

WIRE SIZE AND GAUGE

- 14 AWG stranded and tinned wire is recommended. 16 and 18 AWG can also be used in some circumstances. Refer to technical bulletin #7 for more details.
- Verify maximum outside wire diameter allowable for Virgolite™ modules as per figure 1.
- Virgo™ XS maximum outside diameter wire size is 0.120" (3.05mm)
- Virgo™ S - M - X (long and short), Virgo+™ LS1 and Virgo+™ LS2 - LS3 - LS4 - LS6 maximum outside diameter wire size is 0.150" (3.94mm)
- Any insulation color can be used when it is clear that it leads to a dedicated LED circuit.
- Due to the high frequency nature of the output power of the LMPS power supplies; increasing wire size will not permit a longer run.

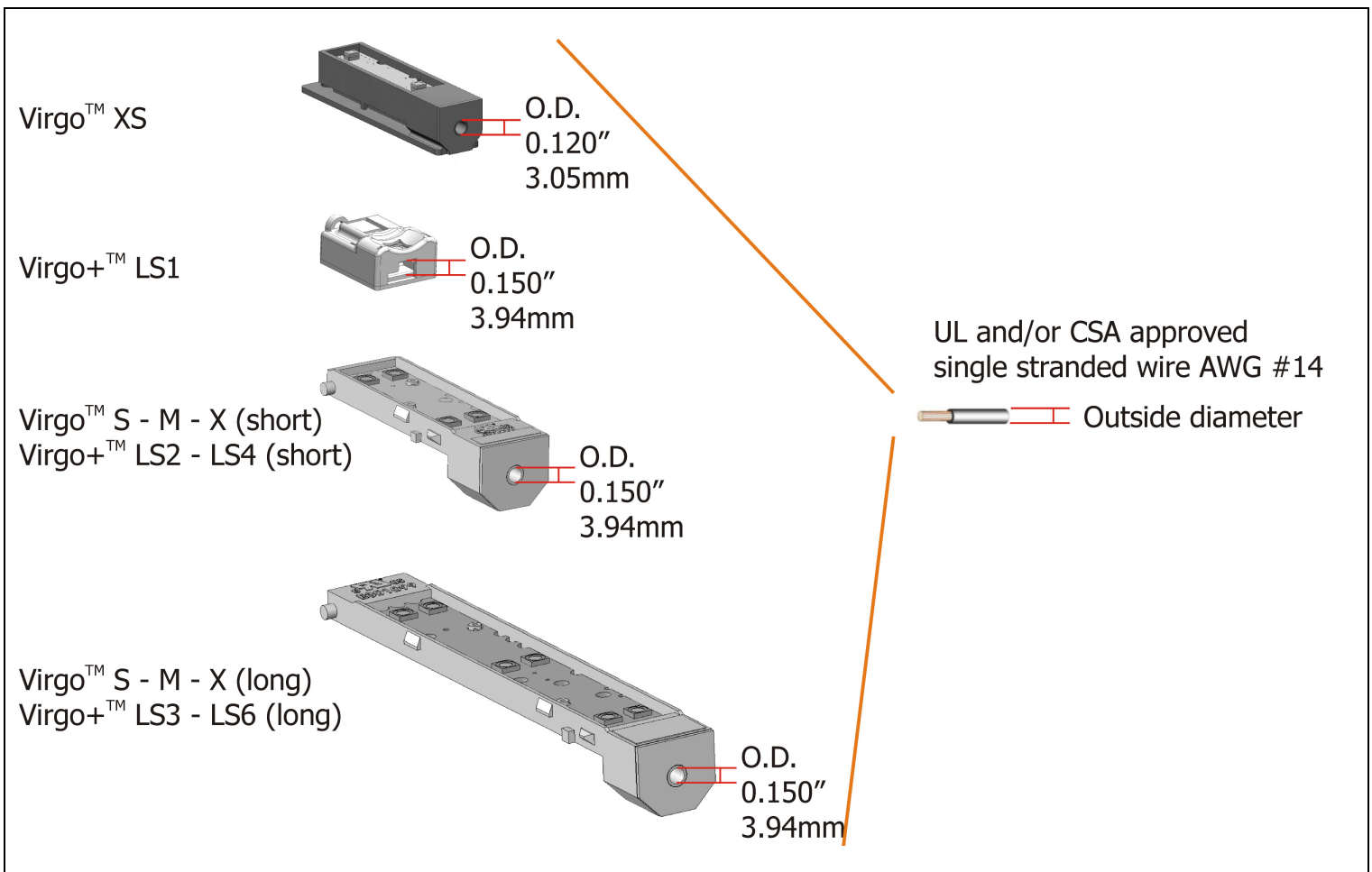


Figure 1: Accepted diameter sizes of single stranded wire



• Due to the variety of installation types and environments it is the responsibility of the installer or end-user to select the proper wire type for the application.

GENERAL CONSIDERATIONS

- Consult the relevant sections of chapter 3 and section 725 of the National Electrical Code (NEC) or section 16 and table 19 of the Canadian Electrical Code (CEC) and applicable standards.
- Conductors exposed to direct sunlight shall bear the mark “SUN RESISTANT”, “SR”, or similar or be listed as being sun resistant if they don’t bear such marking.
- Wiring connections or splices shall only be executed with listed connectors rated for a minimum of two (2) 14 AWG wires. Waterproof connectors need to be used for connections made in wet locations.

DRY LOCATIONS

Dry locations are defined as a location not normally subject to dampness, but may include a location subject to temporary dampness as in the case of a building under construction, provided that ventilation is adequate to prevent the accumulation of moisture.

Application examples:

- Cove lighting
- Under cabinet lighting
- Decorative lighting
- Interior architectural lighting
- Display cases

Suitable wire types:

- According to National Electrical Code (NEC) table 310.104 cable types suitable for dry locations are: RHH, RHW, RHW-2, THHN, THHW, THW, THW-2, THWN, THWN-2, TW, USE, USE-2, XHH, XHHW, XHHW-2, Z, ZW.
- According to the Canadian Electrical Code (CEC) table 19 cable types suitable for dry locations are: R90, RW90, RW75, TW, T90 NYLON, RPV90.

Suggested manufacturers:

Type	AWG	Outside diameter	Suitable for : Virgo™ S - M - X Virgo+™ LS1 Virgo+™ LS2 - LS3 - LS4 - LS6	Suitable for : Virgo™ XS	Manufacturer	HEICO lighting part number
XLPE Building wire RW90	14	0.130" 3.302mm	Yes	No	General Cable	-
PVC Low Voltage Building wire T90/TWN75	14	0.112" 2.845mm	Yes	Yes	General Cable	-
Building wire THHN / THWN / TWN75 / T90	14	0.109" 2.769mm	Yes	Yes	Southwire	C8750022
Simpull T90 Nylon / TWN75	14	0.109" 2.769mm	Yes	Yes	Southwire	-

Example:

- *An interior cove lighting application is considered as “exposed wiring in dry or damp locations”, suitable wire types would be:*
 - R90
 - TW
 - T90 NYLON

DAMP LOCATIONS

Damp locations are defined as an interior or exterior location that is normally or periodically subject to condensation or moisture in, on or adjacent to electrical equipment and includes partially protected locations under canopies, marquees, roofed open porches and similar locations. This also includes interior locations subject to moderate degrees of moisture, such as some basements, some barns and some cold-storage warehouses. Locations sheltered from the weather are considered damp locations.

Application examples:

- Covered terrace lighting
- Covered outdoor alley
- Refrigerators
- Metal light boxes

Suitable wire types:

- According to National Electrical Code (NEC) table 310.104 cable types suitable for damp locations are: RHH, RHW, RHW-2, THHN, THHW, THW, THW-2, THWN, THWN-2, TW, USE, USE-2, XHH, XHHW, XHHW-2, Z, ZW.
- According to the Canadian Electrical Code (CEC) table 19 cable types suitable for damp locations are: R90, TW, T90 NYLON, RPV.

Suggested manufacturers:

Type	AWG	Outside diameter	Suitable for : Virgo™ S - M - X Virgo+™ LS1 Virgo+™ LS2 - LS3 - LS4 - LS6	Suitable for : Virgo™ XS	Manufacturer	HEICO lighting part number
XLPE Building wire RW90	14	0.130" 3.302mm	Yes	No	General Cable	-
PVC Low Voltage Building wire T90/TWN75	14	0.112" 2.845mm	Yes	Yes	General Cable	-
Building wire THHN / THWN / TWN75 / T90	14	0.109" 2.769mm	Yes	Yes	Southwire	C8750022
Simpull T90 Nylon / TWN75	14	0.109" 2.769mm	Yes	Yes	Southwire	-

Example:

- *A covered terrace lighting application is considered as “exposed wiring in dry or damp locations”, suitable wire types would be:*
 - R90
 - TW
 - T90 NYLON

WET LOCATIONS

Wet locations are defined as a location in which liquids may drip, splash, or flow on or against electrical equipment. This also includes outdoor locations, which are any location exposed to the weather. Locations that are sheltered from the weather are not considered outdoor locations. Conductors exposed to direct sunlight shall bear the mark “SUN RESISTANT”, “SR”, or similar or be listed as being sun resistant if they don’t bear such marking.

Application examples:

- Deck lighting
- Eaves lighting
- Exterior architectural lighting (doesn’t include direct burial applications)

Suitable wire types:

- According to National Electrical Code (NEC) table 310.104 cable types suitable for wet locations are: RHW, RHW-2, THHW, THW, THW-2, THWN, THWN-2, TW, XHHW, XHHW-2, ZW.
- According to the Canadian Electrical Code (CEC) table 19 cable types suitable for wet locations are: RW75, RWU75, RL90, R90, RW90, RWU90, TW, TWU, TWU75, TW75, TWN75, RPV90, RPVU90.

Suggested manufacturers:

Type	AWG	Outside diameter	Suitable for : Virgo™ S - M - X Virgo+™ LS1 Virgo+™ LS2 - LS3 - LS4 - LS6	Suitable for : Virgo™ XS	Sun resistant	Manufacturer	HEICO lighting part number
XLPE Building wire RW90 (solid)	14	0.120" 3.05mm	Yes	Yes *see note	Yes	General Cable	A8750020
XLPE Building wire RW90 (stranded)	14	0.130" 3.302mm	Yes	No *see note	Yes	General Cable	A8750021
PVC Low Voltage Building wire T90/TWN75	14	0.112" 2.845mm	Yes	Yes	No	General Cable	-
Building wire THHN / THWN / TWN75 / T90	14	0.109" 2.769mm	Yes	Yes	No	Southwire	C8750022
Simpull T90 Nylon / TWN75	14	0.109" 2.769mm	Yes	Yes	No	Southwire	-
RPV90	14	0.130" 3.302mm	Yes	Yes	No	Nexans	-

* Note: Wiring connections or splices shall only be executed with listed connectors rated for a minimum of two (2) 14 AWG wires. A proper wire splice method with waterproof connectors shall be used for connections made in wet locations.

Examples:

- *A deck lighting application is considered as “exposed wiring in wet locations”, when **not exposed** to sunlight, suitable wire types would be:*
 - RW90
 - TW
 - TWN75
- *A deck lighting application is considered as “exposed wiring in wet locations”, when **exposed** to sunlight, suitable wire types would be:*
 - RW90 (needs to be sun-resistant)

CONDUCTORS IN AN ELECTRICAL ENCLOSURE

An electrical enclosure is a cabinet, panel board or any certified enclosure that prevents the wires and therefore the modules from being directly accessible. The AWM, MTW and TEW conductor types, usually used in this type of installation, are recognized components for use in an overall listed product and are not intended for installation in buildings or structures.

Application examples:

- Electric sign
- Stand alone luminaire

Suitable wire types:

- According to National Electrical Code (NEC) table 310.104 cable types suitable for use within an electrical enclosure are: **AWM** and **MTW**.
- According to the Canadian Electrical Code (CEC) table 19 cable types suitable for use within an electrical enclosure are: **TEW**.
- Other conductor types (like armored cable) can be used when the electrical code permits it.

TRANSPORT CONDUCTOR

The transport conductor goes from the power supply to the LED loop. The transport conductor needs to be compliant for use with Class 2 power sources. A typical wire type is either CL3P or CL2P because of their ease of installation in many environments such as plenums.

Application examples:

- Power supplies in an electrical room away from the modules
- Long distance in between modules or groups of modules

Suitable wire types:

- According to National Electrical Code (NEC) table 310.104 cable types suitable for use in Class 2 circuits are : **CMP, CL3P, CL2P, CMR, CL3R, CL2R, PLTC, CMG, CM, CL3, CL2, CMX, CL3X, CL2X.**
- According to the Canadian Electrical Code (CEC) table 19 cable types suitable for use in Class 2 circuits are: **FCC, CMP, CMR, CMG, CM, CMX, CMH, CMUC.**
- Other conductor types (like armored cable) can be used when the electrical code permits it.

Suggested manufacturers:

Type	AWG (2 conductors)	Part number	Manufacturer	HEICO lighting part number
CL3P	14	454696ABK	Paige	A8750012
CL3P	14	3052S	General Cable	-

Note : The CL3P Paige cable sold by Heico lighting™ has 2 yellow conductors instead of the black and white specified on the Paige product sheet. Only the colors are different, the ratings and certifications remain the same. This cable is only available through Heico lighting™.

CONDUCTOR MARKINGS

The listing and/or marking shall be used to ensure suitability for the use and location. The listing and/or marking shall be used by the inspection authorities to approve the installation. Wires exposed to direct sunlight shall bear the mark “SUN RESISTANT”, “SR”, or similar or be listed as being sun resistant if they don’t bear such marking.

Marking for suggested cables

Type	Manufacturer	Marking
XLPE Building wire RW90 (solid)	General Cable	GENERAL CABLE® (PLANT OF MFG) CSA RW90 XLPE SIZE (AWG OR KCMIL) CU 600V (-40° C) YEAR OF MFG SEQUENTIAL METER MARKING NOTE: for black insulation add -SR
XLPE Building wire RW90 (stranded)	General Cable	GENERAL CABLE® (PLANT OF MFG) CSA RW90 XLPE SIZE (AWG OR KCMIL) CU 600V (-40° C) YEAR OF MFG SEQUENTIAL METER MARKING NOTE: for black insulation add -SR
PVC Low Voltage Building wire T90/TWN75	General Cable	GENERAL CABLE® (PLANT OF MFG) (YEAR OF MFG) THHN/THWN SIZE (AWG OR KCMIL) (MM2) CU GAS AND OIL RES II, 600 VOLTS, VW-1 OR AWM (UL) E-103886 C(UL) T90 NYLON/TWN75 FT1 (-25° C)
Building wire THHN / THWN / TWN75 / T90	Southwire	14AWG 2.08MM2 LL49446 T90 NYLON TWN75 THHN THWN CSA C-US FT1 600V
Simpull T90 Nylon	Southwire	SOUTHWIRE #EEEE# #P# (UL) (AWG 14) 2,082 mm2 CU TYPE MTW OR THWN OF THHN OR GASOLINE AND OIL RESISTANT II OR AWM 600 VOL TS VW-1 --- CSA T90 NYLON OR TWN75 600 VOLTS FT1 NON-ANCE 90 (D)C --- RoHS
RPV90	Nexans	(MONTH/YEAR) NEXANS EXELENE® 14AWG (2.081mm2) CSA LL23462 F RPV90 XLPE -40C 90C 600V SR
CL3P	Paige	PAIGE LoVo 454696AWH E191597 ++ (05-49399) CL3P/FPLP (UL) 2/C 14 AWG RoHS COMPLIANT
CL3P (HEICO lighting™ version)	Paige	PAIGE ELECTRIC LED POWER SUPPLY CORD 454696AWHY-MOD E191597 ++ (01-51709) CL3P/FPLP (UL) 2/C 14 AWG RoHS COMPLIANT
CL3P	General Cable	CAROL A (R) 14 AWG--E3052S--75C E60233-8 (UL) CL3P --- MADE IN USA (DATE CODE) (TRUMARK SEQUENTIAL FOOTAGE)



- The aforementioned markings are only given as indicative information. The specification sheet of the manufacturer and listing shall be consulted to get all the required information to ensure approval of the installation by the inspection authorities.

Always refer to the appropriate electrical code for wire selection, installation and suitability of use.

Suggested wires have been tested for outside diameter by HEICO™ lighting. Other similar wires from other manufacturers can also be used. The suggested wires and manufacturers are guidelines only and not a warranty of compliance for a particular application or environment. It is the responsibility of the installer to verify wire suitability for the application and environment.



For other applications contact HEICO lighting™

- All technical data in this technical bulletin is based on test results and is believed to be correct. However since the end use of HEICO lighting™ products, usage application and installation, is beyond our control, HEICO lighting™ makes no warranty expressed or implied as to the fitness of use. Their use shall be solely by the judgment and at the risk of the user notwithstanding any statement in this technical bulletin.
- The installer is responsible to select the compliant wire insulation in accordance with the National Electrical Code (NEC) in the United States or the Canadian Electrical code (CEC) (CSA22.1) in Canada. Also follow local electrical code ordinances when applicable.
- Class 2 circuits shall NOT be mixed with Class 1 circuits and shall not be connected to ground.
- Due to the variety of installation type and environments it is the responsibility of the installer or end user to select the proper wire type for the application.
- The location definitions are taken from the American Electrical Code (NEC) article 100 and from the Canadian electrical code (NEC) section 0 and appendix B.
- Refer to the product sheet for more information about the LMPS-350, LMPS DC-350, LMPS-750 power supplies and the Virgolite™ modules.