SOUTHERN NIGHTS LED LANDSCAPE LIGHTING, Inc.

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Outdoor LED Holiday Lighting & Limitations for Trees

Holiday/Christmas lights are available in many different types. This article discusses holiday lighting strings, which are frequently used to decorate buildings, post, and trees. Products sold under this description use the terms "Seasonal, Christmas, or Holiday lights". We will address UL 588 Supplement SD for 'string lights' intended for year-round use. Note that the term 'string light' is used by UL to differentiate all-year round listed lights from seasonal use of 'lighting strings'. Both types are completely different by design and approved applications.

Holiday LED lighting strings are available in various sizes such as 5mm wide angle, the most widely used professional grade, and M5 - T5 - C6 - C7 - C9. These can be purchased with a steady on light function, twinkle, or animation. Some are available with dimmable features, or controllers that operate individual runs of multiple light strings. Advanced LED lighting strings can even be programmed creating moving scenes and controlled using wi-fi connections.

All seasonal LED lighting strings are *Underwriters Laboratory (UL) rated to operate 90 days or less per calendar year!* They are not rated for use year-round. Lights should be UL approved and Energy Star qualified. Quality products will also be specified as 'rectified' or 'full wave' to prevent flickering or strobing effects that may be seen in lower quality lighting.

Professional grade LED lighting strings *may* last 6 or 7 seasons, defined as 90 days per calendar year, when properly handled and stored. If left exposed outdoors, the lifespan will be considerably less, *perhaps* 2 to 2.5 years. These lights have small gauge wires (18-22 gauge size) and will be adversely affected by handling, tree movement, exposure to weather, and UV sunlight exposure. Vandalism and damage from chewing rodents or squirrels can also be an issue.

The LED (light emitting diode) itself can be reliable. Malfunctions typically occur due to the minute size of internal wiring connections stressed during movement or impacts from weather. Professional grade LED lighting strings do not have individual LED diodes that can be replaced, thus requiring replacement of strings if too many of the individual diodes fail to operate. You may have experienced this with Christmas trees that have pre-wired LED lights attached.

WARRANTY INFORMATION – BUYER BEWARE

The rated lifespan of a product is not a warranty. That is an estimated calculation based upon operating within a controlled environment. Outdoors is not a controlled environment.

Always review the supplier terms and conditions of warranty as LED lighting strings will typically be listed with a 1 year or 3 year warranty for seasonal use, meaning no more than 90 days within a twelve-month period. Acts of God (or nature) such as exposure to a Hurricane or catastrophic event will void warranties. Installations within 1 mile of the ocean subjects most warranties to one season for 90 days or less usage.

The UL rating for Christmas lighting strings is limited to operating no more than 90 days annually. Products should then be removed and stored properly until the next annual season. Storing LED string lights and materials in high temperature environments such as an attic, cargo container, or warehouse will expedite deterioration of plastic coatings and sensitive materials. It is best to store electronic items inside a climate-controlled building.

Cutting or altering lighting products can immediately void warranties and may violate the NEC unless the manufacturer's instructions allow alteration by a qualified licensed electrician. Self made wiring and plug connectors may not be compliant with the NEC or UL listing.

BASIC INSTALLATION GUIDELINES FOR TREES

1) Select the type of LED lighting string and controller for the desired effect and function.

2) Measure the diameter of each tree at 4 ½ ft. above grade, and the height you will be wrapping to estimate the length of LED string lights and connectors required for each tree trunk.

3) Installing lighting at high elevations (14ft.+) can require equipment such as extension ladders or aerial lifts. This necessitates the use of skilled labor for tree climbing or machinery operation. Install times and materials may then be difficult to estimate. A time and material cost basis may be advised, plus the added cost of support equipment necessary for working heights.

4) These are 120volt lights and must be plugged into an outdoor ground fault interrupter (GFI) outlet to meet the National Electrical Code requirements for safety. Cutting the factory made wiring or adding spliced connectors should be performed by a qualified electrician. LED lighting strings allow multiple runs to be connected end to end, however, total electrical loads (amps/wattage) must be within the manufacturers' recommended operating range.

   Permanently installing 120volt or 12volt light fixtures "in or on" a building structure or sign requires permitting and installation under the supervision of a licensed electrical contractor.

   Standard Installation Methodologies:

   a) Wrap the lighting strings from the base of a tree upwards in a continuous spiral keeping a uniform desired spacing, typically 2-4-6 inches. You can staple the wire in a few places if needed to maintain position, being careful not to penetrate the wiring. The closer the spacing, the more string light length will be required. Skilled labor is not required for wrapping at safe working heights, but step ladder safety procedures must be followed.

   b) Use a product like TreeZWrap that can be attached to a hardwood tree or palm tree to hold the string light in place and provide uniform spacing, making installation easier.

c) Wrapping a whole tree canopy uses a different technique. You start at the top of a tree and work down towards the bottom. This is a time-consuming process and will require skilled labor, aerial lift or bucket truck for access. Energy calculations and multiple connections of lights will be required due to the number of lights being installed.

TIMED STUDY FOR SPIRAL WRAPPING TREE TRUNKS

1) A timed study was performed wrapping a **32 inch diameter tree trunk to a 10ft. height** using two installers, and two step ladders (no lateral branches).
   > Wiring was spaced at **6 inches** using a spiral wrap from base of the tree upwards 10 feet.
   > Ten foot step ladders were placed on opposite sides of the tree for access by both installers.
   > Bottom wiring was stapled to secure in place for wrapping, then the top when completed.
   > On site installation time **25 minutes x 2 installers** using **170ft.** of LED lighting strings.

   Averaged 03 minutes per foot height for installation labor using 2 installers.
   Averaged 17-20 ft. of wiring per foot height of a 32" diameter tree on 6 inch spacings.
   Average cost of seasonal LED lighting string $20 per thirty foot section or less in bulk.

   > Tree diameter, height and spacing will affect the total length of string lights needed (+/-).
   > Adding or subtracting several inches of tree diameter will not significantly alter install time.
   > Lateral branch accessible from a 12ft. step ladder may be wrapped up to ten feet outwards from a main tree trunk with less than 10-15 minutes labor time, averaging 6ft. of wiring (+/-) per 1ft. of tree branch length wrapped around a 10 inch diameter limb.

REFERENCE to NEC & UL

NEC refers to the **National Electrical Code** which is a set of safety regulations and guidelines to protect people and property from electrical hazards. The NEC is regularly revised and updated with changing standards for safety and technology. For reference, **Article 590** governs all temporary electrical installations including holiday lights. 590.3(B) states you can install tree lights and other temporary holiday displays and leave them up for a maximum of 90 days before taking them down or reinstalling them.

UL refers to **Underwriters Laboratory** which tests and certifies products for safety standards. The appropriate listing ensures that light fixtures are safe for their intended application. NEC and Building Codes often require the UL listing of equipment for passing inspections. **UL 588** the Standard for Seasonal Holiday Decorative Products applies to lighting strings with installation and use not exceeding 90 days per calendar year. Using these lights beyond the stated time period *voids* the UL listing and *conflicts* with NEC Article 590.

UL 588 Supplement SD developed additional requirements for **all-year** use string lights intended for longer installations and use than previously permitted by UL 588 for Seasonal Holiday Decorative Products. Please note that series-connected string lights are not included in this revision of UL 588 based on the similarity to lighting strings currently covered under UL 588 that are limited to seasonal and holiday use. Lights intended for longer installation times and use than previously allowed will have increased wire gauge size, wire insulation thickness and additional flexing capabilities. Product warranties will also be more comprehensive and for longer periods of time compared to seasonal products.

The following shows some of the product markings used on **all-year** UL Listed string lights to differentiate them from temporary seasonal lighting strings:

1) The term “string light” appears instead of “lighting string.”
2) The terms “seasonal” or ‘holiday” are not used.
3) The electrical load marking is “CAUTION: this string light is rated ___ Watts; do not overload. Connect other string lights end-to-end up to a maximum of ___ Watts total.”
4) String lights will be marked “This product is intended for all-year use.”
5) The letters on the string lights cord tag are black in a yellow background.
6) The certification mark for this category requires the use of a holographic label.

These types of lights (**all-year**) may be referred to as Festoon lights, Bistro lights, Trim lights or Permanent holiday lights. Permanent lighting installations are covered by Article 410 of the NEC for location and installations. Light fixtures attached to buildings or signs requires permitting (low voltage is not exempted).

Please note the information contained in this document is subject to change and/or verification in the National Electrical Codes, Underwriters Laboratory, and any jurisdictional agency Building Codes. Contact your local Building Department for additional guidance as required. Material cost may vary based upon supplier and the volume purchased. This document is not an endorsement of product(s), or related applications.

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