J2 LED Lighting, LLC

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Application Note: AN-1702

Installation reliability and circuit protection of UL2464 18/2 cable
J2 LED Lighting, LLC P/N: RBC-18AWG-UL2464

For a reliable low voltage LED lighting system installation various general guidelines are recommended for system longevity and reliability. The four main guidelines to follow for low voltage LED lighting cable usage are: cable amperage derating, circuit fusing, mechanical strain considerations, and ambient operating temperature.

The fusing current of cable depends largely on the external ambient temperature extremes expected in the environment the cable is used in. This includes the general ambient temperature and the cables proximity to heat emitting components or devices. The 18 awg UL2464 cable has a maximum operating current of 10 amps. For general purpose low voltage lighting applications, a 25% current derating is recommended for 12-volt DC circuits. Operating the cable at 75% of its rated current capacity equates to 7.5 amps for 90 watts in a 12-volt DC system.

Circuit protection devices (fuses or circuit breakers) are primarily designed to protect the cable from overheating rather than protection of the connected lighting equipment. When protection of the equipment is needed additional circuit protection should be installed within the device. Fuses for circuit protection of the UL2464 lighting cable are recommended at 7.5 amps or less depending on the connected equipment load and the fuse rating is not to exceed 10 amps. The UL2464 cable should never be used with any low voltage LED driver power supply greater than 90 watts.

When the cable is terminated with solderless crimp terminals or into screw type terminal blocks the wire should be carefully stripped. Care should be taken that nicked or cut stranded conductors never exceed 10% of the total number of strands. When the UL2464 cables are bundled the bend radius of the bundle should not be less than 10 times the total bundle diameter. For a single UL2464 cable the recommended minimum bend radius is 5 times the diameter of the 5mm cable or 25mm, (1-inch ref.). When the cable is installed as a single cable or bundled, there should always be adequate strain relief to prevent cable and conductor damage. The use of cable ties in equipment to secure the cable to the enclosure chassis and the use of cable glands when passing through equipment enclosures is recommended. For OEM lighting and equipment manufacturers, additional design guidelines for LED lighting equipment can be found in the UL8750 specification.

The best practice for good LED lighting cable reliability and the reliability of the associated electronics is to assure the ambient temperature within any equipment or enclosures the cable and electronics is installed does not exceed 50 °C (122 °F). An electronics enclosure with several LED power supplies can easily rise quickly in temperature if not properly ventilated. Consideration to vents or fans needs to be given when designing and building LED lighting power supply enclosures.