GUAM POWER AUTHORITY
P.O. Box 2977
Agana, Guam 96932

TRANSMISSION & DISTRIBUTION SPECIFICATION

Specification No. E-045

For

35 KV XLPE UNDERGROUND CABLE
SINGLE CONDUCTOR, SHIELDED,
1000 KCMIL ALUMINUM

35 KV XLPE UNDERGROUND CABLE, SINGLE CONDUCTOR, SHIELDED, 1000 KCMIL ALUMINUM

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1.0 SCOPE

1.1 This specification describes 35 kV single conductor, tree retardant-cross linked polyethylene insulated, copper taped, water blocked, HDPE jacketed power cable.

1.2 The cable is intended for use in wet or dry locations in an underground system suitable for either direct burial or installation in ducts, with conductor temperatures of 90 degree C for normal operation. The cable shall be rated not less than 35 KV, 133% insulation.

1.3 The cable shall be manufactured to ICEA S-93-639 except where otherwise indicated herein.

1.4 The cable manufacturer must have developed and implemented a Quality Management System, using the ISO 9001 standard as the model for quality assurance and criteria for third party accreditation. Proof of compliance with this requirement must be supplied at tender stage with a Registered Supplier Certificate.

2.0 CONFORMANCE TO SPECIFICATION REQUIREMENTS

2.1 APPLICABLE STANDARDS

2.1.1 ICEA Publication No. S-93-369, "5-46 kV Shielded Power Cable for use in the Transmission and Distribution of Electrical Energy".

2.1.2 NEMA Standards Publication No. WC 26, "Wire and Cable Packaging".

2.1.3 ISO 868 "Plastics and ebonite – Determination of indentation hardness by means of a durometer (Shore hardness)"

2.1.4 Except as specified herein, equipment covered by this specification shall conform to all applicable industry standards (i.e. ANSI, ASTM, etc.).

2.2 DEVIATIONS AND NON-CONFORMANCE REQUIREMENTS

2.2.1 Deviations from this specification or changes in the material or design after the purchase order has been placed must be approved by the Guam Power Authority's Engineering Department and acknowledged by a Purchase Order Amendment.

2.2.2 Units received with deviations or non-conformance, which are not acknowledged as specified in sub-paragraph 2.2.1, are subject to rejection. The supplier of units rejected in this paragraph is responsible for any corrective action including but not limited to materials, labor, and transportation necessary to dispose of, or make the units conform to the specification.

2.2.3 Notification of defective units discovered before or after installation that are believed to be inherent to manufacturing problems or workmanship shall be forwarded to the supplier. The description of the item, documentation of the problem and the desired information, disposition and/or follow-up (as appropriate) that GPA expects from the supplier will be specified. The supplier's response shall be made within thirty (30) days unless otherwise noted or an extension is acknowledged and approved in writing by the Guam Power Authority's Engineering Department.

3.0 CONDUCTORS

3.1 Aluminum wire shall be Class B, stranded aluminum alloy 1350, semi-annealed, three quarter hard drawn.

3.2 The numbers of strands are specified in Table A for each conductor size.

4.0 CONDUCTOR SHIELDING

The conductor shall be covered with a layer of extruded semi-conducting cross linked polyethylene strand shield with a minimum average thickness as specified in Table A.

5.0 INSULATION

5.1 Insulation shall be the Dow Chemical Company's HFDB 4202 EC compound.

5.2 The conductor shield, insulation, and insulation shield shall be applied via a triple extrusion head and dry cured in one continuous operation. The insulation shall be homogeneous, solid, free of any contaminants, gels, or discolorations larger than 7 mils in any dimension, and free of porosities and voids larger than 3 mils.

5.3 The nominal insulation thickness shall be as specified in Table A. Tolerances on thickness shall be as specified in ICEA S-93-639.

6.0 INSULATION SHIELDING AND PROTECTIVE COVERING

6.1 The protective covering and insulation shield shall consist of an extruded layer of semi-conducting cross linked polyethylene over the insulation.

6.2 The shielding shall be in intimate contact with the outer surface of the insulation and shall be free stripping, leaving no conducting particles or other residue on the surface of the insulation.

6.3 The insulation shield thickness shall be not less than as specified in Table A.

6.4 A coated or uncoated copper wire shield shall be utilized.

7.0 JACKET

7.1 The cable jacket shall be a black high intensity polyethylene (HDPE), with a minimum thickness as specified in Table A. In addition to the requirements of

ICEA S-93-639, the material must have a minimum instantaneous Shore D hardness of 62 when prepared and tested in accordance with ISO 868.

7.2 The jacket shall be of smooth and uniform composition free of holes, cracks, blisters, and other imperfections.

7.3 The jacket is for metallic shield corrosion protection, moisture entry prevention, protection from termite damage, and mechanical protection for conduit installation.

8.0 IDENTIFICATION

8.1 All cable jackets shall have a durable (lifetime) surface identification showing the manufacturer's name, conductor size and type, insulation type and nominal thickness, voltage, and year of manufacture.

8.2 Identification shall be repeated along the cable at regular surface intervals, with unmarked surfaces not exceeding twelve inches.

8.3 Identification shall be sized as to be easily readable by workmen holding the cable.

9.0 TESTS AND TEST REPORTS

9.1 Cable shall be tested in accordance with ICEA S-93-639.

9.2 Accelerated water/electrochemical treeing test results shall be furnished to the GPA Manager of Engineering at the point of tendering.

9.3 The Supplier shall furnish one copy of a certified report, de tailing the results obtained for tests indicated as having a frequency of 100% in Table 9.7 of ICEA S-93-639, to the GPA Manager of Engineering.

9.4 All test results shall be furnished to the GPA Manager within two weeks of cable delivery.

10.0 REELS

10.1 Reels shall be designed to meet NEMA WC 26, or an equivalent international standard, to support the weight of the cable and withstand handling in accordance with industry practices.

10.2 The inner drum end of the cable, when allowed to project through the flange of the reel, shall be protected to avoid injury to the cable or cable seal.

10.3 The mandrel hole size shall be 3-1/2 inches, minimum.

10.4 A durable, non-fading label shall be securely attached to a flange of the reel plainly stating GPA's Purchase Order Number, shipping length in feel of cable on the reel, beginning and ending sequential footage number, the number, type and size of conductors, nominal thickness and type of insulation, voltage, and tare weight.

10.5 Each reel shall be marked with an arrow suitably stenciled on the flange of the reel, indicating the direction the reel should be rolled.

11.0 PACKING, SEALING, SHIPPING AND STORAGE

11.1 Each end of each length of cable shall be durably sealed and pressurized with dry nitrogen to 10 psi, before shipment, to prevent entrance of moisture. Evidence of water in the cable as received shall be cause for rejection.

11.2 The cable shall be placed on the reels in such a manner that it will be protected from injury during shipment. Care shall be taken to prevent the reeled cable from becoming loose. Each end of the cable shall be firmly and properly secured to the reel.

11.3 The reels shall be lagged or covered with suitable material to provide physical protection for the cable during transit and during ordinary handling operations and

storage, and the materials and system used shall be approved by the GPA Engineering Department.

11.4 Reels shall be transported upright and securely blocked in position so that they will not shift during transit.

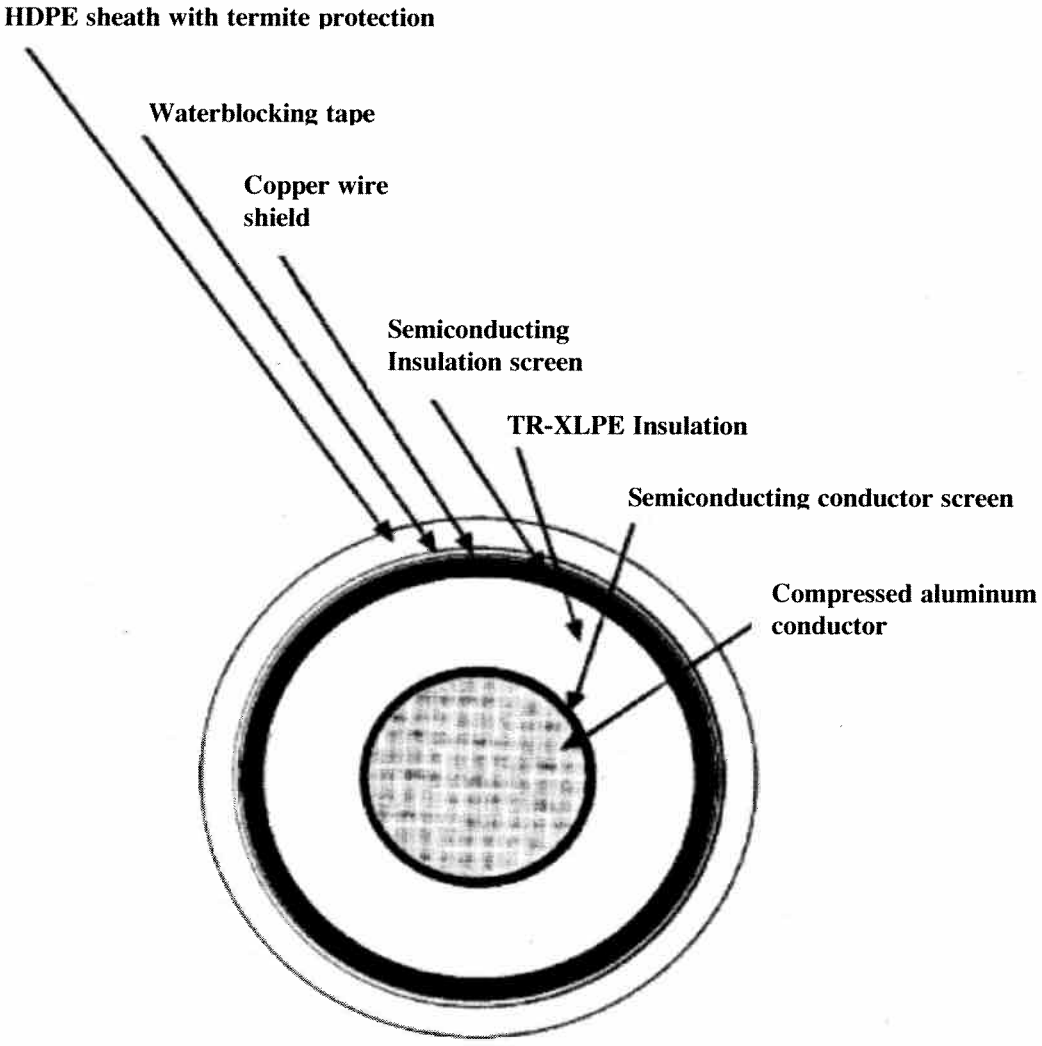
11.5 Reels must be stored upright (NOT FLAT) in a secured and suitably paved area with adequate drainage. Reels should not be stored in a continuous damp environment; ideally a covered area is preferred.

12.0 WARRANTY

The Supplier shall provide a warranty of at least one year that the cable is free from defects.

TABLE A

CONDUCTOR SIZE (AWG / kcmil)	CONDUCTOR NO. OF STRANDS	CONDUCTOR SHIELD THICKNESS (mils)	INSULATION THICKNESS (mils)	INSULATION SHIELD/PROTECTIVE COVERING THICKNESS (mils)	JACKET THICKNESS (mils)
ALUMINUM CONDUCTOR					
1000	61	25	420	50	110



Aluminum 35 kV 133%, CuTp, WbTp
HDPE Jacket

Cable Cross Section