1 SCOPE

This specification covers the requirements for 25 kV rated single-phase primary cable with shielded concentric neutral and an insulating jacket. The cable may be used in single or multi-phase application on the Springfield Utility Board distribution system.

2 REFERENCE STANDARDS

In the event that there is a conflict between Insulated Cable Engineers Association (ICEA) and Association of Edison Illuminating Companies (AEIC) standards, the most stringent requirement will apply. The cable shall meet the all applicable provisions of the latest revised editions for the following specifications.

- Association of Edison Illuminating Companies (AEIC) Cable Specification No. CS8-00.
- Insulated Cable Engineers Association (ICEA) Specification Number S-94-649 for concentric neutral cables rated 5 kV to 46 kV.

American Society for Testing Materials (ASTM), the latest specification shall apply. The following is a list of pertinent specifications.

ASTM	Specification for soft or annealed copper wire
ASTM B230	Specification for aluminum 1350-H19 wire for electrical purposes
ASTM B231	Specification for concentric-lay-stranded aluminum-alloy conductors
ASTM B609	Specification for aluminum 1350 round wire. Annealed and intermediate tempers, for electrical purposes
ASTM D1248	Specification for polyethylene plastic molding and extrusion materials

3 MODIFICATIONS TO EXISTING STANDARDS

3.01 CONDUCTOR

3.01.01 Central conductors shall be copper or aluminum as specified in bid request.

3.01.02 Central aluminum conductors shall be stranded aluminum 1350 H14 or H24 (3/4 hard), in accordance with ASTM B609 or aluminum 1350 H19 in accordance with ASTM B230.

3.01.03 Stranded conductors shall be concentric-lay, Class B, compressed 3%, per ASTM B609 and ASTM B231.

3.01.04 The manufacturer's name and year of manufacture is to be embossed on the center strand of the conductor.

3.02 STRAND FILL

3.02.01 Strand fill shall have excellent adhesion to conductor, and be fully contained within the strands

3.02.02 Strand fill shall be able to withstand 5psi water pressure for 15 minutes when subjected to ICEA T-31-610 testing

3.03 CONDUCTOR SHIELD

3.03.01 The conductor shield shall be an extruded semi-conducting material meeting the applicable requirements of ICEA S-94-649.

3.03.02 The shield shall have an allowable operating temperature equal to, or higher than, that of the insulation.

3.04 INSULATION

3.04.01 The insulation shall be unfilled cross-linked polyethylene with tree retardant (TRXLPE), suitable for a conductor operations temperature of 90°C, emergency overload temperature of 130°C and a short circuit temperature of 250°C.

3.04.02 Alternatively, or if specified in the bid document, the insulation may be ethylene propylene rubber (EPR), suitable for a conductor operations temperature of 105°C, emergency overload temperature of 140°C and a short circuit temperature of 250°C.

3.04.03 Insulation thickness shall be nominal 260 mil unless otherwise specified in the bid document.

3.05 INSULATION SHIELD

3.05.01 The insulation shield shall be an extruded semi-conducting material compatible with all cable components with which it is in contact.

3.05.02 The voids and protrusion limits on the semi-conducting shield shall be in accordance with the appropriate ICEA specification.

3.05.03 The semi-conducting material shall be suitable for exposure to sunlight and other anticipated atmospheric conditions at temperatures of -25° through 90°C.

3.05.04 The shield shall be applied such that it can be easily removed without externally applied heat. Stripping tension values shall be within the range of 6-16 pounds.

3.05.05 The indentation of the concentric neutral into the insulation shield shall not exceed 15 mils at any point. The measurement shall be made on cable samples removed from the composite jacketed cable.

3.06 EXTRUSION PROCESS

The conductor shield, insulation, and insulation shield shall be applied in a triple or tandem triple extrusion operation and cured chemically using the dry cure process.

3.07 CONCENTRIC NEUTRAL

3.07.01 A concentric neutral, consisting of annealed copper, shall be spirally wound over the insulation shield with uniform spacing between wires. The conductor lay shall be 6-8 times the diameter of the cable, measured over the concentric wires.

3.07.02 The wires shall be uncoated.

3.07.03 The conductivity of the concentric neutral shall be considered as full neutral unless specified otherwise in the purchase order.

3.08 OVERALL OUTER JACKET

3.08.01 An electrically insulating outer jacket shall be applied over the concentric neutral conductor.

3.08.02 The jacket shall be applied directly over the concentric neutral conductor. The jacket material shall fill the interstice area (encapsulating but still in compliance with Section 3.07.04), leaving no voids. The jacket shall be free stripping.

3.08.03 The jacket shall be electrically insulating and shall consist of a low density or linear low density HMW black polyethylene compound meeting ICEA S-94-649 and ASTM D1248.

3.08.04 The cable shall be manufactured such that the neutral wires are equally spaced and remain in contact with the underlying extruded insulation shield.

3.09 CABLE IDENTIFICATION

3.09.01 The outer jacket shall be durably marked throughout its length with the manufacturer's identification, type of insulation, insulation level, size of conductor, type of conductor, rated voltage, year of manufacture, and consecutive footage marking for the entire shipment.

3.09.02 Skipped numbers between reels caused by trimming ends or cable rejected by failure to pass acceptance testing is allowable. Supplier shall notify purchaser for skips in excess of 20 feet.

3.10 TESTING

3.10.01 Tests shall be conducted on the manufacturer's reels unless it has been specified that the tests are to be conducted on reels ready for shipment.

3.10.02 Manufacturer's test. Electrical tests shall be conducted in accordance with the requirements of latest editions of AEIC and ICEA.

3.10.03 Apparent discharge test. Corona level tests shall be performed on cable wound on reels that are ready for shipment. Corona level test shall included an x,y recording (apparent discharge versus voltage) for each individual reel. The apparent discharge shall not exceed five (5) picocoulombs for all voltage levels. A copy of this test data for *each shipment reel* will be furnished with the certified test report.

3.10.04 A CV Extrusion Qualification Test, in accordance with Section 10.4 of ICEA S-94-649 shall be completed.

3.10.05 The cable shall be tested either by solvent extraction or hot creep per ICEA S-94-649. The sample frequency shall be according to AEIC.

3.10.06 SUB, or its designee, may perform additional tests to determine quality and/or adherence to this specification.

4 ACCEPTANCE TESTS

4.01 The manufacturer shall furnish the purchaser with certified copies of the results of all tests required by this and all reference standards. Acceptance of cable by purchaser will be conditional upon conforming to the requirements of the latest SUB and AEIC standards.

4.02 SUB will determine the acceptability of the product. Cable that does not meet the requirements of this specification or pass the tests herein may be rejected.

4.03 The manufacturer shall provide three foot (3') samples cut from each cable run for SUB stripability testing. Cable that does not strip well may be rejected. The samples should be shipped prior to reel delivery.

Note: At SUB's discretion, the manufacturer shall provide a three foot (3') sample cut from each reel. In that event, the vendor will be notified at the time of the Purchase Order.

4.04 Rejected orders will be returned to the supplier at the supplier's expense.

5 WARRANTY

5.01 The vendor warrants that the equipment furnished is free from defects in material and workmanship and agrees to repair or replace any unit that is unsuitable for operation or fails in operation during normal and proper use. The warranty shall be for a period of 12 month from date of operation or 18 months from date of acceptance, whichever is earlier.

6 PACKAGING INSTRUCTIONS

6.01 Cable shall be on non-returnable wood reels with one continuous length per reel. Reels shall have a maximum diameter of 72" and maximum outside width of 46", with a three-inch (3") diameter steel bushing arbor hole and shipped with axis horizontal. Weight of full reel shall not exceed 6,000 pounds.

6.02 In accordance with NEMA specifications all reels shall have a Class 3 protective covering prior to being shipped to protect cable against physical damage.

6.03 Cable reels are to be shipped on flange edge and on open flatbed truck only.

7 VENDOR INFORMATION

7.01 All quotations to be complete must include for each cable size the data as indicated in the vendor-furnished data, ***APPENDIX A***.

7.02 Exceptions to this standard shall be presented to the purchaser in writing for consideration.

REVISION TABLE	
3/12/05	Previous version of Standard MSD 1001.
6/18/14	Put into new format. Added Section 4.03, cable samples. Updated Appendix B to become Appendix A (The old Appendix A is no longer used)

MSD 1001 **APPENDIX A** **BID # _____**

VENDOR FURNISHED CABLE DATA

Line Item _____

25kV JACKETED CONCENTRIC NEUTRAL POWER CABLE

(Submit separate sheets for each item quoted)

Manufacturer _____ Vendor _____

1. CONDUCTOR
   a. Size _____
   b. Material (Cu or Al) _____
   c. Number and size of strands _____
   d. Type and Standard _____
2. CONDUCTOR SHIELD
   a. Manufacturer Brand and Type _____
   b. Thickness in Inches _____
   c. Continuous Operation Temperature Rating (degree C) _____
3. INSULATION
   a. Manufacturer Brand and Type _____
   b. Continuous Operation Temperature Rating (degree C) _____
4. INSULATION SHIELD
   a. Manufacturer Brand and Type _____
   b. Thickness in Inches _____
   c. Continuous Operation Temperature Rating (degree C) _____
5. CONCENTRIC
   a. Number and size of strands _____
   b. Full or 1/3 _____