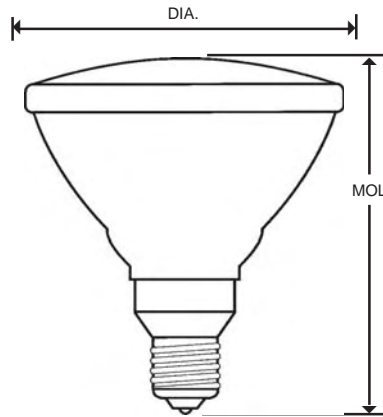
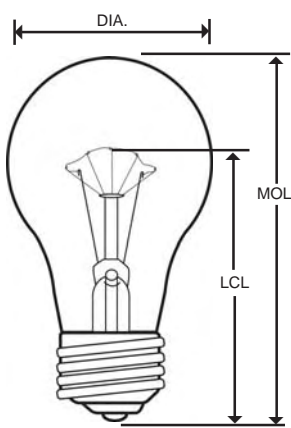


HOW TO MEASURE A BULB



DIA: The diameter of a bulb at its widest point, measured in eighths of an inch.

MOL: Maximum Overall Length from the top of the bulb to the bottom of the base, measured in inches.

LCL: Distance from the center of the light source to the bottom of the base, measured in inches.

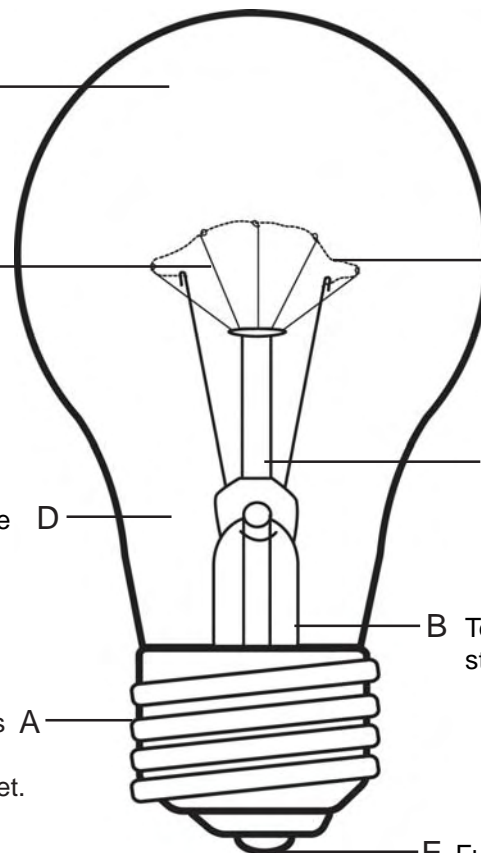
LAMP CONSTRUCTION

Special chemicals are applied inside lamp and on the filament to protect against premature failure.

Long life lamps utilize five filament supports to enhance longevity and guard against filament sagging and breakage.

Argon and Nitrogen gases are used for washing and filling lamps.

Lamp bases made with brass or nickel-plated brass do not freeze or corrode in the socket.



G Long life lamps utilize long, thick coiled filaments.

C Stem type is matched to lamp type to enable exact positioning of filament.

B Tempered glass stem provides strength and durability.

E Fused lead - wire carries electricity from the base to the filament and guards against potential fire hazards.

GLOSSARY OF TERMS

2-Tap: HID ballast that operates at two input voltages: 120, 277.

4-Tap: HID ballast that operates at four input voltages: 120, 208, 240, 277.

5-Tap: HID ballast that operates at five input voltages: 120, 208, 240, 277, 480.

Accent Lighting: Directional lighting used to highlight a particular object or area.

Alternating Current (AC): Electron flow that periodically reverses polarity and direction of travel through a circuit.

Ambient Lighting: The overall general lighting in an area or room.

Ampere (amp): A standard unit of measurement of electrical current. Amps = Watts / Voltage

ANSI (American National Standards Institute): The organization that develops voluntary guidelines and product performance standards for the electrical and other industries.

Arc Tube: A completely sealed quartz or ceramic tube where an electrical arc occurs and generates light.

Argon: Inert gas used in incandescent and fluorescent lamp types. In incandescent light sources, argon retards evaporation of the filament.

Auto-Transformer: A type of transformer that electrically connects the primary and secondary coils. This type of circuit is used to make many ballasts smaller and more efficient.

Average Rated Life: An average rating, in hours, indicating when 50% of a large group of lamps have failed, when operated at nominal lamp voltage and current. Manufacturers use 3 hours per start for fluorescent lamps and 10 hours per start for HID lamps when performing lamp life testing procedures. Every lamp type has a unique mortality curve that depicts its average rated life.

Ballast: A device used to obtain the necessary circuit conditions (voltage, current and waveform) for starting and operating an electric-discharge lamp. All fluorescent and HID light sources require a ballast for proper operation.

Ballast Efficacy Factor (BEF): The ratio of a ballast's light output to input power. Useful for comparing the efficiency of two different ballasts on a light output to power consumption basis.
BEF = % Ballast Factor / Input Power (Watts)

Ballast Factor (BF): The measured ability of a particular ballast to produce light from the lamp(s) it powers. Ballast factor is derived by dividing the lumen output of a particular lamp/ballast combination by the lumen output of the same lamp(s) on a reference ballast.

Ballast Kit: A kit developed to include all necessary parts for the installation of a new ballast. For HID ballast kits this includes: ballast, capacitor, ignitor (if used), and all necessary mounting hardware. For CFL kits this includes: ballast, mounting plate, lead wire set, wire-removal tool and mounting hardware.

Ballast Loss: The total power lost in the operation of the ballast measured in watts. This power is given off as heat energy. It is equivalent to the difference between the input power and the lamp wattage.

Base: The base holds the lamp in place in the fixture and conducts electricity from the circuit to the lamp. It can be designed to dissipate heat.

Beam Angle: The angle between the two directions for which the intensity (candlepower)

Capacitor: A device that can be used to store energy in an electric circuit. This is done via an electric field between two closely spaced conductors.

Cathode Guard: Metal band encircling the cathode of a fluorescent lamp, used to collect the evaporating particles from the cathode, greatly reducing end-blackening.

GLOSSARY OF TERMS

Center Beam Candlepower (CBCP): Refers to the luminous intensity at the center of the beam of a reflector lamp; measured in candelas.

Chromaticity: The aspect of color that includes consideration of its dominant wavelength and purity.

Class H: An operating temperature classification for electrical components established by Underwriters Laboratories. Allows operation up to 180°C.

Class P: A classification for thermally protected ballasts established by Underwriters Laboratories. In Class P ballasts, internal thermal cutoff removes the input power when the specified temperature limits are exceeded.

Coefficient of Utilization (CU): The fraction of initial lamp lumens that reach the work plane. It is a function of luminaire efficiency, room surface reflectance, and room shape.

Coil: Windings of copper wire surrounding a core in a ballast.

Color Corrected: Refers to a lamp with a special phosphor or coating to give it a color rendering profile similar to natural daylight.

Color Rendering Index (CRI): A measurement to rate a lamp's ability to render an object's color on a scale of 0-100, the higher the CRI, the more true to life colors appear, as they would in natural daylight.

Color Spectrum: The visible light spectrum, ranging between 380 (violet) and 770 (red) nanometers in the electromagnetic spectrum.

Color Temperature: The actual color of a light source, also referred to as Correlated Color Temperature (CCT), measured in degrees Kelvin (K). Typical color temperature is:

2700K Incandescent/Fluorescent - Warm White
3000K Halogen/Fluorescent - Soft White
3500K Fluorescent - White
4100K Fluorescent - Cool White
5000K Fluorescent - Natural White
6500K Fluorescent - Daylight

Compact Fluorescent Lamp: A small, fluorescent lamp, often used as an alternative to incandescent lighting, that utilizes small diameter tubes that are bent so that they begin and end in a single base. The lamp life is about 10 times longer than incandescent lamps and is 3-4 times more efficacious.

Constant Wattage Auto-Transformer (CWA): A type of HID ballast reactor that applies a constant wattage to the lamp and uses an auto-transformer to step-up the voltage.

Core: A component of an electromagnetic ballast, which is surrounded by the coil. Core is composed of steel laminations or a solid ferrite material.

Core and Coil Ballast: Another term for an electromagnetic ballast.

Cove Lighting: Refers to light sources mounted above a ledge or in a recess that distribute light upward for ambient lighting.

Crest Factor (Lamp Current Crest Factor): The ratio of the peak lamp current to RMS or average lamp operating current. High current crest factors are detrimental to lamp life and performance. ANSI standard for lamp current crest factor is <1.7.

CSA: Canadian Standards Association. An association that generates product performance and safety standards for many Canadian industries.

cUL: Approval from Underwriters Laboratories for use in Canada.

GLOSSARY OF TERMS

Current: A measure of the rate of flow of electricity, expressed in amperes (A).

Dedicated Voltage: A ballast designed to work on one specific input voltage.

Design Amperes: The approximate current that the lamp will draw at design voltage.

Design Lumens: Lumen value at 40% of rated average life. Also called Mean Lumens.

Diffusion: The even redirection or spreading of light by a lens or diffuser.

Directional Lighting: Illumination on the workplane or on an object predominantly from a single direction.

Discharge Lamp: A light source that produces light by passing a current between electrodes through a vapor or gas. Includes fluorescent and high intensity discharge lamps.

Double-Ended Lamp: Lamps that have two bases or points of electrical connection that provide extra stability in rough service applications.

Down Lighting: A direct lighting unit, usually small, that aims the light downward. Can be recessed, surface mounted or suspended.

Dual Connection: A CFL ballast with both side and bottom exits for the lead wires, allowing use for multiple applications.

Efficacy: Lumen output per unit of power supplied to the ballast.

Electrode: Metal filaments that emit electrons in a fluorescent lamp.

Electromagnetic Ballast: A low-frequency ballast that operates through the use of current carrying coils assembled on a magnetic core.

Electronic Ballast: A ballast that uses semiconductor components to increase the frequency of fluorescent lamp operation (typically in the 20-40 kHz range). Smaller inductive components provide the lamp current control. Fluorescent system efficiency is increased due to high frequency lamp operation. Results are increased lamp efficacy, reduced ballast losses and lighter, smaller ballasts compared to electromagnetic ballasts. Electronic ballasts may also be used with HID (high intensity discharge) lamps.

Elliptical Reflector: Incandescent lamp with a reflector shell that is elliptically shaped. Focuses light immediately in front of the lamp, which reduces absorption and increases efficiency.

EMI/RFI: Electromagnetic Interference or Radio Frequency Interference. Unintentionally generated power during the operation of a ballast that is capable of interfering with other electrical devices operating at high frequencies.

End Blackening: Darkening around the ends of a fluorescent tube caused by particles evaporating from the cathode and adhering to the glass. Lamps made with cathode guards greatly reduce this occurrence.

End-of-Life (EOL) Protection: Circuit in a compact fluorescent ballast that removes power supply to the lamp during abnormal lamp end-of-life. Ballast will reset when a new lamp is installed.

Energy: A measure of work done by an electrical system over a given period of time; measured in kilowatt-hours (kWh).

Energy Policy Act (EPACT): Energy legislation originally passed by Congress in 1992, and updated periodically, mandating labeling and minimum energy efficiency requirements for many commonly used incandescent and fluorescent lamps.

Energy Survey: Systematic cost comparison of an existing system to a proposed system, accounting for electrical, material, maintenance and labor costs.

GLOSSARY OF TERMS

Etch: Markings on the glass envelope or shell of a lamp designating product description, logo and/or brand name.

Exitance: The total light that comes off of a surface. Exitance is dependent upon the illuminance on and reflectance off the surface.

Eyeball: Fixture, usually recessed, which can be rotated to point in a desired direction.

Field Angle: The angle of the cone of light from reflector lamps encompassing the central part of the beam out to the angle where the intensity is 10% of maximum.

Filament: Wire used in incandescent lamps, usually made of tungsten and often coiled, that emits light when heated by an electrical current.

Fixture: Luminaire without lamps.

Floodlight: A reflector lamp designed to produce a broad, relatively diffused beam of light.

Fluorescent Lamp: A glass tube coated on the inside with a fluorescent substance that gives off light when a stream of electrons from the cathode excites mercury vapor in the tube.

Flux: The basic measure of light flow that includes only visible light and is weighted to match the response of the human eye; measured in lumens.

Footcandle (fc): A unit measurement of direct illumination. One footcandle is equal to one lumen per square foot.

Frequency: A measurement of the number of cycles per second; the SI base unit is Hertz (Hz).

Full Spectrum: Broad spectrum light source capable of producing colors throughout the entire range of the visible spectrum, simulating actual sunlight.

General Lighting: Uniform light throughout an area, with no special provisions for task lighting or accent lighting.

Glare: An interference with visual perception caused by an uncomfortably bright light source or reflection within one's field of view.

Grounding: The connection of an electrical component that is a conductor to the "ground" or earth so that the electrical current can pass off into it.

Halogen Cycle: A regenerative cycle of tungsten and halogen atoms, which prevents blackening of the lamp envelope during the life of the lamp.

Halogen Lamp: An incandescent lamp with a filament that is surrounded by halogen gases. Halogen gases allow the filaments to be operated at higher temperatures and higher efficacies.

Harmonic Distortion: Distortion of an AC waveform caused by multiples of the fundamental frequency.

Head: Luminaire for a track-lighting system.

Hertz: A unit of frequency denoted as Hz. One Hz is equivalent to one cycle per second. Can also be measured in kHz, or one thousand cycles per second.

High Intensity Discharge (HID) Lamp: Metal Halide, High Pressure Sodium, Low Pressure Sodium and Mercury Vapor lamp types.

High Output Fluorescent (HO): Fluorescent lamps designed to be used with an 800 milliampere ballast. Able to operate at low temperatures (down to 0°F) and still produce high light levels.

High Power Factor: A power factor above 0.90 or 90%.

High Pressure Sodium (HPS) Lamp: High intensity discharge light sources which produce light by an electrical discharge through sodium vapor operating at relatively high pressures and temperatures.

High Voltage: Voltages of 208 or higher.

GLOSSARY OF TERMS

HO: High Output. A lamp or ballast that operates at 800mA is considered high output.

HX-HPF: A high reactance auto-transformer that operates at a high power factor. A type of circuit used in HID ballasts.

HX-NPF: A high reactance auto-transformer that operates at a normal power factor. A type of circuit used in HID ballasts.

Illuminance: Light arriving at a surface, expressed in lumens per unit area; 1 lumen per square foot equals 1 footcandle, while 1 lumen per square meter equals 1 lux.

Illumination: The result of the use of light.

Incandescent Lamp: A light source that produces light by the heating of a filament by an electric current.

Inches to Millimeters Conversion: To calculate the metric equivalent of inches in millimeters (mm), multiply inches by 25.4.

Indirect Lighting: Luminaires that distribute 90 - 100 percent of their light upward to be reflected by the ceiling.

Induction Lighting: A means of lighting, which uses RF induction of radio waves or microwaves to produce luminescence. Induction lamps have no electrodes inside the chamber and generally, therefore, have longer life than standard incandescent lamps.

Infrared: Radiant energy in the wavelength range of about 770 to 1100 nanometers (nm). Energy in this range is not visible to the naked eye, but can be sensed by the skin. Applications include heat lamps, photography, medical therapy, and industry.

Initial Lumens: The measured luminous output of a new light source.

Input Voltage: Voltage required from a power supply for proper operation of a ballast.

Input Watts: The total power input to the ballast which includes lamp watts and ballast losses.

Instant Start: A type of fluorescent lamp-ballast circuit designed to start fluorescent lamps as soon as the power is applied. Originally, instant-start circuits were developed to eliminate separate mechanical starter devices. Slimline fluorescent lamps operate only on instant start circuits.

Intensity: The light emitted from a source. Intensity varies given the direction at which one views the source. Intensity does not vary with distance.

Kelvin Temperature: See color temperature

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

Kilowatt Hour (kwh): The standard measurement of electrical energy consumption. One kilowatt hour is equal to one kilowatt of electricity used over the period of one hour. Also the typical billing unit used by electrical utilities.

Krypton: A heavy inert gas used in incandescent lamps which allows the filament to glow hotter and brighter and last longer.

Lamp: Lighting industry term used for a light bulb.

Lamp Dimensions: Bulb designations consist of a letter(s) to indicate shape and a number to indicate the diameter in eighths of an inch.

Lens: A glass or plastic element used in luminaires to change the direction and control the distribution of light rays.

Light: Radiant energy that is capable of producing a visual sensation.

Light Center Length (L.C.L.): The distance from a reference point, usually the bottom of the lamp base, to the center of the light source (filament).

GLOSSARY OF TERMS

Light Loss Factor: Used to calculate or project the performance of a lighting system after a given period of time under certain conditions; includes environmental conditions, such as temperature, voltage, dust and or dirt and lamp depreciation.

Louver: An assembly of slats or crosspieces in a lighting fixture, used to control light intensity and glare.

Low Pressure Sodium (SOX): High Intensity Discharge lamp that uses pressurized sodium vapor to produce light.

Lumen: International unit (SI) of luminous flux or quantity of light; expresses quantity of light regardless of direction.

Lumen Depreciation: The gradual decline in light output from a light source over time due to filament deterioration and bulb darkening.

Lumen Maintenance: A measurement of how a lamp maintains its light output over time.

Lumens Per Watt (LPW): A measure of the efficacy (efficiency) of a light source. The number is achieved by dividing lumens produced by watts consumed.

Luminaire: A complete lighting unit including lamps, housing, lens and ballast if required. All the necessary components to make what we commonly refer to as a "fixture".

Luminance (L): Light reflected in a particular direction; the photometric quantity most closely associated with brightness perception, measured in units of luminous intensity (candelas) per unit area (square feet or square meters).

Lux (lx): A unit of illuminance equal to 1 lumen per square meter.

Maximum Overall Length (MOL): The overall length of a lamp, from the top of the shell to the bottom of the base.

Mean Lumens: The measured output of a light source at 40% of lamp life. Also called design lumens.

Mercury Vapor Lamp: A high intensity discharge light source operating at a relatively high pressure (about 1 atmosphere) and temperature in which most of the light is produced by radiation from excited mercury vapor. Phosphor coatings on some lamp types add additional light and improve color rendering.

Metal Halide Lamp: A high intensity light source in which the light is produced by the radiation from mercury, plus halides or metals such as sodium, scandium, indium and dysprosium. Some lamp types may also utilize phosphor coatings.

Multi-Volt: A fluorescent electronic ballast that has a universal input voltage; typically these ballasts have an acceptable input voltage range of 108V to 305V.

Nanometer: A unit of length equal to 10^{-9} meters; commonly used as a unit of wavelength.

National Electric Code (NEC): A nationally accepted electrical installation code to reduce the risk of fire, developed by the National Fire Protection Association.

Neodymium: A rare earth element used to produce full spectrum incandescent lamps; also know as daylight or natural light. They use a colored glass shell to filter out the yellow light produced by standard incandescent lamps.

Nominal Input Voltage: The input voltage at which the ballast is designed to operate. The nominal voltage allows for normal levels of variation without affecting ballast operation.

Nominal Length: A measurement for Fluorescent lamp length based on the length of the lamp plus an allowance for the luminaire's lamp holders.

GLOSSARY OF TERMS

Nominal Open Circuit Voltage (OCV): The rated open circuit voltage for a ballast, typically at the center of an acceptable range for this ballast.

Normal Power Factor: A power factor below 0.90 or 90%. Typically low power factor ballasts operate at <0.50 or <50%.

Ohm's Law: A scientific law which states that current (amperes) in a circuit depends on resistance (ohms) and applied electromotive force (volts). $Current (I) = Voltage (E) / Resistance (R)$

Operating Position: Lamps may be operated in any position unless otherwise noted.

PAR Lamp: PAR is an acronym for parabolic aluminized reflector. A PAR lamp, which may utilize either an incandescent filament, a halogen filament tube or an HID arc tube, is a precision pressed-glass reflector lamp. PAR lamps rely on both the internal reflector and prisms in the lens for the control of the light beam.

Parallel: A type of circuit in which the electrical pathway splits and flows to each lamp simultaneously. In this type of circuit each lamp is operated independently and therefore will continue to operate even if the other lamp fails.

Phosphor: An inorganic chemical compound processed into a powder and deposited on the inner glass surface of fluorescent tubes and some HID and LED. Phosphors are designed to absorb short wavelength ultraviolet radiation and to transform and emit it as visible light.

Photometry: The science of measuring visible light in units that are weighted according to the sensitivity of the human eye to certain wavelengths of light.

Photopic Vision: Refers to vision involving the cones of the eye; used in reference to the adaptation of the eye to illuminance of more than 3.4 candelas per square meter.

Pigtail: An adaptation to a fluorescent ballast that connects multiple wires together into one convenient socket. Most often used for Circline lamps.

Potting: A compound, typically made of asphalt and silica, that is used to fill the inside of a ballast.

Power Factor: A measurement indicating how efficiently a lighting system is using the power it is drawing. The ratio between power used (watts) and power being drawn from the line (volts-amperes). Expressed as a percent or a range from 0 to 1.0. The higher the percent the more efficiently the power is being used. High power factors are ratings of 0.9 (90%) or higher. Incandescent lamps are close to 1.0, magnetic ballasts can be as low as 0.5.

Power Factor Corrected: Ballasts that incorporate a means of Power Factor Correction but whose power factor is <90% and >50%.

Preheat Start: A fluorescent lamp-ballast circuit where the electrodes are heated or warmed by an auxiliary switch or starter before the lamps light up.

Probe Start: A starting method for HID lamps that involves the use of a probe to start the lamp. A large surge of voltage is applied to the probe in order to assist in starting the lamp.

Programmed Start: A fluorescent lamp-ballast circuit that uses a custom integrated circuit (IC), which monitors lamp and ballast conditions to ensure optimal system lighting performance. 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.

Pulse Start. A fluorescent lamp-ballast circuit that is designed with an ignitor to ignite the arc tube. Due to this, bulbs have no need for the starter electrode. Pulse start lamps are typically more efficient than standard counterparts.

GLOSSARY OF TERMS

Radiometry. The science of measuring radiant energy, especially radiant energy in that portion of the total electromagnetic spectrum lying adjacent to the visible region.

Rapid Start. A fluorescent lamp-ballast circuit which utilizes continuous cathode heating, while the system is energized, to start and maintain lamp light output at efficient levels. Rapid start ballasts may be either electromagnetic, electronic or of hybrid designs. Full-range fluorescent lamp dimming is only possible with rapid start systems.

Reactor: The most basic circuit type for an HID ballast, made of a single coil, which acts as an inductor.

Reference Ballast: Laboratory device used to provide ANSI-specified measurements of initial and mean lamp lumens.

Reflector Lamp. An incandescent, halogen compact fluorescent or HID lamp with a built-in reflecting surface. Incandescent and HID versions are made from a single piece of blow-molded soft or hard glass.

Refraction. The bending of light rays.

Refractor. A translucent fixture covering, such as a lens or diffuser that refracts or bends light rays.

RFI: See EMI/RFI

Resistance. A measure of resistance to flow of electrical current, expressed in ohms.

Scotopic Vision. Sight involving the eye's rods, which respond to low levels of lighting, below .034 candelas per square meter.

Series: A type of circuit in which the current flows through the lamps in sequence. The failure of one lamp results in the stoppage of current flow.

Shroud: A glass cylinder surrounding the arc tube in metal halide lamps to protect against the hot arc tube from breaking the glass bulb if an arc tube rupture occurs. It reduces the risk of using metal halide lamps in open fixtures.

Single-Ended Lamp: Lamps that have one base or point of electrical connection.

SI: International System of Units. Most widely used standards for measurement.

Slim Case: A reduced size case for fluorescent ballasts to allow for more versatile applications.

Sound Rating: A rating of the amount of sound produced in the normal operation of a ballast. "A" is the normal favorable rating, producing the lowest amount of sound, while "E" is the least favorable rating, producing the greatest amount of audible noise.

SOX: Low Pressure Sodium abbreviation term.

Spectral Power Distribution: A graph of the radiant power emitted by a light source as a function of wavelength. SPD's provide a visual profile of the color characteristics of the light source throughout the visible part of the spectrum.

Spiral Lamp: A helical-shaped long life compact fluorescent lamp.

Spotlight: A lamp designed to produce a narrow beam angle to illuminate a specifically defined area.

Starter (Ignitor): A device used in conjunction with a ballast to start preheat fluorescent lamps.

Super CWA: Constant wattage, Auto-Transformer for use with Pulse Start Metal Halide Lamps.

Task Lighting: Lighting directed to a specific surface or area that provides illumination for specific tasks.

GLOSSARY OF TERMS

TCLP Test: The Toxicity Characteristic Leaching Procedure (TCLP) test, specified in the Resource Conservation and Recovery Act (RCRA) of 1990, is used to characterize fluorescent lamp waste as hazardous or non-hazardous waste. The TCLP test measures the ability of the mercury in a lamp to leach from a landfill into ground water under very aggressive and reactive conditions.

Thermal Protector: A device used in a ballast to detect when the maximum temperature of the ballast has been exceeded and when to remove input power. Thermally protected ballasts that meet UL certifications are classified as “Class P.”

Total Harmonic Distortion (THD): A measure of the distortion of an electrical wave form. Excessive THD may cause adverse effects to the electrical system.

Trigger Start: A circuit that eliminates the starter and allows for instant starting of preheat lamps.

Troffer: A long recessed lighting fixture, usually installed flush with the ceiling.

UL: Underwriters Laboratories. Laboratory that sets safety standards for building materials, electrical appliances, and other products.

Ultraviolet: Radiant energy in the wavelength range of about 100 to 380 nanometers (nm). This light is invisible to the naked eye and is also known as black light. Applications include:

Blacklight	320-400 nm
Germicidal	220-300 nm
Ozone-producing	180-220 nm

Very High Output (VHO) Lamps: Fluorescent lamps designed to be used with a 1500 milliampere ballast.

Visible Spectrum: Radiant energy in the wavelength range of about 380 to 770 nanometers (nm). The light that can be seen by the human eye and produces what we also call the “color spectrum.”

Volt: The unit of electromotive force (emf). The difference in electrical potential that will cause a current of one ampere to flow through a resistance of one ohm.

Voltage Rating: The recommended operating voltage for a lamp.

Watt: A unit of electrical power. One watt is equal to one ampere of current flowing through one ohm of resistance.

Wavelength: Distance between two successive points of a periodic wave; the wavelengths of light are expressed in nanometers (nm).

INDEX

PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER
89	114	A15WH60/E12	96	A19TF60	96	C11SG40/AMB	103
93	114	A15WH60/E17	96	A19TF75	98	C11SG60	104
93	114	A19BG40	94	A19YEL25C	93	C11SG60/AMB	104
94	114	A19BG60	96	A19YEL25T	93	C15SG25	102
94	114	A19BLU25T	93	A19YEL40C	94	C15SG40	103
387	114	A19BLU40T	94	A19YEL40T	94	C15SG40/AMB	103
755	114	A19BLU60C	96	A19YEL60C	96	C15SG60	104
904	114	A19CL100	99	A21CL100/ND	99	C15SG60/AMB	104
906	114	A19CL100/120	99	A21CL100/P5	99	C7AMB5T	91
908	114	A19CL100/5	99	A21CL150/P5	100	C7BLU/FC/LED	111
909	114	A19CL100/P10	99	A21CL75/ND	98	C7BLU/LED	111
912	114	A19CL100/SB	99	A21FR100/ND	99	C7BLU5C	91
915	114	A19CL25/5	93	A21FR100/P5	99	C7BLU5T	91
918	114	A19CL40	94	A21FR100/SB	99	C7CL/FC/LED	111
921	114	A19CL40/5	94	A21FR150/ND	100	C7CL/LED	111
927	114	A19CL60	96	A21FR150/P10	100	C7CL4	91
963	114	A19CL60/120	96	A21FR150/P5	100	C7CL7	91
1141	114	A19CL60/5	96	A21FR75/ND	98	C7GRN/FC/LED	111
1142	114	A19CL60/ND	96	A21SW3W100	93	C7GRN/LED	111
1156	114	A19CL60/P10	96	A21TF100/P5	99	C7GRN5C	91
1195	114	A19CL60/SB	96	A21TF150/P5	100	C7GRN5T	91
1383	114	A19CL75	98	A23CL150/P5	100	C7ORG5C	91
1815	114	A19CL75/5	98	A23CL200/P5	100	C7PUR5T	91
1820	114	A19FR100	99	A23FR150/P5	100	C7RED/FC/LED	111
3155	114	A19FR100/1750	99	A23FR200/P5	100	C7RED/LED	111
3156	114	A19FR100/20	99	ADP/E26/E12	117	C7RED5C	91
4044	115	A19FR100/5	99	ADP/E26/E26	117	C7RED5T	91
4405	115	A19FR100/P10	99	ADP/E26/GU24	117	C7RG/LED	111
4406	115	A19FR25	93	ADP/E39/E26	117	C7WH5C	91
4411	115	A19FR25/12V	93	AR111FL100	77	C7WH7/NL	91
4414	115	A19FR25/5	93	AR111FL50	77	C7YEL/FC/LED	111
4415	115	A19FR40	94	AR111FL75	77	C7YEL/LED	111
4446	115	A19FR40/20	94	AR111SP50	77	C9AMB7T	91
4505	115	A19FR40/5	94	AR111SP75	77	C9BLU/FC/LED	111
4515	115	A19FR40/P10	94	AR111WFL50	77	C9BLU7C	91
4535	115	A19FR50/12V	95	AR111WFL75	77	C9BLU7T	91
4545	115	A19FR54/10	96	BR30AMB65/5	97	C9CL/FC/LED	111
4546	115	A19FR60	96	BR30BLU65/5	97	C9CL7	91
4587	115	A19FR60/20	96	BR30CL100/12V	99	C9GRN/FC/LED	111
7613	115	A19FR60/5	96	BR30DPNK65/5	97	C9GRN7C	91
120MB	114	A19FR60/ND	96	BR30FL50	95	C9GRN7T	91
120PSB	114	A19FR60/P10	96	BR30FL65	97	C9ORG7C	91
1383/TF	114	A19FR60/SB	96	BR30FL65/120	97	C9RED/FC/LED	111
400G/FL	101	A19FR68/10	97	BR30FL65/20	97	C9RED7C	91
4044-1	115	A19FR75	98	BR30FL65/P10	97	C9RED7T	91
7613-1	115	A19FR75/20	98	BR30FL65/P5	97	C9WH7C	91
912x	114	A19FR75/5	98	BR30GRN65/5	97	C9YEL/FC/LED	111
918x	114	A19FR75/P10	98	BR30PNK65/5	97	CAP/HPS100	65
921x	114	A19FR90/10	98	BR30RED65/5	97	CAP/HPS100/120	65
A15CL15	92	A19GRN25T	93	BR30SP65/5	97	CAP/HPS1000	65
A15CL25	93	A19GRN40T	94	BR30TF65	97	CAP/HPS150	65
A15CL40	94	A19GRO60	96	BR30YEL65/5	97	CAP/HPS150/120	65
A15CL40/E12	94	A19RED25C	93	BR38AMB100	99	CAP/HPS200	65
A15CL40/E17	94	A19RED25T	93	BR38BLU100	99	CAP/HPS250	65
A15CL60	96	A19RED40T	94	BR38GRN100	99	CAP/HPS400	65
A15CL60/120	96	A19RED60C	96	BR38RED100	99	CAP/HPS50/120	65
A15CL60/E12	96	A19RS100	99	BR38YEL100	99	CAP/HPS70	65
A15CL60/E17	96	A19RS50	95	BR40CL125/1	100	CAP/HPS70/120	65
A15CL60/ND	96	A19RS60	96	BR40CL250/1	100	CAP/MH100	65
A15FR15	92	A19RS75	98	BR40CL250/1/TEF	100	CAP/MH1000	65
A15FR25	93	A19SW100/120	99	BR40FL120/5/TEF	100	CAP/MH150	65
A15FR40	94	A19SW40/120	94	BR40FL65/P5	97	CAP/MH175	65
A15FR60	96	A19SW60/120	96	BTL	112	CAP/MH250	65
A15TF40	94	A19SW75/120	98	BTN	112	CAP/MH250PS	65
A15TF60	96	A19TF100	99	C11SG25	102	CAP/MH320PS	65
A15WH40/E12	94	A19TF25	93	C11SG25/AMB	102	CAP/MH350PS	65
A15WH40/E17	94	A19TF40	94	C11SG40	103	CAP/MH400/OIL	65

INDEX

PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER
CAP/MH400PS	65	CFL14/35/A19	26	CFL23/50/R40	25	CTC60/E14	104
CAP/MH50	65	CFL14/41/A19	26	CFL23/50/T2/FS	23	CTC60/ND	104
CAP/MH70	65	CFL14/50/A19	26	CFL24/27/DIM	23	CTCP15	102
CDM100/P38/FL/830	60	CFL14/50/R20	24	CFL25/27/3WAY	22	CTCP25	102
CDM100/P38/SP/830	60	CFL14/50/T20	26	CFL25/41/3WAY	22	CTCP40	103
CDM150/T6/830	60	CFL14/YEL/A19	26	CFL26/27/GU24	23	CTF25	102
CDM35/P20/FL/830	60	CFL15/27	22	CFL26/41/GU24	23	CTF40	103
CDM35/P20/SP	60	CFL15/27/G28	26	CFL26/50/GU24	23	CTF60	104
CDM35/P30L/FL/830	60	CFL15/27/PAR30	25	CFL27/27	24	DDL	112
CDM35/P30L/SP/83	60	CFL15/35	22	CFL27/35	24	DDS	112
CDM35/T6/830	60	CFL15/35/PAR30	25	CFL27/41	24	DED	112
CDM70/P30L/FL/830	60	CFL15/41	22	CFL27/50	24	DVS	112
CDM70/P30L/SP/830	60	CFL15/41/PAR30	25	CFL32/27	24	DYS/DYV/BHC	112
CDM70/P38/FL/830	60	CFL15/50	22	CFL32/41	24	DYS/DYV/BHC/5	112
CDM70/P38/SP/830	60	CFL15/50/G28	26	CFL32/50	24	E108RS/120	46
CDM70/T6/830	60	CFL15/50/PAR30	25	CFL42/27	24	E114RS/120	46
CF11/27	21	CFL15/BLB	22	CFL42/41	24	E120RS/120	46
CFC15	102	CFL15/BLU/R30	24	CFL42/50	24	E126RS/120	46
CFC25	102	CFL15/GRN/R30	24	CFL5/27	21	E139HO/RS/120	46
CFC25/12V	102	CFL15/PNK/R30	24	CFL5/27/A16	25	E154HO/RS/120	46
CFC3	102	CFL15/YEL	22	CFL5/27/E12	21	E1CF13RS/120/GU24	31
CFC40	103	CFL15/YEL/R30	24	CFL5/27/FS	21	E1CF18RS/120/GU24	31
CFC60	104	CFL16/27/G30	26	CFL5/35	21	E1CF26RS/120/GU24	31
CFCP15	102	CFL16/27/R20/DIM	25	CFL5/35/E12	21	E1CR22RS/120/PT	46
CFCP25	102	CFL16/27/R30/DIM	25	CFL5/41	21	E1CR32RS/120/PT	46
CFCP40	103	CFL16/30/R30	25	CFL5/41/A16	25	E220RS/120	46
CFCP7.5	102	CFL16/41/R30	25	CFL5/41/E12	21	E232IS/120/R/SL	46
CFF25	102	CFL16/50/G30	26	CFL5/41/FS	21	E2CR72RS/120/PT	46
CFF40	103	CFL16/50/R30	25	CFL5/50	21	E432IS/120/R/SL	46
CFF60	104	CFL16/50/R30/TF	25	CFL5/50/E12	21	EFC25	102
CFL11/27/PAR20	24	CFL18/27	23	CFL5/50/FS	21	EFC3	102
CFL11/35/PAR20	24	CFL18/27/GU24	23	CFL5CE/30/E12	25	EFC40	103
CFL11/41	21	CFL18/27/T2	23	CFL5CE/30/E26	25	EFC60	104
CFL11/41/PAR20	24	CFL18/27/T2/FS	23	CFL65/27	24	EFF25	102
CFL11/50	21	CFL18/35	23	CFL65/50	24	EFF40	103
CFL11/50/PAR20	24	CFL18/35/T2	23	CFL7/27	21	EFF60	104
CFL11/BLU	21	CFL18/41	23	CFL7/41	21	EGE	112
CFL11/GRN	21	CFL18/41/GU24	23	CFL7CE/30/E12	25	EGG	112
CFL11/RED	21	CFL18/41/T2	23	CFL85/27	24	EHC/EHB	112
CFL11/YEL	21	CFL18/41/T2/FS	23	CFL85/50	24	EHD	112
CFL13/27	22	CFL18/50	23	CFL9/27	21	EHF	112
CFL13/27/GU24	22	CFL18/50/GU24	23	CFL9/27/A16	26	EHM	112
CFL13/27/T2	22	CFL18/50/T2	23	CFL9/27/E12	21	EHV	112
CFL13/27/T2/4PK	22	CFL18/50/T2/FS	23	CFL9/27/FS	21	EJA	112
CFL13/27/T2/E12	22	CFL19/27/PAR30/DIM	25	CFL9/27/G25	26	EJL	112
CFL13/27/T2/FS	22	CFL19/27/R40/DIM	25	CFL9/35	21	EJM	112
CFL13/30/E19	26	CFL20/27	23	CFL9/35/E12	21	EJV	112
CFL13/35	22	CFL20/27/A20	26	CFL9/41	21	EKE	112
CFL13/35/T2	22	CFL20/35	23	CFL9/41/A16	26	ELC	112
CFL13/35/T2/E12	22	CFL20/41	23	CFL9/41/E12	21	ELH	112
CFL13/41	22	CFL20/41/A20	26	CFL9/41/FS	21	ENH	112
CFL13/41/GU24	22	CFL20/50	23	CFL9/50	21	ENX	112
CFL13/41/T2	22	CFL23/27	23	CFL9/50/E12	21	ENX/5	112
CFL13/41/T2/4PK	22	CFL23/27/GU24	23	CFL9/50/FS	21	EP132IS/MV/SL	46
CFL13/41/T2/E12	22	CFL23/27/PAR38	25	CFL9/50/G25	26	EP2110RS/120	46
CFL13/41/T2/FS	22	CFL23/27/T2/FS	23	CFL9CE/30/E12	26	EP2110RS/MV	46
CFL13/50	22	CFL23/30/BR38	25	CFL9CE/30/E26	26	EP232IS/120/SL	46
CFL13/50/GU24	22	CFL23/30/R40	25	CFTC3	102	EP232IS/H/MV/SL	46
CFL13/50/T2	22	CFL23/35	23	CFTC7.5	102	EP232IS/L/MV/SL	46
CFL13/50/T2/E12	22	CFL23/35/PAR38	25	CTC15	102	EP232IS/MV/SL	46
CFL13/50/T2/FS	22	CFL23/41	23	CTC25	102	EP239HO/PS/MV	46
CFL13/65	22	CFL23/41/GU24	23	CTC25/E14	102	EP240RS/120	46
CFL14/27/A19	26	CFL23/41/PAR38	25	CTC25/ND	102	EP240RS/MV	46
CFL14/27/A19/DIM	26	CFL23/41/T2/FS	23	CTC40	103	EP254HO/PS/MV	46
CFL14/27/DIM	22	CFL23/50	23	CTC40/E14	103	EP259IS/MV	46
CFL14/27/T20	26	CFL23/50/GU24	23	CTC60	104	EP260IS/120	46
CFL14/30/R20	24	CFL23/50/PAR38	25	CTC60/120	104	EP260IS/277	46

INDEX

PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER
EP275IS/MV	46	F17T8/741/ECO/IC	40	F32T8/841/ECO/IC	41	F72DL/M	42
EP2CF13PS/MV/DC/K	31	F17T8/750/ECO	40	F32T8/850/ECO	41	F72DLHO/M	43
EP2CF18PS/MV/DC/K	31	F17T8/750/ECO/IC	40	F32T8/850/ECO/HL	41	F84CW/M	42
EP2CF26PS/MV/DC/K	31	F17T8/830/ECO	40	F32T8/850/ECO/IC	41	F84CWHO/M	43
EP2CF42RS/MV/DC/K	31	F17T8/835/ECO	40	F32T8/865/ECO	41	F84DLHO/M	43
EP332IS/120/SL	46	F17T8/841/ECO	40	F32T8/865/ECO/IC	41	F8T5BLB	39,45
EP332IS/H/MV/SL	46	F17T8/850/ECO	40	F32T8/ULTRA950	41	F8T5CW	39
EP332IS/L/MV/SL	46	F18T8CW/K24	45	F32T8BLB	41,45	F8T5DL	39
EP332IS/MV/SL	46	F18T8CW/K26	45	F34CWES/ECO	42	F8T5WW	39
EP432IS/120/SL	46	F18T8CW/K28	45	F34WWES/M	42	F96/735/M	43
EP432IS/L/MV/SL	46	F18T8CW/K30	45	F35T5/835/ECO	40	F96/T50	43
EP432IS/MV/SL	46	F20T12/ULTRA50	39	F35T5/841/ECO	40	F96AB	42
ER30FL50/P5	95	F20T12CW	39	F36T12CWHO/M	43	F96ABHO	43
ESD	112	F20T12DL	39	F36T12DLHO/M	43	F96CWES/ECO	42
ESL	112	F20T12WW	39	F39T5/830/HO/ECO	40	F96CWHOES/ECO	43
ESM	112	F21T5/830/ECO	39	F39T5/835/HO/ECO	40	F96CWHOO/ECO	43
ESN	112	F21T5/835/ECO	39	F39T5/841/HO/ECO	40	F96CWVHO/M	43
ESP	112	F21T5/841/ECO	39	F40/350BL	42,45	F96DLHOO/A	43
ESR	112	F24T12CWHO/M	43	F40/730/ECO	42	F96DX/ECO	42
ESS	112	F24T12DLHO/M	43	F40/735	42	F96SL	43
ETB	113	F24T5/835/HO/ECO	39	F40/741	42	F96T5HO	43
ETC	113	F24T5/841/HO/ECO	39	F40/950	42	F96T8/735/M	41
ETC25	102	F25T12CW/28	45	F40/ULTRA50	42	F96T8/735HO/M	43
ETC40	103	F25T12CW/33	45	F40AB	42	F96T8/741/M	41
ETC40/TF	103	F25T8/730/ECO	40	F40BLB	42,45	F96T8/741HO/M	43
ETC60	104	F25T8/735/ECO	40	F40CWX	42	F96T8/850/M	41
ETC60/TF	104	F25T8/735/ECO/IC	40	F40DX	42	FAL	113
ETD	113	F25T8/741/ECO	40	F40NL	42	FB31/830/ECO	44
ETE	113	F25T8/741/ECO/IC	40	F40SL	42	FB31/835/ECO	44
ETF	113	F25T8/750/ECO	40	F40T10/955	42	FB31/841/ECO	44
ETF25	102	F25T8/830/ECO	40	F40T10/SS/SG	42	FB31/850/ECO	44
ETF40	103	F25T8/835/ECO	40	F40T10/TRI41	42	FB32/730/6/ECO	44
ETF60	104	F25T8/841/ECO	40	F40T10/ULTRA50	42	FB32/730/6/ECO/IC	44
ETG	113	F28T5/830/ECO	39	F40T8/735/M	41	FB32/735/6/ECO	44
ETH	113	F28T5/830/ECO/IC	39	F40T8/741/M	41	FB32/735/6/ECO/IC	44
EVR	113	F28T5/835/ECO	39	F42CWHO/M	43	FB32/741/6/ECO	44
EVW	113	F28T5/835/ECO/IC	39	F42DLHO/M	43	FB32/741/6/ECO/IC	44
EXR	113	F28T5/841/ECO	39	F42T6CW/M	42	FB32/750/6/ECO	44
EXR/5	113	F28T5/841/ECO/IC	40	F48CW/M	42	FB32/750/6/ECO/IC	44
EXY	113	F28T5/850/ECO/IC	40	F48CWHO/M	43	FB32/830/6/ECO	44
EYA	113	F28T8/835/ECO	41	F48CWVHO/M	43	FB32/835/6/ECO	44
EYB	113	F28T8/841/ECO	41	F48DL/M	42	FB32/835/6/ECO/IC	44
EYB/5	113	F28T8/850/ECO	41	F48DLHO/M	43	FB32/841/6/ECO	44
EYV	113	F30T12CW	42	F4T5CW	39	FB32/841/6/ECO/IC	44
EYW	113	F30T12CWHO/M	43	F54T5/830/HO/ECO	40	FB32/850/6/ECO	44
EYX	113	F30T12DL	42	F54T5/830/HO/ECO/IC	40	FB34CWU3ES/M	44
F10AMB25	102	F30T12DLHO/M	43	F54T5/835/HO/ECO	40	FB34CWU6ES/M	44
F13T5CW	39	F30T12WW	42	F54T5/835/HO/ECO/IC	40	FB34CWU6ES/SG	44
F13T5WW	39	F30T8CW	39	F54T5/841/HO/ECO	40	FB40/TRI51	44
F14T12CW	39	F32T8/730/ECO	41	F54T5/841/HO/ECO/IC	40	FB40ABU7	44
F14T5/830/ECO	39	F32T8/730/ECO/IC	41	F54T5/850/HO/ECO	40	FB40DX/6/M	44
F14T5/835/ECO	39	F32T8/735/ECO	41	F54T5/850/HO/ECO/IC	40	FB40SLU7	44
F14T5/841/ECO	39	F32T8/735/ECO/IC	41	F58T8/840	41	FC12T9CW	44
F14T8CW	39	F32T8/741/ECO	41	F60CW/M	42	FC16T9CW	44
F15AMB25	102	F32T8/741/ECO/IC	41	F60CWHO/M	43	FC22T5/835	44
F15AMB40	103	F32T8/750/ECO	41	F60DL/M	42	FC22T5/841	44
F15CL25	102	F32T8/750/ECO/IC	41	F60DLHO/M	43	FC40T5/835	44
F15CL40	103	F32T8/765/ECO	41	F64CW/M	42	FC40T5/841	44
F15T12CW	39	F32T8/765/ECO/IC	41	F64CWHO/M	43	FC8T9CW	44
F15T8CW	39	F32T8/830/ECO	41	F64DL/M	42	FC8T9DL	44
F15T8DL	39	F32T8/830/ECO/HL	41	F64DLHO/M	43	FC9T9/831	44
F15T8WW	39	F32T8/830/ECO/IC	41	F64T6CW/M	42	FCL	113
F17T8/730/ECO	40	F32T8/835/ECO	41	F6T5CW	39	FCM	113
F17T8/730/ECO/IC	40	F32T8/835/ECO/HL	41	F70T8/840/M	41	FCR	113
F17T8/735/ECO	40	F32T8/835/ECO/IC	41	F72CW/M	42	FCS	113
F17T8/735/ECO/IC	40	F32T8/841/ECO	41	F72CWHO/M	43	FEL	113
F17T8/741/ECO	40	F32T8/841/ECO/HL	41	F72CWVHO/M	43	FFN	77

INDEX

PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER
FFN	113	HP30FL75/FR	76,98	JCD25/G9	82	M47/1000CWA/4T/K	64
FHM	113	HP30FL75L	76,98	JCD25FR/G9	82	M47/1000CWA/5T/K	64
FHS	113	HP30FL75L/120	76,98	JCD35	82	M57/175CWA/4T/K	64
FHS/5	113	HP30FL75L/FR	76,98	JCD35/G8	82	M57/175CWA/5T/K	64
FL6LED/B	111	HP30SP50	75,95	JCD40/FR/G9/120	82	M57/175CWAH/4T/K	64
FLK	113	HP30SP50L	75,95	JCD40/G9	82	M58/250CWA/4T/K	64
FML27/NDL	30	HP30SP75	76,98	JCD40FR/G9	82	M58/250CWA/5T/K	64
G16CL15	102	HP30SP75/120	76,98	JCD50	82	M58/250CWAH/4T/K	64
G16CL25	102	HP30SP75L	76,98	JCD50/G8	82	M59/400CWA/4T/K	64
G16CL25/ND	102	HP30SP75L/120	76,98	JCD60/G9	82	M59/400CWA/5T/K	64
G16CL40	103	HP30WFL75L	76,98	JCD60FR/G9	82	M59/400CWAH/4T/K	64
G16CL40/ND	103	HP36NSP20/HX	75,92	JCD75	83	M90/100HX/4T/K	64
G16CL60	104	HP36NSP35/HX	75,93	JDD150	77	M98/70HX/4T/K	64
G16WH15	102	HP36NSP50/HX	75,95	JDD250	78	MB19FR50	77,95
G16WH25	102	HP36VNSP20/HX	75,92	JDR/5AMB60/LED	110	MB19FR75	77,98
G16WH40	103	HP36VNSP35/HX	75,93	JDR/5BLU60/LED	110	MH100/C/U/MED/PS	57
G16WH60	104	HP36VNSP50/HX	75,95	JDR/5GRN60/LED	110	MH100/U/MED/PS	57
G19CL25	103	HP36WFL20/HX	75,92	JDR/5NW40//LED	110	MH100/U/MOG/PS	57
G19WH40	103	HP36WFL35/HX	75,93	JDR/5RED60/LED	110	MH1000/BU/BDX	61
G19WH60	104	HP36WFL50/HX	75,95	JDR/5WW40/LED	110	MH1000/BU/GDX	61
G25CL100	104	HP38FL100	76,99	JDR35/S/L	80	MH1000/C/U/BT37/IC	59
G25CL25	103	HP38FL120	76,100	JDR75/L	81	MH1000/C/U/IC	60
G25CL40	103	HP38FL120/120	76,100	JDR75INT/L	81	MH1000/U/BT37/IC	59
G25CL40/120	103	HP38FL45	76,95	JTT100/SW	77	MH1000/U/IC	60
G25CL40/ND	103	HP38FL45/120	76,95	JTT60/SW	77	MH100DE/UVS/3K	61
G25CL40/SB	103	HP38FL60	76,97	JTT75/SW	77	MH100DE/UVS/4K	61
G25CL60	104	HP38FL60/FR	76,97	LED/NL1	111	MH150/C/U/MED/PS	57
G25CL60/120	104	HP38FL75	76,98	LED/NL2	111	MH150/U/MED/PS	57
G25CL60/SB	104	HP38FL75/120	76,98	LU150/U/PS	62	MH1500/U/PS	57
G25FR40/ND	103	HP38FL85/HX	76,98	MH1500/BU/IC	60	MH1500/BU/IC	60
G25WH100	104	HP38FL90	76,98	MH1500BUH	60	MH1500BUH	60
G25WH25	103	HP38FL90/120	76,98	MH150DE/UVS/10K	61	MH150DE/UVS/10K	61
G25WH40	103	HP38FL90/FR	76,98	MH150DE/UVS/3K	61	MH150DE/UVS/3K	61
G25WH40/120	103	HP38SP45	76,95	MH150DE/UVS/4K	61	MH150DE/UVS/4K	61
G25WH60	104	HP38SP90	76,98	MH150DE/UVS/BDX	61	MH150DE/UVS/BDX	61
G25WH60/120	104	HP38SP90/120	76,98	MH150DE/UVS/GDX	61	MH150DE/UVS/GDX	61
G30WH60	104	IGN/HPS1	65	MH150DE/UVS/MDX	61	MH150DE/UVS/MDX	61
G40CL100	104	IGN/HPS2	65	MH150SE/UVS/3K	61	MH150SE/UVS/3K	61
G40CL150	104	IGN/HPS3	65	MH150SE/UVS/4K	61	MH150SE/UVS/4K	61
G40CL40	103	IGN/MH1	65	MH175/BU/MED/PS	57	MH175/BU/MED/PS	57
G40CL60	104	JC10	81	MH175/BU/PS	57	MH175/BU/PS	57
G40WH100	104	JC10/BA15S	81	MH175/C/U/IC	59	MH175/C/U/IC	59
G40WH150	104	JC10/BA15S/HX	81	MH175/C/U/MED/IC	59	MH175/C/U/MED/IC	59
G40WH40	103	JC10/HX	81	MH175/U/IC	59	MH175/U/IC	59
G40WH60	104	JC10/X	81	MH175/U/IC/TEF	59	MH175/U/IC/TEF	59
GBE	113	JC100	83	MH175/U/MED/IC	59	MH175/U/MED/IC	59
GBF	113	JC20	82	MH175/U/T15/10K	61	MH175/U/T15/10K	61
H4515	115	JC20/6.35	82	MH200/BU/PS	57	MH200/BU/PS	57
HP14FL35	75,93	JC20/BA15S/HX	82	MH200/C/BU/PS	57	MH200/C/BU/PS	57
HP16NFL45	75,95	JC20/FR/BA15S/HX	82	MH250/BU/LU	59	MH250/BU/LU	59
HP16NFL60	76,97	JC20/HX	82	MH250/BU/PS	57	MH250/BU/PS	57
HP16NFL60/120	76,97	JC20/X	82	MH250/C/BU/PS	57	MH250/C/BU/PS	57
HP16NSP60	76,97	JC35	82	MH250/C/HOR/IC	59	MH250/C/HOR/IC	59
HP20FL50	75,95	JC35/BA15D	82	MH250/C/U/IC	59	MH250/C/U/IC	59
HP20NFL35	75,93	JC35/BA15D/HX	82	MH250/HBU/T15/IC	59	MH250/HBU/T15/IC	59
HP20NFL45/HX	75,95	JC35/G4	82	MH250/HOR/IC	59	MH250/HOR/IC	59
HP20NFL50	75,95	JC35/HX	82	MH250/U/IC	59	MH250/U/IC	59
HP20NFL50/120	75,95	JC5	81	MH250/U/IC/TEF	59	MH250/U/IC/TEF	59
HP20SP50	75,95	JC5/BA9S	81	MH250DE/4K	61	MH250DE/4K	61
HP20SP50/120	75,95	JC50	82	MH320/BU/PS	57	MH320/BU/PS	57
HP30FL50	75,95	JC50/BA15D	82	MH320/C/BU/PS	57	MH320/C/BU/PS	57
HP30FL50/120	75,95	JC50/HX	82	MH350/BU/PS	57	MH350/BU/PS	57
HP30FL50L	75,95	JC75	83	MH360/BU/ES	59	MH360/BU/ES	59
HP30FL70/HX	76,97	JCD100	83	MH400/BU/BDX	61	MH400/BU/BDX	61
HP30FL70L/HX	76,97	JCD100/G8	83	MH400/BU/GDX	61	MH400/BU/GDX	61
HP30FL75	76,98	JCD20	82	MH400/BU/LU	59	MH400/BU/LU	59
HP30FL75/120	76,98	JCD20/G8	82	MH400/BU/PS	57	MH400/BU/PS	57

INDEX

PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER
MH400/C/HOR/IC	59	MR11FTD/L/TL	78	MR16EXZ	81	PAR20/8NW40/LED	110
MH400/C/U/ED28/IC	59	MR11FTE/L	79	MR16EXZ/L	81	PAR20/8NW60/LED	110
MH400/C/U/IC	59	MR11FTE/L/TL	79	MR16EXZ/L/HX	81	PAR20/8RED40/LED	110
MH400/HBU/ED18/IC	59	MR11FTF/L	79	MR16EXZ/L/SC	81	PAR20/8RGB25/LED	110
MH400/HOR/IC	59	MR11FTF/L/HX	79	MR16EXZ/SC	81	PAR20/8WW120/LED	110
MH400/U/ED28/IC	59	MR11FTF/L/TL	79	MR16EXZ/U	81	PAR20/8WW40/LED	110
MH400/U/IC	59	MR11FTH/L	79	MR16EYC/SC	81	PAR20/8WW60/LED	110
MH400/U/IC/TEF	59	MR11FTH/L/24V	79	MR16EYF/SC	81	PAR30/14NW120/LED	110
MH400/U/T15/10K	61	MR11FTH/L/HX	79	MR16EYJ/SC	81	PAR30/14NW25/LED	110
MH50/C/U/MED/PS	57	MR11SP10/L	78	MR16FL10	78	PAR30/14NW60/LED	110
MH50/U/MED/PS	57	MR11SP5/L	78	MR16FL10/L	78	PAR30/14WW120/LED	110
MH70/C/U/MED/PS	57	MR16/3NW25/LED	109	MR16FL20/L/GU10	79	PAR30/14WW25/LED	110
MH70/U/MED/PS	57	MR16/3NW60/LED	109	MR16FL35/L/GU10	80	PAR30/14WW60/LED	110
MH70DE/UVS/3K	61	MR16/3WW25/LED	109	MR16FL35/L/SC	80	PAR36NSP25/M	93
MH70DE/UVS/4K	61	MR16/3WW60/LED	109	MR16FL50/L/GU10	81	PAR36NSP50/M	95
MH70SE/UVS/3K	60	MR16/5AMB60/LED	109	MR16FMW	80	PAR36VWFL25/M	93
MH70SE/UVS/4K	60	MR16/5BLU60/LED	109	MR16FMW/BLK/L	80	PAR36VWFL50/M	95
MH70SE/BU/PS	57	MR16/5GRN60/LED	109	MR16FMW/L	80	PAR36WFL25	93
MHC100UMED/4K/M	60	MR16/5NW120/LED	109	MR16FMW/L/HX	80	PAR36WFL50	95
MHC150UMED/4K/M	60	MR16/5NW25/LED	109	MR16FMW/L/SC	80	PAR3FL150/M	100
MHC70UMED/4K/M	60	MR16/5NW60/LED	109	MR16FMW/SC	80	PAR3FL65/M	97
MP100/C/U/MED/PS	58	MR16/5RED60/LED	109	MR16FNV/L/HX	81	PAR46MFL200	100
MP100/PAR38/FL/4K	58	MR16/5WW120/LED	109	MR16FNV/L/SC	81	PAR46NSP200	100
MP100/U/MED/PS	58	MR16/5WW25/LED	109	MR16FNV/SC	81	PAR56MFL300	101
MP150/C/U/MED/PS	58	MR16/5WW60/LED	109	MR16FNV/U	81	PAR56NSP300	101
MP150/U/MED/PS	58	MR16/M5NW120/LED	109	MR16FRA/L/HX	80	PAR56Q500MFL	77,101
MP175/BU	58	MR16/M5NW40/LED	109	MR16FRA/L/SC	80	PAR56Q500NSP	77,101
MP175/U/MED/IC	58	MR16/M5WW120/LED	109	MR16FRB/24V	80	PAR56Q500WFL	77,101
MP200/BU/PS	58	MR16/M5WW40/LED	109	MR16FRB/L/SC	80	PAR56WFL300	101
MP200/C/BU/PS	58	MR16BAB	78	MR16FRB/SC	80	PAR56WFL300/12V	101
MP250/BU	58	MR16BAB/BLK/L	79	MR16SP10	78	PAR64MFL500	101
MP250/BU/PS	58	MR16BAB/BLU	79	MR16SP10/L	78	PAR64NSP500	101
MP250/C/BU	58	MR16BAB/FR/SC	79	MR16WFL20/L/HX	79	PAR64Q1000MFL	77,101
MP250/C/BU/PS	58	MR16BAB/GRN	79	MR16WFL20/L/SC	79	PL13D/27/ECO	77,101
MP320/BU/PS	58	MR16BAB/L	78	MR16WFL20/SC	79	PL13D/35/ECO	27
MP320/C/BU/PS	58	MR16BAB/L/HX	79	MR16WFL35/SC	80	PL13D/41/ECO	27
MP360/BU/ES	58	MR16BAB/L/SC	79	MR16WFL75/L/SC	81	PL13D/50/ECO	27
MP400/BU	58	MR16BAB/RED	79	MR16WFL75/SC	81	PL13D/E/27/ECO	27
MP400/BU/TEF	59	MR16BAB/SC	78	MR8N20/L	78	PL13D/E/30/ECO	28
MP400/C/BU	58	MR16BAB/YEL	79	MR8W10/L	78	PL13D/E/35/ECO	28
MP50/C/U/MED/PS	58	MR16BBF/L/SC	79	MR8W20/L	78	PL13D/E/41/ECO	28
MP50/U/MED/PS	58	MR16ESX	79	MR8W35/L	79	PL13D/E/50/ECO	28
MP70/C/U/MED/PS	58	MR16ESX/24V	79	MS400/BU	59	PL13S/27/ECO	28
MP70/PAR38/FL/4K	58	MR16ESX/L	79	MSB/0412/12	47	PL13S/35/ECO	27
MP70/U/MED/PS	58	MR16ESX/L/HX	79	MSB/0620/24	47	PL13S/41/ECO	27
MP750/BU/PS	59	MR16ESX/L/SC	79	MSB/1224/24	47	PL13S/50/ECO	27
MR11/2NW120/LED	109	MR16ESX/SC	79	MSB/1240/46	47	PL13S/E/27/ECO	27
MR11/2NW25/LED	109	MR16EXN	80	MSB/2040/24	47	PL13S/E/35/ECO	27
MR11/2NW40/LED	109	MR16EXN/24V	80	MSB/2448/46	47	PL13S/E/41/ECO	27
MR11/2WW120/LED	109	MR16EXN/BLK/L	80	MV1000DX	63	PL13S/E/50/ECO	27
MR11/2WW25/LED	109	MR16EXN/BLU	80	MV100DX	63	PL13SP/E/27	27
MR11/2WW40/LED	109	MR16EXN/FR/SC	80	MV100DX/A23	63	PL13SP/E/41	29
MR11FL10/L	78	MR16EXN/G8	81	MV100DX/R40	63	PL18D/27/ECO	29
MR11FL20/L/GU10	78	MR16EXN/GRN	80	MV100DXMOG	63	PL18D/35/ECO	27
MR11FL35/L/GU10	79	MR16EXN/L	80	MV175CL	63	PL18D/41/ECO	27
MR11FL5/L	78	MR16EXN/L/HX	80	MV175DX	63	PL18D/50/ECO	28
MR11FTB/L	78	MR16EXN/L/SC	80	MV175DX/R40	63	PL18D/E/27/ECO	28
MR11FTB/L/24V	78	MR16EXN/RED	80	MV250CL	63	PL18D/E/35/ECO	28
MR11FTB/L/HX	78	MR16EXN/SC	80	MV250DX	63	PL18D/E/41/ECO	28
MR11FTB/L/TL	78	MR16EXN/SIL/L	80	MV400CL	63	PL18D/E/50/ECO	28
MR11FTC/L	78	MR16EXN/YEL	80	MV400DX	63	PL18T/E/27/ECO	28
MR11FTC/L/24V	78	MR16EXT	80	MV50DX	63	PL18T/E/35/ECO	29
MR11FTC/L/HX	78	MR16EXT/24V	81	MV75DX	63	PL18T/E/41/ECO	29
MR11FTC/L/TL	78	MR16EXT/L	80	PAR20/8AMB40/LED	110	PL18T/E/50/ECO	29
MR11FTD/L	78	MR16EXT/L/HX	80	PAR20/8BLU40/LED	110	PL22D/28	29
MR11FTD/L/24V	78	MR16EXT/L/SC	80	PAR20/8GRN40/LED	110	PL22D/50	28
MR11FTD/L/HX	78	MR16EXT/SC	80	PAR20/8NW120/LED	110	PL26/R40/E/30	28

INDEX

PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER	PRODUCT CODE	PAGE NUMBER
PL26/R40/E/50	29	Q100CL/MC	84	R20FL60/ND	95	T10CL60	94
PL26D/27/ECO	29	Q100CL/MC/120	84	R20GRN50	97	T10FR25	97
PL26D/35/ECO	28	Q100DC	84	R20PNK50	95	T10FR25/ND	93
PL26D/41/ECO	28	Q100MC	84	R20RED50	95	T10FR40	93
PL26D/50/ECO	28	Q100T3C	84	R20TF50	95	T10FR60	94
PL26D/E/27/ECO	28	Q100T3C/12V	83	R25FL60/ND	95	T10TF40	97
PL26D/E/35/ECO	28	Q100T3C/S	83	R30FL75/ND	97	T6.5CL20DC	94
PL26D/E/41/ECO	28	Q1500T3C	83	R40CL375	98	T6.5CL20INT	92
PL26D/E/50/ECO	28	Q1500T3C/277	84	R40CL375/TEF	101	T6.5CL25DC	92
PL26SP/E/27	28	Q150CL/DC	84	R40FL150/ND	101	T6.5CL25INT	93
PL26SP/E/41	29	Q150CL/DC/120	84	R40FL300/12V	100	T6.5CL40INT	93
PL26T/E/27/ECO	29	Q150CL/MC	84	R40FL300/HG	101	T6.5FR20DC	94
PL26T/E/35/ECO	29	Q150CL/MC/120	84	R40FL400/HG	101	T6.5FR20INT	92
PL26T/E/41/ECO	29	Q150DC	84	R40FL500/3FL	101	T6CL15/145V	92
PL26T/E/50/ECO	29	Q150DC/120	84	R40FL500/HG	101	T6CL15/CAN	92
PL28D/28	29	Q150MC	84	R40GRO150	101	T7CL15CAN	92
PL28D/50	28	Q150MC/120	84	R40RED250/10	100	T7CL15DC	92
PL32T/E/27/ECO	28	Q150T3C	84	R40RED250/10/TEF	100	T7CL15INT	92
PL32T/E/35/ECO	29	Q150T3C/12V	83	RCYCL/BAL/5GAL	100	T8CL25DC	92
PL32T/E/41/ECO	29	Q150T3C/S	83	RCYCL/CFL12	116	T8CL25INT	93
PL32T/E/50/ECO	29	Q200T3C	83	RCYCL/FL146/4FT	116		
PL42T/E/27/ECO	29	Q200T3C/S	83	RCYCL/FL30/8FT	116		
PL42T/E/35/ECO	29	Q250CL/DC	83	RCYCL/FL60/4FT	116		
PL42T/E/41/ECO	29	Q250CL/DC/120	85	RCYCL/MIX/2FT	116		
PL42T/E/50/ECO	29	Q250CL/MC	85	RCYCL/MIX/5GAL	116		
PL57T/E/27/ECO	29	Q250CL/MC/120	85	S11CL10	116		
PL57T/E/41/ECO	29	Q250DC	85	S11CL7.5	92		
PL57T/E/50/ECO	29	Q250DC/120	85	S11GRN7.5C	91		
PL9D/27/ECO	29	Q250MC	85	S11N25	91		
PL9D/41/ECO	27	Q250PAR/FL	77,100	S11N40	93		
PL9S/27/ECO	27	Q250PAR/SP	77,100	S11ORG7.5C	94		
PL9S/35/ECO	27	Q250T3C/83MM	83	S11RED7.5C	91		
PL9S/41/ECO	27	Q250T3C/S	83	S11WH7.5C	91		
PL9S/50/ECO	27	Q300T3C	83	S11YEL7.5C	91		
PLL18/830	27	Q300T3C/120	83	S14AMB11T	91		
PLL18/835	30	Q35CL/DC	83	S14BLU11C	92		
PLL18/841	30	Q35CL/MC	84	S14BLU11T	92		
PLL24/830	30	Q400CL/MC	84	S14CL11	92		
PLL24/835	30	Q500CL/DC	85	S14FR11	92		
PLL24/841	30	Q500CL/MC	85	S14GRN11C	92		
PLL36/830	30	Q500CL/MC/120	85	S14GRN11T	92		
PLL36/835	30	Q500MC	85	S14RED11C	92		
PLL36/841	30	Q500MC/120	85	S14RED11T	92		
PLL40/830/RS	30	Q500T3C	85	S14WH11C	92		
PLL40/835/RS	30	Q500T3C/120	83	S14YEL11C	92		
PLL40/841/RS	30	Q50CL/DC	83	S14YEL11T	92		
PLL40/850/RS	30	Q50CL/MC	84	S50/250CWA/4T/K	92		
PLL55/835	30	Q75CL/DC	84	S50/250CWA/5T/K	64		
PLL55/841	30	Q75CL/MC	84	S51/400CWA/4T/K	64		
PS25CL150/P5	30	Q75CL/MC/120	84	S51/400CWA/5T/K	64		
PS25CL200/P5	100	Q75MC	84	S52/1000CWA/4T/K	64		
PS25CL300/P5	100	Q75T3C	84	S52/1000CWA/5T/K	64		
PS25FR150/P5	101	Q75T3C/S	83	S54/100HX/4T/K	64		
PS25FR200/P5	100	R14INT25	83	S54/100R/120/K	64		
PS25FR300/P5	100	R14INT40	93	S55/150HX/4T/K	64		
PS25SW3W300	101	R14MED25	94	S55/150R/120/K	64		
PS25TF150/P5	99	R14MED40	93	S62/70HX/4T/K	64		
PS25TF200/P5	100	R16MED40	94	S62/70R/120/K	64		
PS30CL300/P5	100	R16MED40/120	94	S66/200CWA/4T/K	64		
PS30FR300/P5	101	R16SP40	94	S68/50R/120/K	64		
PS35CL300/P5	101	R20AMB50	94	S6CL6	64		
PS35FR300/P5	101	R20BLU50	95	S6CL6/145V	91		
PS40CL500/P5	101	R20CL100/12V	95	S76/35R/120/K	91		
PS52CL1000	101	R20DPNK50	99	SOX18	64		
Q1000T3C	101	R20FL100/S	95	SOX35	63		
Q100CL/DC	84	R20FL30	99	T10CL25	63		
Q100CL/DC/120	84	R20FL45	93	T10CL40	93		

Quality Assurance

At Halco Lighting Technologies, we are committed to quality and service.

We measure our success by one standard, customer satisfaction.

With this in mind, we offer you the following:

Should you encounter any product from Halco Lighting Technologies that fails to perform according to specifications, contact your account representative immediately. If our product is found to be defective in either material or workmanship, we will credit your account or replace the product at no charge. In order to better maintain our standard of quality, we reserve the right to inspect any defective product.

We make this assurance to clearly demonstrate our commitment to your satisfaction.



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