

C-8
CC-8

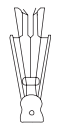


2CC-8



C-9

C-11
CC-11

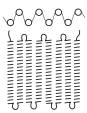


C-13
CC-13

C-2R
CC-2R

RC-9

MP



BP

FF

M

SC

CC-6

CC-8

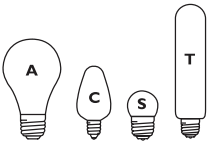
Incandescent Bulb Finishes

Clear Bulbs		Provide sparkle, especially in fixtures that are made of chrome, have mirrored surfaces, multiple sockets or have cut glass parts. If glare is a problem, use a dimmer or a lower wattage bulb to reduce brightness. Clear bulbs are also used in fixtures with reflectors.
Soft White		Provides the ultimate in soft, uniform, diffused illumination with reduced glare.
Inside Frost		Reduced glare
Natural Light		Natural Light's distinctive blue coating reduces dull light effects to provide light that is more vibrant and natural. Philips Natural Light bulbs can help you to see things as they should be. Their light is more like natural daylight.
Colored		Used to create a festive party atmosphere or a special effect. Available in Blue, Green and Red 60 watt A19.
Agro		Promotes plant growth by producing the appropriate light spectrum for plants to thrive.

Incandescent Types

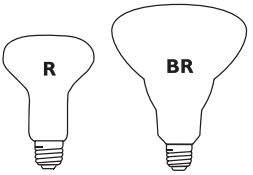
General Service

Includes, A, C, S, and T shape bulbs. Used mainly for general illumination.



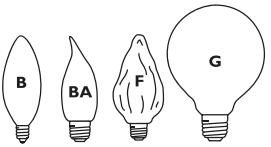
Reflector Types

Provide directional illumination. Reflector bulbs (R) and (BR) are often used in recessed down lights and track lighting. They have a soft, smooth beam and are available in spot and flood. They cannot be used outside in open fixtures.



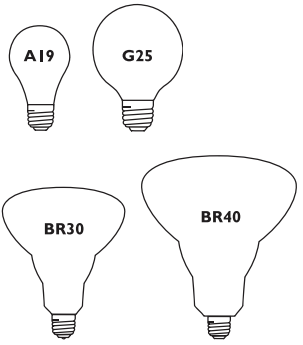
Decorative

"Deco" bulbs come in a myriad of shapes, sizes, and finishes. They are most often used when the bulb is in direct view. Decorative bulbs meet a variety of decorative needs including Chandeliers, Wall Sconces, Vanity Strips, and surface mounted decorative fixtures.



Industrial Grade and Contractors Choice

Also referred to as 130 volt bulbs. These bulbs are designed to last 3 times as long as a standard incandescent. 130 volt bulbs have an extra thick filament and are ideal for hard to reach applications and areas that have a lot of surges and spikes on the power line. Because of the thick filaments, they produce less light than a standard bulb, and have a warmer color appearance than standard bulbs.



Incandescent Featured Products

Natural Light

Try changing your current light bulbs to **Philips Natural Light!** Natural Light's distinctive blue coating reduces dull light effects to provide light that is more vibrant and natural. The wrong lighting can make anyone appear older. The right lighting can make skin tones and color look natural and healthy. Philips Natural Light bulbs can help you to see things as they should be. Their light is more like natural daylight.

The Natural Light line includes:

- Standard
- 3-Way
- Vanity Globes
- Decoratives
- Reflector Floods
- Fan Lights

Incandescent Featured Products

DuraMax®

Philips DuraMax® Long Life Light Bulbs reduce the hassle of replacing light bulbs every few months, since all DuraMax products last longer than standard incandescent light bulbs. A wide assortment of shapes, sizes and wattages ensure that there is a DuraMax product to meet most basic lighting needs.

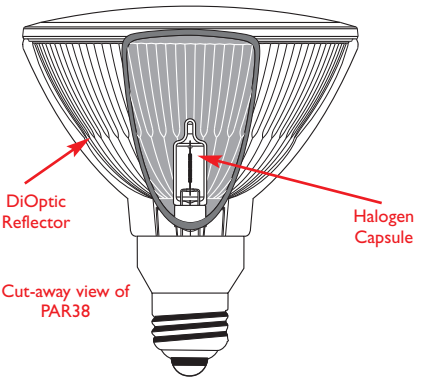
The DuraMax line of light bulbs includes:

- SoftWhite
- SoftWhite 3-Way
- Reflectors
- Fan Lights
- Globe
- Sparkling Clear
- Decorative

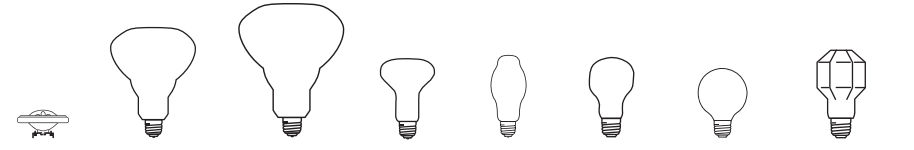
Halogen Lighting

Halogen Operation

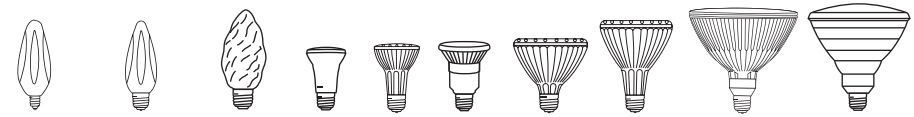
Halogen Bulbs are technically incandescent bulbs, but they have three features that make them superior to standard incandescent. They are brighter, whiter, and last longer. A Halogen lamp has a thin filament, which produces more light than its thicker counterpart. This makes Halogen brighter and whiter. But how does it last longer with a thin filament? The answer is…The Halogen Cycle. The filament is in a glass capsule. The glass capsule contains an incandescent bulb, but before the tungsten deposits on the bulb wall, the halogen gas transports it back to the filament—replenishing it and keeping the bulb clean and bright. The halogen gas actually regenerates the filament. This is why Halogen bulbs last much longer and stay bright throughout their life. However, the tungsten does not go back exactly to the same spot on the filament, so eventually it gets weak at one point and fails, ending the cycle. Halogen lamps are available for low-voltage (12V) operation (for which a transformer is needed) or for 120 volt as direct replacements for incandescent lamps.



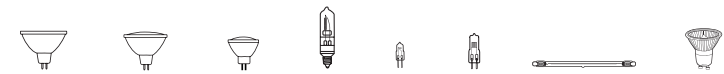
Halogen Bulb Shapes



ALU-Pro III
BR30
BR40
R20
BT15
T60
G25
CP19

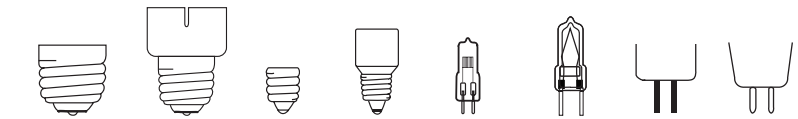


F10½ Candelabra
F10½ Stylized Flame
F15 Postlight
PAR16
PAR20
PAR20 Electronic
PAR30S
PAR30L
PAR38 Dioptic Reflector
PAR38 Standard Reflector

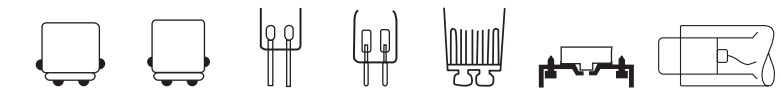


MR16
MRC16
MRC11
T4 Mini-Can
T3
T4
T3 RSC
Twistline

Halogen Bases



Medium Med.
Medium Skirted
Candelabra Can.
Mini Candelabra
Bipin G-4/GY-6.35
Widepin GY-8.6
GU4
GU5.3



B15d
BA15d
G4
GY6.35
GU10
G53
Recessed Single Contact RSC

Screw bases are made of Aluminum, Brass or Nickel-Plated Brass. Aluminum is the most economical material. Brass and Nickel-Plated Brass bases are corrosion resistant and are used on bulbs designed for outdoor use, very long life, or in corrosive environments. Brass bases or Nickel-Plated Brass bases should be used in applications where corrosion might cause a bulb to seize in the socket and make replacement difficult.

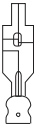
Halogen Filaments

Filament designations consist of a letter or letters to indicate how the wire is coiled and an arbitrary number sometimes followed by a letter to indicate the arrangement of the filament on the supports. Prefix letters include C (coil)— wire is wound into a helical coil or it may be deeply fluted; CC (coiled coil)—wire is wound into a helical coil and this coiled wire again wound into a helical coil. Some of the more commonly used types of filament arrangements are illustrated.

C-2V
CC-2V

C-6
CC-6

C-8
CC-8



2CC-8

CC-6

CC-8

Halogen Types

Halogen Specialty Double-Ended (Linear)

These 100–500 watt lamps are 120 volt and must be used in an enclosed fixture. Care must be exercised when using these types due to the heat created by 300–500 watts. Typical applications include torchieres, outdoor flood lighting, portable lighting and general lighting.

Halogen Specialty Capsules

These tiny halogen lamps produce a sparkling white light. Halogen capsules must always be used in an enclosed fixture. Common applications include task lighting and under cabinet lighting. Low voltage types require a fixture with a 12 volt transformer. 120 volt types require a fixture specifically designed for 120 volt operation. Never interchange 12 and 120 volt types.

Halogen Specialty MR16

These small low voltage (12 volt) lamps require a fixture with a transformer. They produce brilliant white light with excellent beam control. If the fixture does not have a cover glass over the face of the bulb, a covered MR16 must be used. MR16s are often used in track lighting and down lighting.

Halogen Featured Products

Halogená® Energy Saver Light Bulbs

The new **Halogená® Energy Saver** bulbs save energy, without sacrificing the qualities of traditional light bulbs. They provide bright white light, work with dimmer switches, and are available in familiar shapes.

Halogená Energy Saver bulbs are available in standard "A-shape", floods, and decoratives. Just screw them into your fixtures and your home will look great while you save energy.

- Up to 47% energy savings*
- Bright, white light
- Fully dimmable
- Contains NO mercury
- Lasts 2 years†
- Instant-on

* When compared to a 75-watt 1,500 hour incandescent R20 bulb rated at 570 lumens, this 40-watt Halogená Energy Saver provides similar light, longer life and up to 47% energy savings.

† Lasts 2 years based on 4 hours average usage per day/7 days per week.

Halogen Featured Products

Halogená® Household

Superior Light Quality

- Provides bright, white light
- Maintains a high light quality when dimmed

Lasts 2 Years[1]

- Fewer light bulb changes means less hassle
- Great choice for hard-to-reach fixtures

The Benefits You Need

- Dimmable—change the mood of the room, saves energy
- Replaces standard incandescent bulbs
- Contains NO mercury

1) Lasts 2 years based on 4 hours average usage per day/7 days per week.

Halogen Featured Products

Halogená® Reflector floods

Superior Light Quality

- Provides bright, white light
- Maintains a high light quality when dimmed

Lasts 2 Years[1]

- Fewer light bulb changes means less hassle

The Benefits You Need

- Dimmable—change the mood of the room, saves energy
- Use as a design tool—accent art and architecture as well as enhance your outdoor landscape

Beneficial Features of Halogená PARs

- Smooth, round beam of light
- More light output per watt than BR type reflectors
- Rugged design allows indoor or outdoor use[2]

1) Lasts 2 years based on 4 hours average usage per day/7 days per week.
2) For indoor or outdoor use. A weather-protected fixture is recommended for wet locations.

Halogen Featured Products

Natural Light Plus

Provides light similar to natural daylight

- Enhance true colors
- See details more clearly

Delivers clean, clear light that's ideal for indoor activities such as:

- Hobbies, computer time, reading, homework

Dimmable

- Let's you change the mood of the room

Long Life

- Lasts 2 Years![1] Long life reduces the hassle of changing burned-out light bulbs

The Natural Light Plus line includes:

- Standard (BT15)
- Reflectors: PAR16, PAR20, BR30, BR40

1) Lasts 2 years based on 4 hours average usage per day/7 days per week.

Compact Fluorescent Lighting

Energy Saver Compact Fluorescent Bulb Shapes


EL/mDT

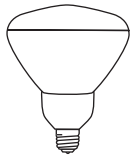

EL/DT

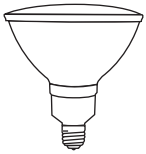

EL/3W


EL/mDT GU24


EL/A R20


EL/A R30


EL/A R40


EL/A PAR38

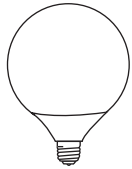

EL/Can


EL/mCan


EL/A G16½

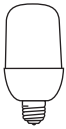

EL/A G25


EL/A G30


EL/A G40

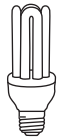

EL/A FAN


EL/A SWP


EL/O


EL/A SWP BAW


SLS EL/T


EL/Genie

Energy Saver Compact Fluorescent Bases


Medium Med. E26


Candelabra Can. E12


GU24

Energy Saver Featured Products

Energy Saver Universal

Direct replacement for incandescent bulbs

- Provides warm and inviting soft white light
- Fits into incandescent fixtures and can be used in enclosed fixtures

Long life

- Lasts at least 11 years[1]

Energy savings

- Saves up to $112 over the life of the lamp when you replace a 100W A19 incandescent lamp with a 25W energy saver universal[2]

1) Based on an average daily usage of 3–4 hours, 7 days per week.
2) Energy savings based on wattage saved x replacement lamp rated average life (15,000 hours) ÷ 1000 x $0.10 kWh rate.

Energy Saver 3-Way Twister

Direct replacement for incandescent bulbs

- Double Helix Technology—utilizes two separate burners to provide three distinctive light levels
- Instant on
- Settings are low/medium/high
- Save 39/77/116 watts in your 3-Way lamps when you replace a 50/100/150 watt incandescent 3-Way with an 11/23/34 energy saver 3-Way twister
- Optimized color quality to match incandescent lamps
- Harp extenders included

Long life

- Lasts 7 years[1]

1) Based on an average of hours usage per day/7 days per week. Hours differ between products and there are exceptions. See individual packaging for details.

Energy Saver Featured Products

Energy Saver Soft White Plus

Direct replacement for incandescent bulbs

- Provides warm and inviting soft white light
- Fits into incandescent fixtures
- Shape and size similar to an incandescent A19

Long life

- Lasts 7 years[1]

Energy savings

- Saves up to $44 over the life of the lamp when you replace a 75W A19 incandescent lamp with a 20W energy saving soft white plus lamp[2]

1) Based on an average daily usage of 3–4 hours, 7 days per week.
2) Energy savings based on wattage saved x replacement lamp rated average life (8000 hours) ÷ 1000 x $0.10 kWh rate.

Energy Saver GU24 Twisters

- Self-ballasted
- Simple twist and lock design to allow quick and easy replacement
- Instant on
- Compact size fits most GU24 fixtures
- Meets California's Energy Efficiency Standards for Residential and Nonresidential Buildings (24 CCR 6)

Long life

- Lasts 9 years[1]

Energy savings

- Saves up to $77 over the life of the lamp when you replace a 100W A19 incandescent lamp with a 23W energy saving soft GU24 twister[2]

1) Based on an average of hours usage per day/7 days per week. Hours differ between products and there are exceptions. See individual packaging for details.
2) Energy savings based on wattage saved x replacement lamp rated average life (10,000 hours) ÷ 1000 x $0.10 kWh rate.

Energy Saver Featured Products

Energy Saver Twisters

Direct replacement for incandescent bulbs

- Instant on
- Select wattages available in a variety of color temperatures

Long life

- Lasts at least 9 years[1]

Terrific energy savings

- Saves up to $129 over the life of the lamp when you replace a 150W A21 incandescent lamp with a 42W energy saving decorative twister[2]

1) Based on an average of hours usage per day/7 days per week. Hours differ between products and there are exceptions. See individual packaging for details.
2) Energy savings based on wattage saved x replacement lamp rated average life (12,000 hours) ÷ 1000 x $0.10 kWh rate.

Energy Saver Floods

Direct replacement for incandescent bulbs

- Select R30 wattages available in a variety of color temperatures
- Fits into incandescent fixtures
- Dimmable reflector—dims down to 10%

Long life

- Lasts 7 years[1]

Energy savings

- Saves up to $77 over the life of the lamp when you replace a 120W PAR38 incandescent reflector with a 23W energy saver PAR38 reflector[2]

1) Based on an average of 3–4 hours usage per day/7 days per week.
2) Energy savings based on wattage saved x replacement lamp rated average life (8000 hours) ÷ 1000 x $0.10 kWh rate.

Energy Saver Featured Products

Energy Saver Decoratives

Direct replacement for incandescent bulbs

- Provides warm and inviting soft white light
- Fits into incandescent fixtures
- Similar look of a standard incandescent globe
- Globes are perfect for bathroom vanity strips
- Candles offered in candelabra and medium base

Long life

- Lasts 7 years[1]

Energy savings

- Saves up to $84 over the life of the lamp when you replace a 100W G30 incandescent globe with a 16W Energy Saver G30 Globe[2]

1) Based on an average daily usage of 3–4 hours, 7 days per week.
2) Energy savings based on wattage saved x replacement lamp rated average life (10,000 hours) ÷ 1000 x $0.10 kWh rate.

Energy Saver Product Selection

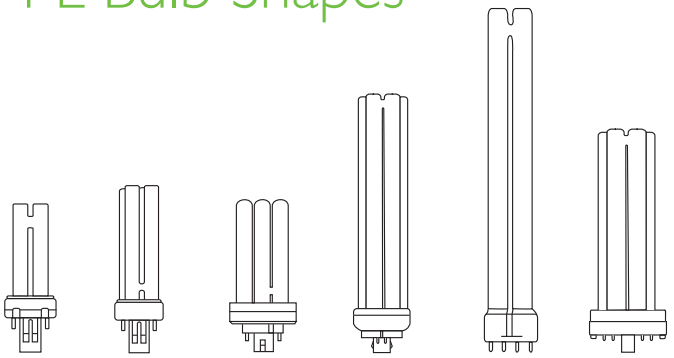
	Bulb Type	Twister	3-Way	GU24	Soft White Plus	Reflector Flood	Dimmable Reflector Flood	Decorative Globe	Decorative Candle	Outdoor	Bug-A-Way	Universal	Genie
	Table/Floor Lamp	●	●	●	●							●	●
	Outdoor Postlight	●			●			●	●	●	●	●	●
	Wall Sconce	●		●	●				●			●	●
	Surface Mount	●		●								●	●
	Reading Lamp	●	●	●	●				●			●	●
	Border Lights				●					●	●	●	
	Recessed Fixture			●		●	●					●	
	Open Hanging	●		●	●	●	●	●		●	●	●	●
	Vanity Strip							●					
	Ceiling Fan			●	●			●	●				
	Chandelier								●				

PL Compact Fluorescent Lighting

Energy savings made simple

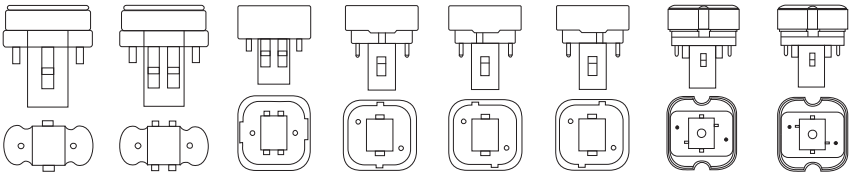
Philips PL Compact Fluorescent Lamps offer designers, specifiers and end-users new levels of efficiencies and versatility in sizes, configurations and application possibilities. There are many fixtures available to complement the small size, high light output and advanced technology of the lamps.

PL Bulb Shapes

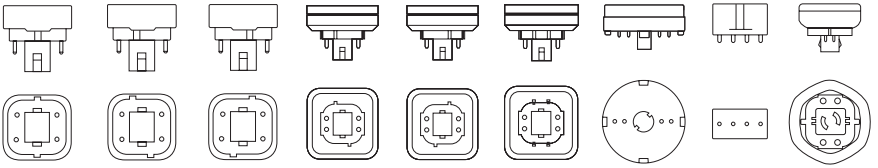


PL-S PL-C PL-T 57W PL-T PL-L PL-H

PL Base Shapes



G-23 GX23 GX23-2 G24d-1 G24d-2 G24d-3 GX32d-2 GX32d-3



G24q-1 G24q-2 G24q-3 GX24q-2 GX24q-3 GX24q-4 2G8-1 2G11 GX24q-5

PL Family of Compact Fluorescent Lamps

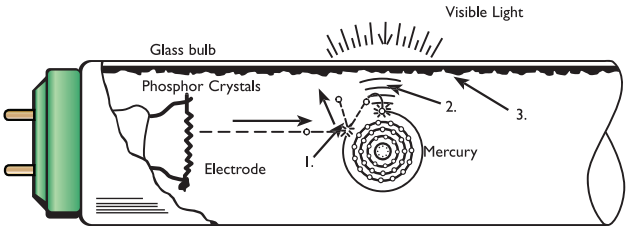
- High lumen output
- Excellent lumen maintenance
- Compact size
- Ideal for interior lighting application

	2700K	3000K	3500K	4100K	5000K
PL-S (2-pin)					
5W	●			●	
7W	●		●	●	●
9W	●		●	●	●
13W	●	●	●	●	●
PL-C (2-pin)					
13W	●	●	●	●	
18W	●	●	●	●	
XEW 14W	●		●	●	
26W	●	●	●	●	
XEW 21W	●		●	●	
15mm 20W*	●	●	●		
15mm 27W*	●	●	●		
PL-C (4-pin)					
13W	●	●	●	●	
18W	●	●	●	●	
26W	●	●	●	●	
PL-T (4-pin)					
18W	●	●	●	●	
26W	●	●	●	●	
32W	●	●	●	●	
XEW 27W		●	●	●	
42W	●	●	●	●	
XEW 33W		●	●	●	
57W*		●	●	●	
PL-L (4-pin)					
18W		●	●	●	
24W		●	●	●	
36W		●	●	●	
40W		●	●	●	
XEW 25W		●	●	●	
50W		●	●	●	
55W					●
80W		●	●	●	
PL-H (4-pin)					
60W		●		●	
85W		●		●	
120W		●		●	

**Non-ALTO® lamps*

Fluorescent Lighting

Fluorescent Lamp Operation



Operation

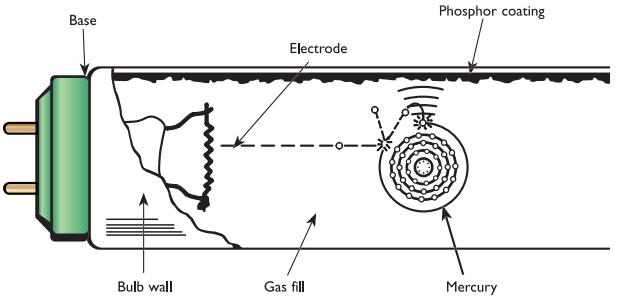
When started, the electrodes at each end of the lamp emit electrons.

1. The electrons travel through the tube in the form of an electrical current. The electrons collide with the mercury atoms contained in the glass bulb.
2. After the collision, the mercury atom releases invisible ultraviolet energy.
3. The ultraviolet energy strikes the phosphor coating and the phosphor converts the ultraviolet to visible light.

Ballast

All fluorescent lamps need a ballast to operate properly. The ballast provides the proper starting voltage and limits the current through the lamp. It is important to have the correct ballast for proper operation. The ballast label has important information such as which lamps the ballast will operate and a wiring diagram.

Fluorescent Lamp Parts



Bulb wall

A glass tube or bulb coated with phosphors.

Gas fill

Usually an electrically conductive mixture of neon and argon gas is used. Krypton/Argon blend is used in Econ-o-watt™ lamps.

Mercury

All fluorescent lamps contain a small amount of liquid mercury which vaporizes during lamp operation. Philips ALTO® lamps contain less mercury than standard lamps.

Base

The base is cemented to each end of the lamp to connect the bulb to the electrical circuit.

Electrode

The electrodes are a coiled tungsten wire that conducts electricity to the gas fill. The electrodes are sputtered away as the lamp starts and is vaporized as it operates. When the electrodes are used up, the lamp can no longer start. Philips bulbs contain an exclusive electrode guard that minimizes end blackening.

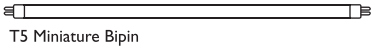
Phosphor Coating

Phosphor coating on the bulb wall converts ultraviolet energy to visible light in a process called fluorescence. Newer, more expensive phosphor coatings are used on bulbs to provide high color rendering, higher lumen maintenance, and higher light output.

Fluorescent Bulb Shapes

The letter indicates the shape of the bulb and the number tells us the diameter in eighths of an inch.

- Example: A T8 Bulb is a tubular shape that is 8 eighths or one inch in diameter.



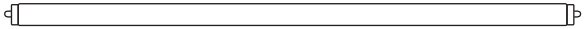
T5 Miniature Bipin

T8 Medium Bipin

T12 Medium Bipin

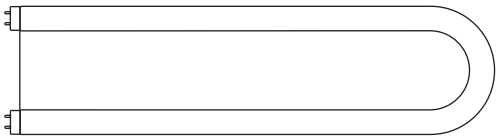
T8 Recessed Double Contact

T12 Recessed Double Contact

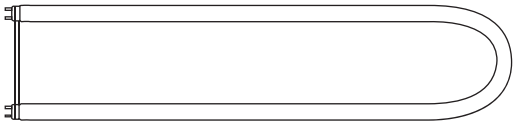


T8 Single Pin Slimline

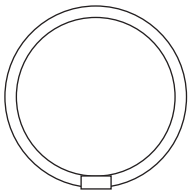
T12 Single Pin Slimline



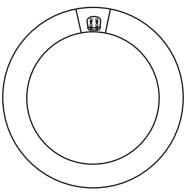
T12 Medium Bipin U-Bent Lamp (6")



T8 Medium Bipin U-Bent Lamp



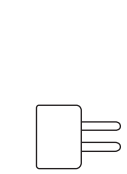
T5 Circular



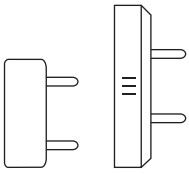
T9 Circline 4-Pin

Fluorescent Bases

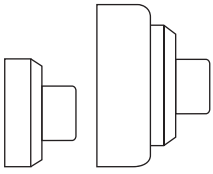
A green color base indicates the lamp is a low mercury ALTO® lamp. See page 38 for more on ALTO II™ Technology.



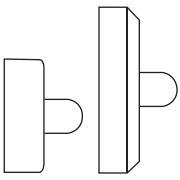
Miniature Bipin T5
Min. Bipin



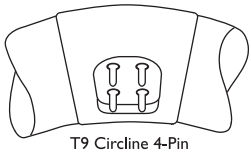
Medium Bipin T8/T12
Med. Bipin



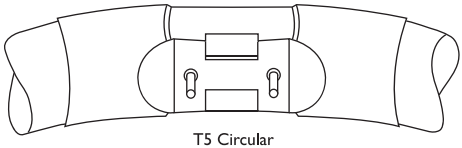
Recessed Double Contact T8/T12
Recessed D.C.



Slimline Single Pin
T8/T12

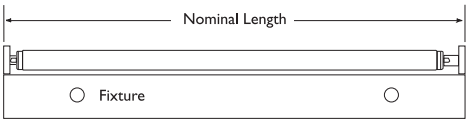


T9 Circline 4-Pin

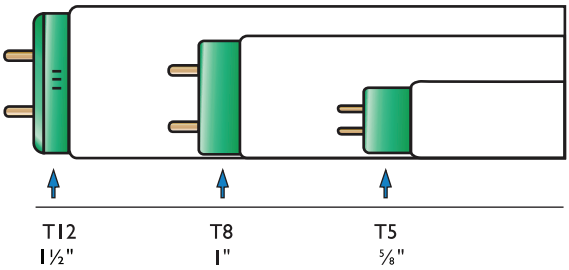


T5 Circular

To determine the length of a fluorescent lamp, you do not measure the lamp. The Nominal Length of the bulb is the measurement from back of socket to back of socket on the fixture.



To determine the type of lamp you need, measure the endcap and use the illustration below as a guide.



Fluorescent Types

Preheat Lamps

The first type of fluorescent lamps was preheat. These lamps require a starter or preheat switch. Several seconds of warm-up time is required before starting. They are usually 30 watts or less and equipped with a bipin base.

Slimline (Instant Start) Lamps

The ballast provides sufficient voltage to start these lamps instantly. Only a single pin on each end of the lamp is required.

Rapid Start Lamps

Are the most popular type, usually 32 watts or more. Continuously heated electrodes provide smooth, fast starting (~1 second) without a starter. Rapid start lamps are available with Bipin and Recessed Double Contact bases.

Fluorescent Featured Products

T8 Lamps featuring ALTO II™ Technology

Mercury in T8 lamps

All fluorescent lamps need a small amount of mercury to operate efficiently but Philips has worked hard to reduce the mercury levels. With the use of ALTO® Lamp Technology, Philips set a standard by reducing the amount of mercury in T8 lamps to a then industry-low 3.5mg. With the new ALTO II™ Technology, fluorescent T8 lamps now have only 1.7mg of mercury and still deliver outstanding performance. And to further help reduce environmental impact, Philips only uses recycled mercury in the lamp.

Better for the environment. Same performance characteristics.

There is a misconception that lowering the mercury will reduce lamp life, energy savings or light output—this is not the case. Philips has developed an innovative way to lower the mercury level without sacrificing life or any other performance parameters.

Fluorescent Featured Products

Consumer Fluorescent Lamps Collection

Soft White for Kitchen and Bath
- Comfortable, pleasant light
- Great for the kitchen, bath, or any room
- Flattering light that shows colors accurately
- Enhances skin tones and furnishings

Cool White Plus
- General purpose light
- Cool white color
- Outperforms shop lights
- For the garage, workshop or basement

Natural Sunshine
- Simulates natural, full-spectrum light
- Bright, white light
- For any room in the home

Daylight Deluxe
- Creates a cool, refreshing environment
- Arctic-white light
- For any room in the home

BlackLight
- True Blacklight-blue fluorescent light
- Ideal for special-effect lighting
- White objects have a dramatic glow under blacklight

Plant & Aquarium
- Helps promote plant growth and enhances the appearance of aquarium fish
- The right spectrum for growing indoor plants
- Ideal for freshwater aquariums

Consumer Fluorescent Lamp Color Selection Chart

This chart combines 4 foot fluorescent lamps and can help you select appropriate colors.

HomeLight Collection	Cool White	Soft White
The mood of the light	General purpose light for the home. Ideal for the garage, workshop, or basement.	Comfortable, pleasant light that shows color accurately. Ideal for the kitchen, bathroom, or any room
Color Scale: = Soft light 6500= Vibrant, white light (a)	4100K	3000K
On a scale of 0 to 100, the lamp's ability to show colors accurately (b)	70	85
Also known as…	Cool, Cool White	Warm Deluxe, Kitchen & Bath, Warm White

HomeLight Collection	Natural Sunshine	Daylight Deluxe
The mood of the light	Simulates natural, full-spectrum light. Bright white light. Ideal for any room where more natural light is desired.	Creates a cool, refreshing environment. Arctic white light. Can be used in any room.
Color Scale: = Soft light 6500= Vibrant, white light (a)	5000K	6500K
On a scale of 0 to 100, the lamp's ability to show colors accurately (b)	92	79
Also known as…	Full Spectrum, Sunshine, Sunlight	Daylight, Daybright

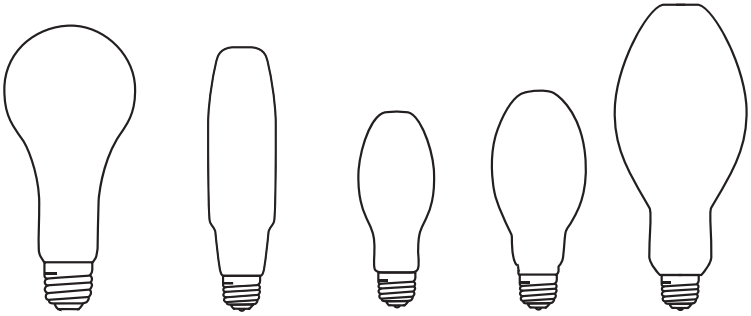
a) Color is a personal preference. Select a bulb that creates the mood you desire to have in the room.
b) A higher number can make a big difference, even in laundry rooms. Then you will be able to distinguish between similar colors.

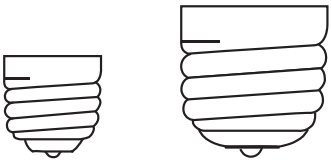



High Intensity Discharge

HID Bulb Shapes and Bases

All Philips HID lamps feature a corrosion resistant brass base and have been lubricated with a black spot of graphite to ensure easy lamp removal at end of life.





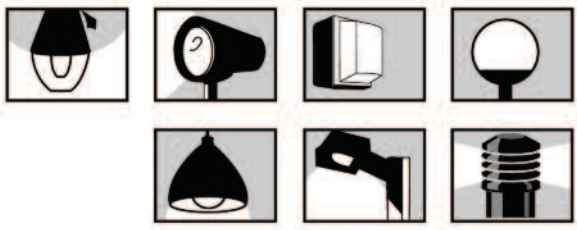
Featured Products

Mercury Vapor

Mercury Vapor lamps feature low initial cost, but have higher operating costs than HPS or Metal Halide due to its lower efficiency. The clear mercury bulb has a bluish green appearance and the Deluxe White has a higher color rendering. Mercury lamps get dimmer over time and rarely burn out, so it is wise to replace them and restore light level. Mercury lamps are used for landscape lighting, dusk to dawn fixtures, roadway, parking lots, floodlight, and security.

- Life = +24,000 hours
- CRI = Clear 20, Deluxe White 45
- Color Temperature = Cool
- Efficiency = up to 55 Lumens per Watt

Mercury Bulb	ANSI Code from ballast
50 watts	H46
75 watts	H43
100 watts	H38
175 watts	H39
250 watts	H37
400 watts	H33



Featured Products

Quartz Metal Halide

Metal Halide lamps are the fastest growing segment of the HID family due to their crisp white light, high efficiency, and good color rendering. Because of their good color rendering, Metal Halide lamps are used in interior as well as exterior applications. Metal Halide lamps are used extensively in shopping malls, retail commercial buildings, roadway lighting, parking lots, airports, sports lighting, and building flood lighting.

- Life = 7500–20,000 hours
- CRI = 65
- Color Temperature = Cool, 4000K
- Efficiency = up to 100 Lumens per Watt

ANSI Code from ballast	Metal Halide Bulb
150 watts	M107
175 watts	M57
250 watts	M58
400 watts	M59

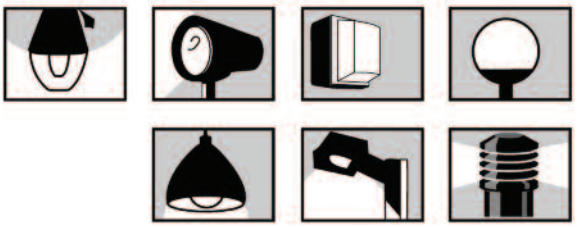
Featured Products

High Pressure Sodium (HPS)

High Pressure Sodium lamps are the most efficient HID lamps available. If color rendering is not critical and energy saving is important, HPS is an excellent choice. HPS lamps attract less insects than other light sources. HPS fixtures cycle on and off when it is time to replace the bulb. Applications include security lighting, dusk-to-dawn fixtures, parking lots, flood lighting, roadway, and Industrial/ Commercial installations.

- Life = +24,000 hours
- CRI = 20
- Color Temperature = Golden White, 2100K
- Efficiency = up to 125 Lumens per Watt

HPS Bulb	ANSI Code from ballast
35 watts	S76
50 watts	S68
70 watts	S62
100 watts	S54
150 watts	S55
250 watts	S50
400 watts	S51



Philips Energy Saving Substitution Guide

Present Lamp	Suggested Substitute Energy Saving Lamps	Light Level	Watts Saved per Socket	Annual Energy Cost Savings per Socket*
7W Nightlight	4W Nightlight	55%	3	$1.20
40W G25 Globe	Energy Saver Vanity Globe 9W	120%	31	$12.40
60W BR30 Halogen Fl.	Energy Saver R30 Flood 15W	107%	45	$18.00
60W Soft White A19	45W EcoVantage Soft White A19	96%	15	$6.00
	40W Halogená® Energy Saver T60	96%	20	$8.00
	Energy Saver SLS 14W	104%	46	$18.40
	Energy Saver Soft White Plus 14W	96%	46	$18.40
	Energy Saver Twister 13W	105%	47	$18.80
65W BR30 Flood	40W BR30 Halogená® Energy Saver Flood	101%	25	$10.00
75W Soft White A19	50W Halogená® Energy Saver T60	104%	25	$10.00
	55W EcoVantage Soft White A19	98%	20	$8.00
	Energy Saver SLS Universal 20W	113%	55	$22.00
	Energy Saver Soft White Plus 20W	104%	55	$22.00
	Energy Saver Twister 18W	118%	57	$22.80
75W R20 Flood	40W Halogená® Energy Saver R20	114%	35	$14.00
	Energy Saver R20 Flood 14W	100%	61	$24.40
75W BR30 Flood	50W BR30 Halogená® Energy Saver Flood	107%	25	$10.00
	Energy Saver R30 Flood 15W	100%	60	$24.00

Philips Energy Saving Substitution Guide (Continued)

Present Lamp	Suggested Substitute Energy Saving Lamps	Light Level	Watts Saved per Socket	Annual Energy Cost Savings per Socket*
85W BR40 Flood	50W BR40 Halogená® Energy Saver Flood	98%	35	$14.00
90W Halogen PAR38	70W Halogená® Energy Saver PAR 38	121%	20	$8.00
100W Soft White A19	70W Halogená® Energy Saver T60	5%	30	$12.00
	75W EcoVantage Soft White A19	111%	25	$10.00
	Energy Saver SLS Universal 25W	105%	75	$30.00
	Energy Saver Twister 27W	122%	73	$29.20
100W G30 Globe	Energy Saver Deco Globe G30 16W	104%	84	$33.60
100W G40 Globe	Energy Saver Deco Globe G40 23W	158%	77	$30.80
100W Postlight	60W F15 Halogená® Post Top	90%	40	$16.00
120W BR 40 Flood	70W BR40 Halogená® Energy Saver Flood	105%	50	$20.00
	Energy Saver R40 23W Flood	108%	97	$38.80
250W R40 Heat Lamp	175W R40 PAR 38 Heat Lamp	NA	75	$30.00
F32 T8	F32 T8/XEW 25W	97%	7	$2.80
F40 T12	F34 T12/EW	85%	6	$2.40
F96 T12	F96 T12/EW	85%	15	$6.00
F96 T12 HO	F96 T12/HO/EW	85%	15	$6.00

* Based on 4000 operating hours per year @ .10 cents per kWh

Lighting Formulas

Energy Savings Calculator

To calculate energy dollars saved over the life of a bulb, use this formula. All you need is your Present Bulb Wattage and the Replacement Bulb Wattage and Lamp Life.

Present Bulb Wattage		Watts
Subtract		
Replacement Bulb Wattage		Watts
Equals Wattage Saved		Watts
Multiply		
By Replacement Bulb Life		Hours Life
Equals Energy Saved		Watt-Hours
To Convert to Kilowatt Hours Divide by 1000	÷1000	
Equals Energy Saved		Kilowatt Hours
Multiply		
By Your Kilowatt Hour Rate		
Equals Energy Dollars Saved by Each Bulb	$	
Multiply		
By Number of Bulbs in Your Facility		
TOTAL DOLLARS SAVED Over the rated average life of the bulbs	$	

Lighting Formulas

Use this formula to determine the diameter of the beam of a reflector or PAR lamp at a specific distance. You will need a scientific calculator and the beam diameter in degrees.

Formula: (Beam Spread÷2) tan x Distance x 2 = Beam Diameter

On scientific calculator: Enter beam spread, divide by two, hit equal, hit tangent button (TAN), multiply by distance, multiply by two—this equals the diameter of the beam.

Example: 90PAR 38 HAL/FL28° at 12 feet distance, what will the diameter of the beam be?

On scientific calculator:	
Enter beam spread 28°	28
Divide by 2	2
Hit equal button	14
Hit tangent button	.2493
Multiply by distance	12 feet
Multiply by 2	2
Equals diameter of beam	5.98 feet or about 6 feet

Use this formula to determine the illuminance in footcandles (FC) hitting a target from a reflector or PAR lamp at a specific distance. You will need the Maximum Beam Candlepower (MBCP) for the specific bulb and the distance from the lamp to the target. You can get the MBCP from the Philips Lamp Specification and Application Guide.

Formula: FC = MBCP/D^2

Take the MBCP and divide by the distance squared (distance x distance)

Example: 90PAR 38 HAL/FL28° at 12 feet distance, what will the illuminance in footcandles be?

The MBCP is 4500 candlepower
The distance squared is 12 feet x 12 feet or 144 square feet
4500/144 = 31.25 footcandles or about 30FC

Working towards Sustainability

Sustainability offers a world of opportunities to improve quality of life and create value for individuals, communities and the company. We firmly believe that socially and environmentally sound behavior contributes to sustained profitable growth and value creation. That's why we are embedding sustainability throughout the organization and in our products and addressing key issues such as energy efficiency and toxicity.

They may not have called it "sustainability" back in 1891, but improving the quality of people's lives—the lives of our customers, our workers and society as a whole—was inherent in our mission from the start. Fast forward to the present, Philips is breaking new ground in advancing sustainable values and practices with new business models that will benefit current and future generations.

In 1980, Philips pioneered the compact fluorescent lamp. In 1995, our landmark launch of ALTO® low-mercury lamp technology pioneered a whole new lighting category. Then in 2005 Philips introduced the MasterColor® Integrated 25W PAR38 which can save 65 watts per socket simply by replacing a 90 watt standard halogen PAR lamp.

Environmental performance

We regard environmental improvement as an opportunity for innovation. With a tradition of sound environmental policy for more than 30 years, we are guided by the basic principle that prevention is better than cure. And our team of lighting specialists and supply partners are ready to meld our vision with yours to help you meet or exceed your sustainability goals.

† ALTO products pass the U.S. EPA's Toxicity Characteristic Leaching Procedure (TCLP) and can be classified as non-hazardous waste. Check with state and local regulations regarding disposal.

How to Use Our Catalog From SAG-100

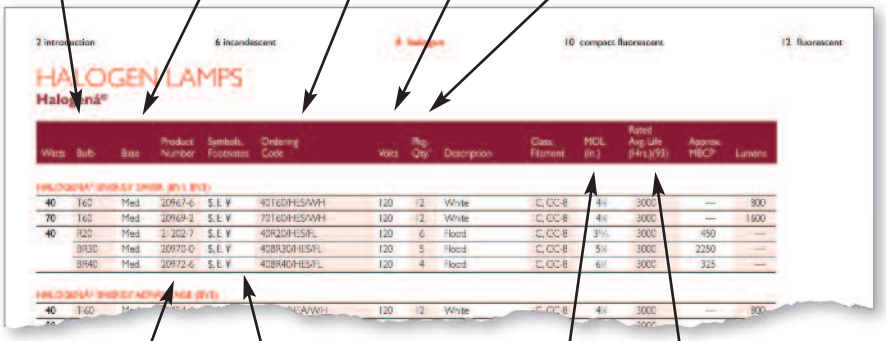
Bulb: Bulb designations indicate approximate shape and size.

Ordering Code: Must be used when placing orders.

Package Qty.: Number of lamps packaged in a shipping container. (Quantity shown is minimum shipping container.)

Base: Full base names and configuration drawings are shown in the back of each lamp section.

Volts: For lamps listed with voltage ranges.



Pyramid Symbol: Footnote, explanation is listed at the back of each lamp type section.

M.O.L.: Maximum Overall Length in inches.

Product Number: Both Product Number and complete ordering code should be used when placing orders.

Rated Average Life: the length of operation (in hours) at which point an average of 50% of the lamps will still be operational and 50% will not.

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How to read the Ballast Catalog Number

Catalog Number Example

- R-2S40-TP V-2S40-TP REL-2P32-SC
- R=120 Volt V=277 Volt I=120–277V
- H=347/480V G=347 Volt JC=277–480V
- EL = Electronic Ballast
- 2 = # of Lamps operated by the Ballast
- S = Circuit Type–Series
- P = Circuit Type–Parallel
- 32 = Lamp Wattage
- 40 = Lamp Wattage
- TP = Thermal Protection

Basic Construction Types

- Electromagnetic (Low Frequency)
- Electronic (High Frequency)

Size of a Ballast

- Ranges from:
  - —½ lbs. choke ballast to 25 lbs. sign ballast
- Generally:
  - — the larger the lamp, the larger the ballast

Purpose of a Ballast

- Incandescent Lamps
  - —Designed to start at 120V
  - —Size of filament regulates current
- Fluorescent Lamps
  - —Starting voltage dictated by lamp length and diameter
  - —Lamp itself will not regulate current

Ballast Function

- Provides starting voltage to the lamp
- Limits current through the lamp

In Preheat and Rapid Start Lamps:

- Provides proper cathode heating

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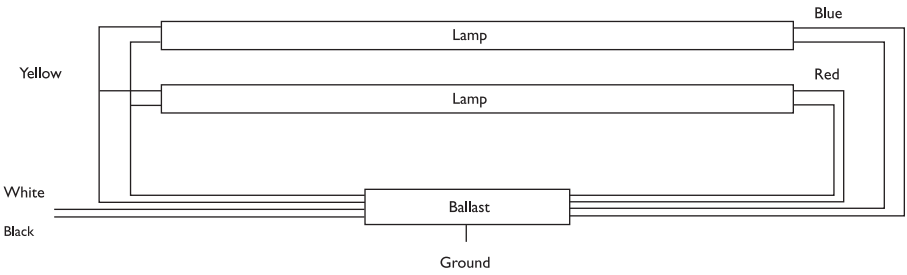
Features / Benefits—Magnetic

- Industry standard
- Energy saving–10% vs. older models
- Proven reliability–> 50,000 hrs. of operation
- Easy replacement
- Low frequency operation–eliminates interference concerns
- Popular models will be outlawed in 2010. No longer being used in new fixtures

Series Rapid Start Circuit

- Series
  - —Rapid Start
  - —One Lamp Out–All Lamps Out
  - —Industry standard for T12 Lamps

2 Lamp Series Rapid Start Circuit



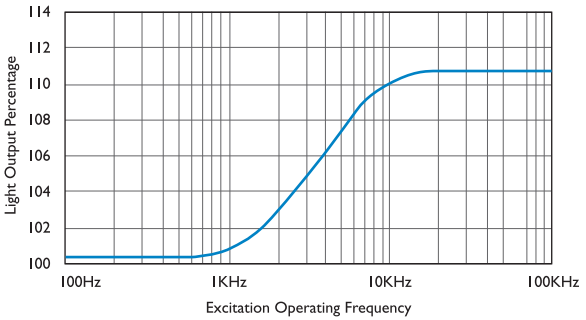
Electronic Ballasts

- Operate same lamps as Magnetic
- Use more components
- Smaller size
- Operates lamps at "High Frequency" >40,000 Hz

Operating Frequency

- Why >40,000 Hz?
  - —Lamps more efficient at high frequency
  - —Higher light output for same watts as 60 Hz
  - —Same light output as 60 Hz for fewer watts
  - —Helps avoid interference with other high frequency electronic equipment
- Input Frequency—power line frequency
  - —50 Hz or 60 Hz (cycles per second)
- Output Frequency—lamp operating frequency
  - —50 Hz or 60 Hz for Magnetic & Hybrid
  - —>40,000 Hz for Electronic ballasts

Light Output and Operating Frequency

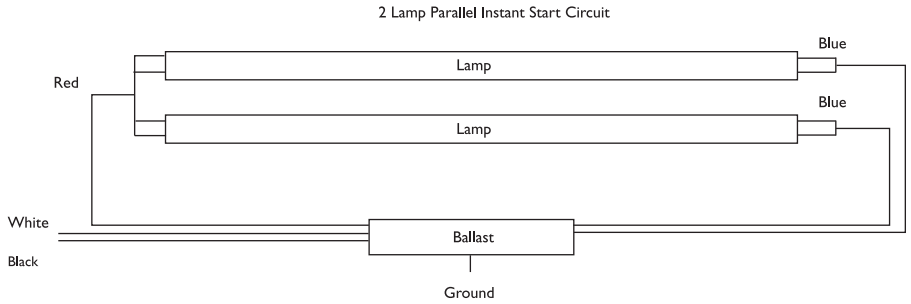


Features / Benefits—Electronic

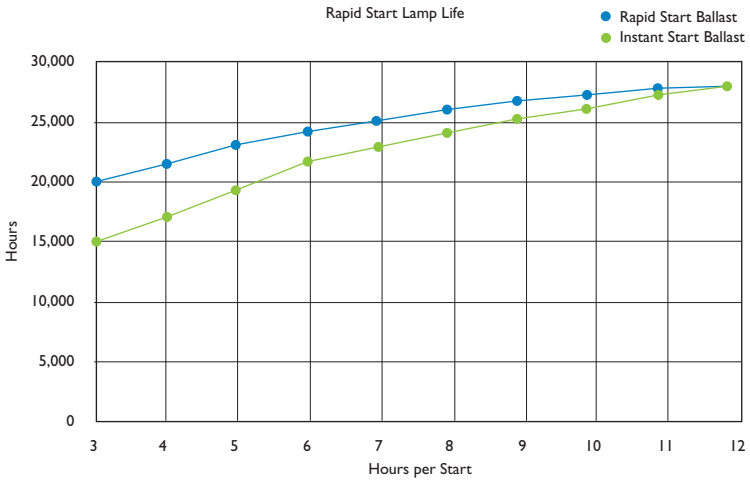
- Most energy efficient design—saves 20-30%
- Lightweight – 4 ft unit = 1.5 Lbs.—Less stress on ceiling and easier to install
- Quiet Operation—reduces or eliminates ballast humming
- Smaller size (SC)—same mounting dimensions—easier to handle
- Proven reliability—15 year track record
- Used in all new commercial fixtures

Parallel Instant Start Circuit

- Parallel
  - —Instant Start
  - —Independent Lamp Operation—
    One lamp out the others remain lit



Lamp Life Instant Start vs. Rapid Start



Qualifying Questions to Ask the Customer

When qualifying customers to determine their specific need for a ballast, be sure to consider the following:

- Type and length of lamp in the customer's fixture. The description etched on the end of the lamp is the best way to determine this piece of information.
- The number of lamps in the fixture being operated by the ballast and the number of ballasts in the fixture.
- Energy efficiency—Can the customer use an electronic ballast to replace a magnetic ballast in their application.
- Catalog number and manufacturer of the ballast the customer is looking to replace. Utilize cross reference chart to determine correct replacement if existing unit is not Advance.

Frequently Asked Questions

Question: Why do ballasts hum?

Answer: Magnetic components in the ballast create noise due to their movement when regulating voltage and current. Potting material helps dampen this sound but it is still audible at 24–36 decibels.

Question: What is the black smoke that comes from a ballast at its end of life?

Answer: That is potting material being burned due to the ballast overheating. This could be caused by a bad lamp being left in the fixture for too long or the ballast overheating due to component failure.

Question: Can fluorescent lamps be dimmed?

Answer: Yes, but you must use a specific dimming ballast for the lamp type and use a fluorescent dimmer not a standard incandescent dimmer.

Question: How do I determine the correct ballast to use?

Answer: You must know the lamp description / lamp type in the fixture. This may be found etched on the end of the fluorescent lamp. You must also know the number of lamps the ballast needs to operate. This may be found on the ballast label. You must also know the operating voltage of the ballast needed. This may also be found on the ballast label. In addition, there are upgrade opportunities with electronic ballasts to reduce energy costs. See your Home Depot associate and find out if your application allows for this upgrade.

Question: What are the benefits of electronic ballasts?

Answer: Lower electric bill, lighter weight, cooler and quieter operation, longer life and more environmentally friendly.

Glossary

Absorption Conversion of light to heat by interaction with matter.

Accent Lighting Concentrated light on a subject which highlights it and causes it to stand out from its surrounding. Depending on degree of drama desired, accent light should minimally be 10x the general light or ambient light.

Alternating Current (AC) Flow of electricity which cycles of alternates direction many times per second. The number of cycles per second is referred to as frequency. The most common frequency used in this country is 60 Hertz (cycles per second).

Amalgam A mixture of mercury and other metals used in Compact Fluorescent lamps to allow the lamps to have a stable light output over a wide range of temperatures and burning positions. The amalgam causes the lamp to have a 60 second warm-up time.

Ambient Lighting General lighting, or lighting of the surrounding area.

American National Standards Institute (ANSI) A consensus organization which coordinates voluntary standards for the physical, electrical, and performance characteristics of lamps, ballasts, luminaires, and other lighting and electrical equipment.

Amperes (amps or A) The unit of measurement of electric current. The is current related to voltage and power as follows:
Current (amps) = Power (watts) / Voltage (volts).

Arc Discharge (in gas or vapor) Electric discharge that produces light without a filament.

Average Illuminance (E_{av}) Over a surface. Illuminance averaged over the specified surface.

Ballast The ballast is an electrical device that performs two basic functions: 1) provides the starting voltage and 2) limits the current to sustain lamp operation.

Ballast types for fluorescent lamps:

Instant Start: Instant start electronic ballasts are the most popular type of electronic ballast today because they provide maximum energy savings and they start lamps without delay or flashing. Since they do not provide lamp electrode heating, instant start ballasts consume less energy than comparable rapid start, program rapid start or programmed start ballasts. As a result, they provide the most energy efficient solution to fluorescent lamp ballasting. The instant start ballast uses 1.5 to 2 watts less energy per lamp than the rapid start alternative.

Instant-start electronic ballasts provide a high initial voltage (typically 600V for F32T8 lamps) to start the lamp. This high voltage is required to initiate discharge between the unheated electrodes of the lamp. However, the cold electrodes of lamps operated by an instant start ballast may deteriorate more quickly than the warmed electrodes of lamps operated by a rapid start, program rapid start or programmed start ballast. Lamps operated by instant start ballasts will typically withstand 10–15K switch cycles. Instant start ballasts are typically wired in *parallel*. This means that if one lamp fails, the other lamps in the circuit will remain lit.

Rapid Start: Rapid start ballasts have a separate set of windings which provide a low voltage (approx. 3.5 volts) to the electrodes for one second prior to lamp ignition. A starting voltage somewhat lower than that of instant ballast (typically 450–550V for F32T8 lamps) is applied, striking an electrical arc inside the lamp. Most rapid start electronic ballasts continue to heat the electrode even after the lamp has started, which results in a power loss of 1.5 to 2 watts per lamp. Lamps operated by a rapid start electronic ballast will typically withstand 15–20K switch cycles. Rapid start ballasts are typically wired in *series*. This means that if one lamp fails, all other lamps in the circuit will extinguish.

Programmed Start: Programmed start (PS) electronic ballasts provide maximum lamp life in frequent starting conditions (up to 50,000 starts). PS ballasts use a custom integrated circuit (IC) which monitors lamp and ballast conditions to ensure optimal system lighting performance. Life Program rapid start ballasts, PS ballasts also precisely heat the lamp cathodes. However, PS ballasts heat the lamp cathodes to 700°C prior to lamp ignition. This puts the least amount of stress on the lamp electrodes, resulting in maximum lamp life regardless of the number of lamp starts. Programmed start ballasts are typically wired in *series*.

Ballast types for HID lamps:

Reactor: Single coil, very efficient, but poor voltage regulation to the lamp.

Constant Wattage Autotransformer (CWA): Employing two coils, the ballast is less efficient then reactor types, but have better voltage regulation. Most popular type in use.

Magnetically Regulated (Mag Reg) or Regulated Lag (Reg Lag): Three coils make for very effective voltage regulation but also not very efficient.

Electronic: Allows for both high efficiency and the best voltage regulation.

Base The end of the lamp that inserts into lamp socket.

Beam Spread The angle over which the intensity of the beam drops to 50% of its peak intensity. Measured in degrees.

Brightness A visual sensation that describes how much light an area appears to emit. There are no units of measure for brightness; its measurement is relative. In other words, more or less bright.

British Thermal Units (BTUs) Measurement of heat produced Unit BTU, BTUs per hour = watts x 3.413

Bulb The glass outer or envelope of a lamp. Also, a lamp is commonly referred to as a bulb.

Burning Position The position in which a lamp is designed to be operated.

Canadian Standards Association (CSA) An organization that writes standards and tests lighting equipment for performance as well as electrical and fire safety. Canadian provincial laws generally require that all products sold for consumer use in Canada must have CSA or equivalent approval.

Candela (cd) (Luminous Intensity) The intensity base unit for light. Intensity is the luminous flux emitted from a point per unit solid angle into a particular direction, regardless of distance.

Candlepower (cp) Luminous intensity expressed in candelas.

Chromaticity See color temperature.

Class "P" Ballast Contains a thermal protective device, which deactivates the ballast when the case reaches a certain critical temperature. The device resets automatically when the case temperature drops to a lower temperature.

Color Appearance The color impression when looking directly at a light source.

Color Rendering Expression for the effect that the light has on the color appearance of objects.

Color Rendering Index (CRI) A method for describing the effect of a light source on the color appearance of objects, compared to a reference source of the same color temperature (CCT). The highest CRI attainable is 100. Originally based on an eight standardized color comparisons, it was later extended to fourteen colors.

Color Temperature or Correlated Color Temperature (CCT) The color temperature of a light emitter refers to the temperature to which one would have to heat a "blackbody" source (Planckian radiator) to produce light of similar overall appearance or chromaticity. A low color temperature implies warmer color (more yellow/red) light while high color temperature implies a cooler light (more blue). The standard unit for color temperature measurement is expressed in Kelvin (K).

Compact Fluorescent Lamp (CFL) The general term applied to families of smaller diameter fluorescent lamps, some of which have built-in ballasts and medium screw bases for easy replacement of incandescent lamps.

Cone Photoreceptors in the retina containing light-sensitive pigments responsible for seeing color.

Contrast The difference between the object and its background.

Cornice Lighting Lighting system comprising light sources shielded by a panel parallel to the wall and attached to the ceiling, distributing light over the wall.

Correlated Color Temperature The temperature of a piece of metal whose perceived color most closely resembles that of a compared light source at the same brightness. Unit Kelvin, K.

Cosine Law of Incidence The law that states that illuminance at a point on a plane is proportional to the cosine of the angle of light incidence (the angle between the direction of the incident light and the normal to the plane). $E=I/d^2\cos$

Cove Lighting Lighting system comprising light sources shielded by a ledge or recess, and distributing light over the ceiling and upper wall.

Diffuse Reflection Diffusion by reflection in which, on the macroscopic scale, there is no regular reflection.

Diffused Lighting Lighting in which the light is not coming mainly from one particular direction.

Diffuser Device used to alter the distribution of light and depending essentially on the phenomenon of diffusion.

Diffusion (scattering) Change of the distribution of a beam of light when it is deviated in many directions by a surface or by a material.

Dimmer A device in the electrical circuit for varying the light output from lamps in a lighting installation. Dimming an incandescent lamp extends its life.

DiOptic Reflector A segmented, dual parabolic reflector that increases the reflector efficiency up to 20%.

Direct Current (DC) Flow of electricity continuously in one direction.

Direct Glare Glare resulting from high luminances or insufficiently shielded light sources in the field of view.

Direct Lighting Lighting by means of fixtures or luminaires that have 90 to 100 percent of the light reaching the working plane directly.

Directional Lighting Lighting in which the light on the working plane or on an object is coming predominately from one particular direction.

Discharge Lamp Lamp in which the light is produced, directly or indirectly, by an electric discharge through a gas, a metal vapor, or a mixture or several gases and vapors.

Discomfort Glare Glare that causes discomfort without necessarily impairing the vision of objects.

Dispersion To split light into the colors of the rainbow.

Distance (D) The distance from the light source to the working plane.

Downlight (Can, High Hat) Small luminaire, which distributes the light downward, usually recessed in the ceiling.

Efficacy Of a source. Efficacy is the rate at which lamp is able to convert electrical power (watts) into light (lumens), expressed as lumens per watt. Divide light produced (lumens) by the power consumed (watts). Lumens/watts = LPW. Units lumen per watt, LPW, lm/W

Efficiency Often misused term in lighting, to describe lumens per watt; the correct term is efficacy. See efficacy.

Electric Discharge The passage of an electric current through gases and vapors. This results in the emission of electromagnetic radiation (light).

Electromagnetic Spectrum A continuum of electric and magnetic radiation that can be characterized by wavelength or frequency. Visible light encompasses a small part of the electromagnetic spectrum in the region from about 380 nanometers (violet) to 770 nanometers (red) by wavelength.

Electronic Ballast A short name for a fluorescent high frequency electronic ballast. Electronic ballasts use solid state electronic components and typically operate fluorescent lamps at frequencies in the range of 25–35 kHz. The benefits are: increased lamp efficacy, reduced ballast losses, and lighter, smaller ballasts compared to electromagnetic ballasts.

Emergency Lighting Lighting provided for use when the supply to the normal lighting fails.

Energy Policy Act (EPACT) Comprehensive energy legislation passed by the US Congress in 1992. The lighting portion includes lamp labeling and minimum energy efficacy (lumens/watt) requirements for many commonly used incandescent and fluorescent lamp types. Similar legislation is being proposed in Canada.

Escape Lighting That part of the emergency lighting provided to ensure that an escape route can be effectively identified and used in case of failure of the normal lighting system.

Federal Communications Commission A US Federal Agency which is charged with regulating emissions in the radio frequency portion of the electromagnetic spectrum. For example, a regulation entitled, "Part 18" deals with electromagnetic interference (EMI) from all lighting devices operating at frequencies higher than 9 kilohertz (kHz). Typical electronically-ballasted compact fluorescent lamps operate in the range of 24–100 kHz.

Flicker Impression of fluctuating brightness or color.

Floodlight 1) A fixture designed for floodlighting, usually capable of being pointed in any direction and of weatherproof construction. 2) A lamp with a wide beam of light usually greater than 20° beam spread.

Fluorescent Lamp Discharge lamp of the low-pressure mercury type in which most of the light is emitted by a layer of fluorescent material excited by the ultraviolet radiation from the discharge. For example: F40T12.

Footcandle The unit of measure for the density of light on a surface unique to the USA. One footcandle is equal to one lumen per foot (lm/ft^2). One footcandle = 10.674 lux.

Full Spectrum Lighting There is no official definition of the term "full spectrum" but most agree that it is a source that has a cool temperature and a high color rendering that mimics natural daylight. Philips Colortone 50 or C50 is described as a full spectrum light source.

Fuse Safety device to prevent excess current flow.

General Lighting (Ambient Lighting) Lighting designed to deliver a predominately uniform level of light throughout an area.

Glare Glare is an interference with visual perception caused by an uncomfortably bright light source or reflection within one's field of view; a form of visual noise. In its simplest form, glare (unwanted light) is a consequence of the human eye to adapt to different light levels. In the case of glare, the eye adapts to the high level of the glare source, which makes it difficult to perceive details in the now too dark work area.

Direct Glare: Glare resulting from high luminances in the visual environment that are directly visible from a viewers position; such as an insufficiently shielded luminaire.

Reflected Glare or Veiling Reflection: A reflection of incident light that partially or totally obscures the details to be seen on a surface by reducing the contrast.

Discomfort Glare: Glare which is distracting or uncomfortable (subjective), which interferes with the perception of visual information, but which does not significantly reduce visual performance.

Disability Glare: The effect of light which significantly reduces visual performance and perception; such as car high beams in your face on a dark country road.

Group Relamping An economical method to predict bulb life and replace all lamps at one time. Saves time and money.

Halogen Lamp Gas-filled lamp containing a tungsten filament and a proportion of halogen gas. The halogen gas recycles evaporated particles of tungsten back onto the filament surface.

Heat Measured in British Thermal Units (BTUs). Unit BTUs per hour = watts x 3.413

High Intensity Discharge Lamps (HID) HID lamps include groups of lamps known as Mercury Vapor, Metal Halide, and High Pressure Sodium.

High Pressure Mercury (Vapor) Lamp A long life lamp, with or without a coating of phosphor, in which an arc flowing through mercury vapor produces a bluish-white light. Deluxe phosphor coated lamps have a higher CRI.

High Pressure Sodium Lamps (HPS) A high efficiency and long life bulb in which an arc flowing through sodium vapor produces a yellow light.

Hot Re-Strike Time In HID lamps, the amount of time after a momentary power interruption to return of full light output. Ranges from 1–15 minutes or more, depending on lamp type and fixture.

Illuminance
The total density of visible light—from all directions—illuminating, falling on or incident to, a surface. Standard unit of measure for illuminance is LUX (lx) which is lumens per square meter (lm/m^2). See Footcandle.

Illumination Application of light to a scene, objects or their surroundings so that they may be seen.

Incandescent (electric) Lamp Lamp in which light is produced by heating a filament to incandescence by the passage of an electric current.

Indirect Light On a surface. The light received by the surface from a lighting installation after reflection from other surfaces.

Indirect Lighting Lighting by means of fixtures or luminaires that have 90–100 percent of the light reaching the working plane indirectly or reflected from the ceiling or walls.

Infrared Radiation Long wavelengths of energy, that heat objects instantly.

Instant-start Lamp Fluorescent lamp designed to start without reheating of the electrodes. Usually has a single pin and starts instantly.

Intensity (I) Of a source in a given direction. Used mainly in directional light sources; the strength of the beam. Unit candela, cd.

Inverse Square Law This law says that the measured flux density from a light source decreases along any line from the source. It falls off in proportion to the square of the relative distance traversed. Thus the illuminance measurement 2 feet from the light source will be ¼ of the measurement 1 foot from the source—not ½.

Kilowatt (Kw) A measure of electrical power equal to 1000 watts.

Kilowatt Hour (kWh) The measure of electrical energy from which electricity billing is determined. For example, at the rate of $0.10 per kWh, a 100 watt lamp operating for 2000 hours will cost $20.00 (100 x 2000/1000 = 200 kWh x .10 = $20.00)

Lamp An artificial source of light commonly referred to as a bulb. Also portable luminaire equipped with a cord and a plug.

Lamp Mortality See Mortality Rate.

Light Radiant energy that stimulates the sense of sight. The "visible" part of the electromagnetic spectrum from 380–770 nm. Light is the energy which allows us to see.

Light Output Amount of light produced by a light source such as a lamp. Measured in lumens or candlepower.

Lighting (or illumination) Application of light to a scene, objects, or their surroundings so that they may be seen.

Louvre Shield made of translucent or opaque material and positioned to prevent lamps from being directly visible over a given angle.

Low Pressure Sodium Lamp (LPS) The most efficient man made light source. LPS only produces yellow light therefore it has a 0 CRI. Example: A SOX lamp.

Lumen (lm) SI unit of luminous flux. Photometrically, it is the luminous flux emitted within a unit solid angle (lsr) by a point source having a uniform luminous intensity of 1 cd.—or—The SI unit for measuring the flux of light being produced by a light source or received by a surface.

Luminaire (light fixture) A complete lighting unit which consists of lamp(s), ballast(s)—if applicable—as well as mechanism for light distribution, lamp protection and alignment and connection to power.

Luminance (L) In a given direction, the amount of light coming off of the surface. Unit candela per square foot, cd/ft^2.

Lux (FC) The metric unit of illuminance. The amount of lumens falling on an area measured in square meters. One lumen falling on one square meter is equal to one lux.

Maximum Beam Candlepower (MBCP) The maximum intensity of the beam in a given direction. Usually in the center of the beam. Unit candela, cd.

Mercury Vapor Lamp A high-pressure mercury lamp in which the light is produced by the mercury vapor and sometimes by a layer of fluorescent material on the inner surface of the outer bulb excited by the ultraviolet radiation of the discharge.

Metal Halide Lamp Discharge lamp that produces a white light with good color rendering and high efficiency.

Maximum Overall Length (MOL) Maximum Overall Length is measured from the top of the bulb to bottom of the base.

Mortality Rate The number of operating hours elapsed before a certain percentage of the lamps fail.

Mounting Height The distance between fixtures and the working plane.

Operating Current Current in amps consumed by a lamp at rated watts.

Operating Voltage Voltage at rated watts after a lamp fully warms.

PAR Lamps Parabolic Aluminized Reflector lamps which offer excellent beam control, come in a variety of beam patterns from spot to flood, and can be used outdoors unprotected because they are made of "hard" glass that can withstand adverse weather.

Parabolic A concave mirror, the reflecting surface of which has the shape of a paraboloid, capable of focusing rays parallel to its axis to a point.

Peak intensity The luminous intensity of a luminaire or lamp in the direction of the beam axis.

Pendant (Pendant) Luminaire Luminaire provided with a cord, chain, tube, etc. which enables it to be suspended from a ceiling or other support.

Point Source A source of light in which the dimensions are small, compared with the distance between the source and the working surface. Produces sharp shadows.

Power Factor Power factor in lighting is primarily applicable to ballasts. It is the ration of watts over volts multiplied by amperes. Since volts and watts are fixed, amperes (the current) will go up as the power factor goes down. This necessitates the use of larger wire sizes to carry the increased amount of current needed with low power factor ballasts as compared to high power factor ballasts.

Preheat Fluorescent Lamp A fluorescent lamp designed for operation on a circuit requiring a manual starting switch or a starter to preheat the electrodes in order to start the arc.

QL Induction Lamp (System) A super long life lamp (system), based on the low-pressure mercury discharge principle, but without electrodes, in which the ionization of the gas within a discharge vessel is brought about by the induction of a high-frequency electromagnetic field. Philips QL System file = 100,000 hours.

R lamps Reflectorized lamps available in spot (clear face) and flood (frosted face).

Radiation Emission or transfer of energy in the form of electromagnetic waves or particles.

Rapid Start Fluorescent Lamp A fluorescent lamp designed for operation with a ballast that provides a low-voltage winding for preheating the electrodes and initiating the arc without a starter or the application of high voltage. Takes about one second to start.

Recessed Luminaire Luminaire mounted above the ceiling or behind a wall or other surface so that any visible projection is insignificant.

Reflectance Ration of the reflected light to the incident light on a surface.

Reflected Glare Glare resulting from reflections of high brightness sources in polished or glossy surfaces in the field of view.

Reflection Light striking a surface is either absorbed, transmitted, or reflected. Reflected light is that which bounces off the surface, and it can be classified as specular or diffuse reflection. Specular reflection is characterized by light rays which strike and leave a surface at equal angles. Diffuse reflection leaves a surface in all directions.

Reflector Device in which the phenomenon of reflection is used to alter the distribution of the light source.

Reflector Lamp Lamp in which part of the bulb is coated with a reflecting material, either diffuse or specular, so as to control the light. Example: R, BR, PAR bulbs.

Re-strike Time The time it takes for a lamp to re-strike after a power interruption. In most HID lamps, if the lamp is at full brightness and the power is removed for even a split second, the lamp will extinguish and will have to cool down before it restrikes, which can take between 1–15 minutes depending on lamp type, wattage and fixture variables.

Retina Membrane at the back of the eye which is sensitive to light stimuli and containing photoreceptors (cones and rods) and nerve cells that transmit the stimulation to the optic nerve.

Rod Photoreceptors in the retina containing light-sensitive pigments. Rods probably play no part in color discrimination.

Rough Service Lamps Incandescent lamps designed with extra filament supports to withstand bumps, shocks, and vibrations.

SAD Seasonal Affective Disorder is a type of depression, a feeling of lethargy, that may be related to the reduction of sunlight as days grow shorter. Also known as "Winter Time Blues" or "Cabin Fever". It is sometimes treated with "Full Spectrum" lighting.

Shielding An arrangement of light-controlling material to prevent direct view of the light source.

Spacing The distance between the centers of two successive luminaires in an installation.

Spacing to Mounting Height Ratio (S/M) The ratio of the distance between luminaire centers to the height above the work plane. Gives the maximum spacing of luminaires at which even illumination will be provided.

Speed of Light Approximately 186,000 miles per second.

Spill Light The scattered light of a floodlight falling outside the beam that is usually considered wasted light.

Spotlight A (small) projector giving concentrated light usually not more than 20° beam spread.

Stand-by Lighting That part of emergency lighting that enables normal activities to continue substantially unchanged.

Starter Device for starting a fluorescent lamp that provides for the necessary preheating of the electrodes and/or causes a voltage surge in combination with the series ballast.

Task Lighting Lighting designed for a specific visible operation which requires higher light levels; most often characterized by proximity to that task.

TCLP Toxic Characteristic Leaching Procedure. A US Environmental Protection Agency test for non-hazardous waste, a test designed to measure substances that might dissolve into the ecosystem. Philips ALTO® lamps pass this test.

Transformer Device used to raise or lower voltage to a lamp.

Transmission Passage of light through a material.

Troffer A long, recessed luminaire usually installed with the opening flush with the ceiling.

Tungsten-Halogen Lamp A gas filled incandescent lamp with a tungsten filament containing a certain proportion of halogens (usually bromine).

Ultraviolet Radiation Invisible radiation in which the wavelengths are shorter than those for visible radiation.

Uniformity A measure of the variation of light over a given area expressed as either: 1. The ratio of the minimum to the maximum illuminance, 2. The ratio of the minimum to the average illuminance.

Valance Lighting Lighting system comprising light sources shielded by a panel parallel to the wall at the top of a window.

Visible Radiation Any radiation capable of causing a visual sensation directly.

Visual System The group of structures comprising the eye, the optic nerve, and certain parts of the brain, which is responsible for seeing.

Warm-up Time The amount of time from turn-on to 90% light output.

Watt Unit used to measure electric power consumed by a lamp or any electrical device.

Wavelength Distance of a periodic wave between two successive points at which the phase is the same. Unit meter, m.

Ultraviolet (UV) Radiation Radiant energy in the range of about 100—380 nanometers (nm). For practical applications, the UV band is broken down further as follows:

Ozone-producing .....180–220 nm
Bactericidal (germicidal) .....220–300 nm
Erythermal (skin reddening) .....280–320 nm
"Black" Light .....320–400 nm

Underwriter Laboratories (UL) A private organization which tests and lists electrical (and other) equipment for electrical and fire safety according to recognized UL and other standards. A UL listing is not an indication of overall performance. Lamps are not UL listed except for integrated compact fluorescent lamps—those with screw bases and built-in ballasts.

Volt (V) The unit for measuring electric potential. It defines the force or pressure of electricity.

WISO With Industry Superior Optics. A segmented parabolic reflector designed specifically for an axially mounted halogen capsule. Produces an extremely smooth, round beam with high efficiency.

Work (or working) Plane Reference surface defined as the plane at which work is usually done. Example: The table top is the working plane.

Zenith The direction directly above the luminaire.

Customer Information Hotline

Telephone 1-800-555-0050

Monday–Friday, 8:30am–5:00pm (EST)

- Detailed Product Specifications
- New Products
- Lamp Specifications
- Material Safety and Data Sheets

Philips Customer Service

Telephone 1-800-933-3768 or 1-800-795-2114

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