



**Hawaiian
Electric**

The information found in this document are general guidelines that may be used to aid in the preparation of your service request proposal. Please be advised that depending on the specific needs and actual conditions of your project, Hawaiian Electric may require your design to comply with different specifications including specifications that include more stringent requirements than those included in these design specification guidelines. For further guidance and clarification on the actual specifications that will apply to your particular project, please refer to instructions issued by Hawaiian Electric's Planner or Engineer who is assigned to your particular (Project/Review Request/...). Additionally, please be advised that Hawaiian Electric reserves the right to require additional modifications to any approved design if it is determined during actual construction that additional modifications must be made to address certain field conditions that were not detected or Hawaiian Electric was unaware of during the design review process.



HAWAIIAN ELECTRIC CO., INC.

SPECIFICATION NO. M7001-6

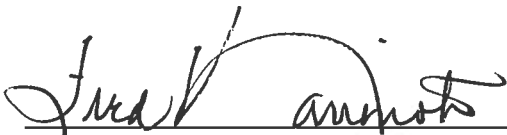
FOR

PLASTIC CONDUITS AND FITTINGS

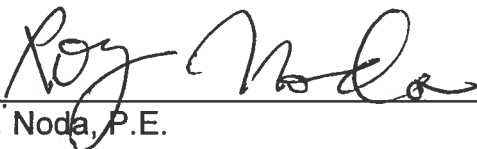
CONSTRUCTED WITH

PVC PLASTIC

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PART 1 SCOPE, CLASSIFICATION AND SIZES

1.01 SCOPE

This specification covers plastic conduit and fittings for the underground installation for communication and electrical wire and cables.

1.02 CLASSIFICATION

This specification covers the following type of plastic conduit as specified in the invitation for bids.

EPC-40-PVC - Electrical PVC conduit designed for normal-duty applications above ground; also used for all concrete encased applications or direct burial.

EPC-80-PVC - Electrical PVC conduit designed for heavy-duty applications above ground; also used for all concrete encased applications or direct burial.

1.03 SIZES

The conduit shall be made in the following nominal Iron Pipe Sizes (IPS):

Schedule 40 - 3/4, 1, 1-1/2, 2, 3, 3-1/2, 4, 5, and 6 inches

Schedule 80 - 1, 1-1/2, 2, 3, 3-1/2, 4, 5, and 6 inches

1.04 KIND AND SIZE OF FITTINGS

Fittings shall be of the kind and nominal sizes as indicated below:

KIND	NOMINAL SIZES, INCHES
Bell End	2, 3, 4, 5, 6
Couplings	3/4, 2, 3, 3-1/2, 4, 5, 6
Couplings; 5 Degree	2, 3, 4, 5, 6
Reducers	3x2, 3-1/2x2, 4x3, 4x3-1/2, 5x4, 6x5
Adapters	2, 3, 3-1/2, 4, 5, 6
Plugs	2, 3, 3-1/2, 4, 5, 6
Caps	2, 3, 3-1/2, 4, 5, 6
Long Sweep Bends, 90°	2, 3, 3-1/2, 4, 5, 6
Long Sweep Bends, 45°	2, 3, 3-1/2, 4, 5, 6
S Bends	2, 3, 3-1/2, 4, 5, 6
Curved, Segments, 22-1/2°	2, 3, 3-1/2, 4, 5, 6

The conduit shall conform to National Electrical Manufacturers Association (NEMA) Standard No. TC 2. The fittings shall conform to NEMA Standard TC 3.

1.05 SPECIFICATION FOR RADIUS OR CURVATURE

SIZE (Inches)	Radii 45° & 90° Bends Inches	Sweeps Feet	Tangent or Minimum Straight Length at End Inches
2	24 & 36	12-1/2	2.000
3	30 & 36	12-1/2	3.125
3-1/2	36 & 60	12-1/2	3.375
4	36 & 60	12-1/2	3.625
5	36 & 60	12-1/2	4.250
6	48 & 60	12-1/2	5.250

PART 2 MATERIAL TO BE USED, APPLICABLE SPECIFICATIONS, STANDARDS, AND OTHER PUBLICATIONS

- 2.01 The material to be used for this conduit shall be PVC plastic. Reground material from manufacturer's own pipe products may be used by the MANUFACTURER provided the end product is equal in quality to pipe from virgin material.
- 2.02 All definitions and terms used in this specification are in accordance with ASTM D-882.
- 2.03 The NEMA Standard Publication No. TC-2 or the ANSI/ASTM Standard Specification F512, latest revision, shall apply to the material in this specification.

PART 3 REQUIREMENTS

- 3.01 **MATERIALS**
The conduit and fittings shall be made of materials as specified in Par. 2.01 capable of meeting the physical and chemical requirements. This plastic may contain stabilizers, lubricants, dyes, pigments and fillers.
- 3.02 The heat distortion, impact resistance, deformation strength, crushing strength, joint tightness, dimensions, fittings, workmanship, chemical resistance, water resistance, water

absorption, and wet strength shall be as specified in the Standard Publication No. TC-2, latest revision.

PART 4 SAMPLING, INSPECTION, AND TEST PROCEDURES

4.01 SAMPLES

The MANUFACTURER shall certify on each lot or shipment that the plastic conduit and fittings supplied meet all of the requirements of the NEMA Standard Publication No. TC-2. The letter of certification shall state the lot or control number and manufacturer of resin used. In addition, the MANUFACTURER shall perform such individual tests described in Sections 4 and 5 on each lot or shipment as may be directed by the PURCHASER. When requested by the PURCHASER, test report shall be certified by an independent laboratory and submitted to the PURCHASER.

4.02 INSPECTION

Conduit shall be examined for compliance with dimensional requirements and for freedom from manufacturing defects.

4.03 TEST METHODS

Tests shall be made in accordance with the NEMA Standard Publication No. TC-2, Sections 4 and 5.

PART 5 PREPARATION FOR DELIVERY

The conduit and fittings shall be packed to insure carrier acceptance and safe delivery to destination in accordance with Uniform Freight Classification Rules or with other rules and regulations applicable to the mode of transportation.

PART 6 NOTES

6.01 ORDERING DATA

PURCHASER should specify the kind and size of conduit, the kind and size of fittings required and should exercise any desired options offered herein.

6.02 JOINTS

All connections shall be made with the solvent weld compound recommended by the conduit manufacturer and the suggestions in TC 2 Appendix A.

- 6.03 It is believed that this specification adequately describes the characteristics necessary to secure the desired items and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should definitely be stated. This specification is to apply in all other respects.
- 6.04 Marking, identification and inspection. Each length of conduit and fitting shall be identified with a marking showing the name of the extruder or the extruder's trade mark, PVC, nominal size, and Schedule. No order of marking is specified. Any additional information deemed necessary by the extruder is permitted. The resin used for each lot or shipment of conduit or fittings shall be identified by stating in the letter of certification the lot or control number of the resin and the manufacturer's name. All tests required for samples in this specification shall be filed or mailed to PURCHASER as requested on purchase order. Any conduit that does not compare with the test results for that unit will give sufficient reason for rejecting the entire unit.
- 6.05 See Page 5 of 5 for conduit dimension.

TABLE 1
SIZES AND DIMENSIONS OF PVC CONDUIT

U.S. Customary Units

Nominal Size, Inches	Outside Diameter, In. Average	Wall Thickness, Inches				Minimum Cross-Sectional Area, Square Inches of EPC-80-PVC*	Bell Insertion Depth, Inches
		EPC-40-PVC		EPC-80-PVC			
		Maximum	Minimum	Maximum	Minimum		
3/4	1.050 ± 0.004	0.133	0.113	-	-	-	3/4 - 1-1/2
1	1.315 ± 0.005	0.153	0.133	0.200	0.179	0.69	7/8 - 1-7/8
1-1/2	1.900 ± 0.006	0.165	0.145	0.224	0.200	1.71	1-1/16 - 2
2	2.375 ± 0.006	0.174	0.154	0.244	0.218	2.87	1-1/8 - 2
3	3.500 ± 0.008	0.242	0.216	0.336	0.300	6.43	1-5/8 - 3-1/8
3-1/2	4.000 ± 0.008	0.253	0.226	0.356	0.318	8.65	1-11/16 - 3-1/4
4	4.500 ± 0.009	0.265	0.237	0.377	0.377	11.2	1-3/4 - 3-3/8
5	5.563 ± 0.010	0.289	0.258	0.420	0.375	17.8	1-15/16 - 3-5/8
6	6.625 ± 0.011	0.314	0.280	0.484	0.432	25.8	2-1/8 - 3-3/4