



**REVENUE METERING REQUIREMENTS FOR
GENERATING FACILITIES INTERCONNECTING
TO THE LIPA TRANSMISSION SYSTEM**

I. INTRODUCTION

The following is provided as a guide for Electric Revenue Metering requirements as currently applied by the Long Island Power Authority (LIPA) to Producer generation facility (Producer) facilities. These requirements pertain to all revenue metering and associated equipment, and any other equipment that may be required, but is not specifically referenced herein, to provide for complete and operational revenue metering system installation in compliance with prudent electric utility practice and the laws of the State of New York.

All Producers interconnected to the LIPA system at the transmission level shall adhere to the requirements as stated herein. In addition, applicable metering requirements identified in the NYISO Control Center Requirements and Revenue Metering Requirements Manuals may be required for the specific interconnection desired.

"Approved equal" as used herein, shall mean that the use of other manufacturer's equipment or material will be acceptable if, as solely determined and transmitted in writing by LIPA, it meets or exceeds the construction standards, maintenance requirements, size criteria, reliability criteria or any combination of such that LIPA deems necessary to ensure that the interconnection is constructed in accordance with prudent utility design standards.

Large generators, as defined by the NYISO, must conform to the requirements described in the NYISO Open Access Transmission Tariff (OATT) Attachment X, Standard Large Facilities Interconnection Procedure, in addition to the requirements in this document. NYISO LGIA Article 7 metering provisions are generally met by the provisions of this document. Where conflicting requirements are encountered the Producer will contact LIPA to resolve the conflict.

II. GENERAL REQUIREMENTS

Four (4) sets of schematics, physicals, one lines, three lines and catalog cuts shall be submitted for LIPA approval at least three (3) months prior to the purchase, construction and/or fabrication of any system or component thereof.

Revenue metering instrument transformer structures shall be so designed and arranged to facilitate three (3) element metering (one (1) CT and one (1) PT per phase). As determined by LIPA, a neutral current transformer may be required with associated structure and equipment.

No equipment other than LIPA revenue metering and related equipment approved by LIPA shall be permitted to be connected within revenue metering circuits.

The revenue metering cubicle shall be housed indoors within the control house of the interconnect substation or other indoor location approved by LIPA.

Producer shall provide LIPA with a minimum of ten (10) working days notice prior to installing any equipment or wiring.

All equipment and wiring shall be checked for proper connection and proof tested to the satisfaction of LIPA. Defects in Producer furnished apparatus, materials and labor shall be corrected by the Producer at its expense and the expense of any retest(s) by LIPA shall be borne by the Producer.

LIPA shall be granted unrestricted access to the revenue meters and related equipment at all times.

III. EQUIPMENT REQUIREMENTS

Producer shall be responsible for the procurement and installation of all equipment as outlined herein.

LIPA shall be the sole supplier of all revenue metering potential and current transformers, all electric revenue meters and related accessories. Producer shall be responsible for the cost of electric revenue metering potential and current transformers, spare transformers, electric revenue meters and spare equipment as determined by LIPA, including but not limited to spare meters.

Producer shall be responsible for all costs associated with replacement equipment as determined by LIPA.

All materials and equipment supplied by the Producer shall be new and of recent fabrication and all electrical equipment shall be listed by the Underwriters' Laboratories, Inc. for the use intended. All items of similar type shall be the product of a single manufacturer.

A. Metering Cubicle

The metering cubicle shall be NEMA 12 construction, rated code gauge steel, rigid, self-supporting with minimum dimensions; 36" wide, by 36" deep, by 90" high. Subsequent to the Producer's submittal of the panel approval drawings, LIPA will provide specific dimensional requirements for panel mounted equipment. The cubicle shall be painted ANSI light gray and shall accommodate entrance of all instrument transformer secondary wiring from the base of the enclosure. Equipment mounting panels shall be provided on each of the two (2) inner sides of the cubicle.

The rear of the cubicle shall be provided with a full sized lockable, hinged door with three point latching operated by one handle and having provisions for a LIPA padlock and seal.

The metering cubicle shall be provided with interior lighting and a 120VAC duplex receptacle. Producer shall provide the 120VAC power from a source external to the metering cubicle.

The Producer shall provide uninterruptible 120VAC control power within the metering cubicle.

The metering cubicle shall not be located greater than 100 running feet of control cable from the revenue instrument transformers.

B. Instrument Transformer Structures

Instrument transformer structures shall be provided to support and facilitate the measurement of each feeder phase voltage and current. Producer shall submit instrument transformers structure design drawings to LIPA for approval.

Producer shall provide junction boxes with "States" type shorting blocks, located at the base of each instrument transformer structure for the termination of secondary wiring from said instrumentation transformers.

C. Test Switch and Cover

Test switch and cover shall be provided for each revenue meter and shall be of the switchboard type, back connected, in accordance with LIPA's Rules and Regulations for Electric Installations ("Red Book"; latest revision).

D. Junction and Pull Boxes

Outlet, terminal, junction, and pull boxes shall be constructed of code gauge sheet steel with sides flanged in around the cover opening, or with approved supporting frame and with mounting lugs and threaded bosses as required. Box seams shall be continuously welded and grounded smooth. Pull, terminal and junction boxes shall be provided with covers held in place by stainless steel screws. Pull and terminal boxes shall be provided with terminal block supports and approved lockable hinged covers fitted tightly against a gasket and secured by lug bolts and wing nuts. All boxes shall be provided with rabbeted gaskets or flange gaskets securely held in place.

All such boxes and covers shall be protected inside and outside by galvanizing, and all box hardware shall be made of an approved non-ferrous, non-corrodible metal.

All boxes shall have provisions for a LIPA locking device and seal.

Terminal blocks shall be rated for heavy duty use and shall have high-pressure mechanical clamp-type "box" connectors with substantial barriers of insulating material between circuits. Insulation medium and base shall be molded of one piece with insulation rating of not less than 600V. The terminals shall accommodate up to three (3) #10 AWG solid copper ring type insulated connectors.

E. Hardware for Mounting Equipment

Producer shall provide a sufficient quantity of hardware for the mounting of electrical equipment.

1. Hardware for mounting equipment shall be high strength, stainless steel and conform with prudent electric utility practices.
2. All anchor bolts shall be "Phillips Red Head Stud Anchor" type, or approved equal.
3. All screws and bolts shall be stainless steel. Heavy duty stainless steel flat washers and lock washers shall be provided with all screws and bolts. If required, as determined by LIPA, equipment mounted in the substation and/or control house buildings, shall be attached to the walls, ceilings and floors of the buildings with clamps as manufactured by "Kindorf" or "Unistrut" or an approved equal.

F. Wire and Cable

Insulated multi-conductor control cable for installation as specified herein shall be as follows:

600-volt, 10 conductor #9 AWG, Class "C" stranding (19/25), soft drawn, annealed copper, color coded; black, white, red, blue, green, orange, white with trace, red with trace, green with trace, orange with trace.

Cable shall be flame resistant (passes IEEE 383 Vertical Tray Flame Test).

Each conductor to be insulated with an extruded 20 mil wall of virgin high molecular weight polyethylene, melt index .2 to .4, 75°C heat resistant, covered with a 10 mil thick color coded 75°C heat and moisture resistant polyvinyl chloride jacket over the polyethylene insulation. Overall 60 mil PVC jacket.

Multi-conductor control cable shall be provided for all secondary wiring of instrument transformers from the instrument transformers.

Conductors shall be pulled into ducts using non-organic pulling compounds and cable grips suitable for insulated cables. Cables shall be carefully unreeled and fed into position during the pulling and/or stringing operation to avoid kinking or otherwise damaging or straining the conductor or the insulation. Installation of instrument transformer secondary wiring shall be installed under the direct supervision of a LIPA representative.

Producer shall submit to LIPA, in advance of cable installation, a detailed description of the equipment and methods to be used for pulling cable, including means of limiting pulling tensions. Cables shall be continuous unless prior approval is granted by LIPA.

After placing a pulling sleeve, an approved cable-pulling compound (not grease or oil) shall be applied to the remaining length of cable as it enters the conduit. After pulling each length of cable, the cable-end shall be held rigidly in place, and the conduit sealed, by use of link-seals or other means approved by LIPA.

All cable shall be neatly trained without interlacing in pull boxes, apparatus and terminal boxes. The Producer shall pull a sufficient length of cable to permit a neat arrangement of all entering cables, with individual conductors formed into neat packs between the point of jacket removal and the conductor terminals. Cables shall be clamped or secured in a manner such as to avoid tension on the conductor and terminals. Cables shall be protected from mechanical injury and from moisture at the unprotected ends. Cable forming shall be done in a manner that will not introduce sharp bends over conduit bushings. The radius of bend in any cable shall not be less than the minimum bending radius allowed by the NEC, or as recommended by the cable manufacturer. Damaged or improperly routed cables shall be replaced by the Producer at its expense.

Producer shall take great care not to damage the cable in any way during or after installation. Cables must not be pulled until all supports and conduits are in place and completely installed. Shields of fiberglass board shall be provided where required, to prevent any cables from touching or rubbing against surfaces, or walls.

In the handling and pulling of cables, a cable shall not be bent to a radius less than 12 times its outer diameter. Before and during pulling, Producer shall take care to prevent intrusion of foreign materials when opening sealed ends of conduit.

Wire packs shall consist of the conductors of one cable neatly trained, arranged and grouped together. Packs consisting of the conductors of several cables may also be grouped together, provided such grouping would permit easy removal of an associated cable when desired. Conductors breaking away from a pack and leading to terminals shall be neatly grouped together and shall have a formed radius. All grouping of cables or conductors shall be done by using "Ty-raps" as manufactured by Thomas & Betts, or approved equal.

Control wiring and 120VAC cables shall not be spliced. Where a junction in wiring is required a terminal block shall be installed. The terminal block and the identification of the conductors at both sides of the terminal block shall be in accordance with the requirements stated herein.

G. Metallic Conduit and Conduit Fittings

Conduit shall be rigid metal, high grade standard weight steel piping, galvanized by the hot-dip process, for all cable runs. Condulets shall not be permitted.

Conduit shall be provided for all instrument transformer secondary wiring from the instrument transformer to the metering cubicle. Penetration of these cables into metering cubicle shall be through floor of cubicle.

Conduits, fittings and boxes required in the work under these specifications for power and control shall be installed in accordance with the requirements herein specified and shall meet all applicable requirements of the NEC.

All fittings for conduit work shall be of cast iron alloy and shall be protected inside and outside by galvanizing. Fittings for conduits shall be Crouse-Hinds "Mogul" type or an approved equal. Conduit fitting of proper size, together with approved rubber gaskets and covers secured by stainless steel screws, shall be furnished and installed by the Producer as required. Where it is necessary to use unions, galvanized Thomas & Betts "Erickson" couplings, or approved equal shall be used and coated with a LIPA approved conductive sealant and screwed together to make a water tight connection. Couplings, unions, reducers and all other conduit fitting shall be furnished and installed by the Producer as required.

All conduits shall be rigidly supported by approved steel channels or angles, malleable iron one-hole straps, or a combination thereof. All conduit hangers, straps, box hangers and supports shall be hot-dip galvanized.

All conduits shall be carefully cleaned before and after installation. All ends shall be reamed free of burrs and inside surfaces shall be free from imperfections likely to damage the cable.

In no case shall deformed, split, or otherwise defective conduit be installed. All joints shall be made with standard threaded or other approved couplings. Conduits shall be terminated at boxes and enclosures in accordance with the NEC. Conduits which terminate in the open shall be provided with approved metallic insulating bushings.

Field cuts in conduit shall be made square. All threads on conduits shall be cut accurately. Running threads will not be permitted. Conduit supports shall be spaced no greater than 7 ft. apart on concrete walls and no greater than 10 ft. apart on structural steel.

All exposed metal conduits, fittings, boxes, straps, hangers and supporting details which have field cut edges, tool marks or other breaks in the finish shall be touched up with two coats of a matching paint after erection such as Subox, Galvanox or approved equal.

Where conduits are direct buried, all backfill material shall be clean, free of large stone, cinders and ashes. Backfill within twelve (12) inches of conduit shall be free of stones greater than one (1) inch in diameter. All conduit, fittings, supports, etc. shall be electrically grounded in accordance with the NEC.

H. Cable Tray

A cable tray shall be located above the metering cubicle to allow for routing of wiring into the control house tray system.

I. Telephone Line

Producer shall provide and maintain, at its expense, a dial-up, dedicated, voice grade telephone line within the metering cubicle with required station protection and isolation.

IV. MAINTENANCE AND OPERATIONS REQUIREMENTS

A. General Requirements

Except as otherwise specified herein, all equipment furnished and installed under this Specification shall be tested in accordance with this section.

Producer shall perform all tests as may be deemed necessary by LIPA, to demonstrate that the equipment, as installed, complies with these requirements. All labor, instruments and apparatus required for such tests shall be provided completely by the Producer. If any of the equipment fails, under test, the defects shall be rectified by readjusting, or removing and replacing, the faulty equipment until, under test, all requirements are met. LIPA reserves the right to check the Producer owned test instruments and/or to furnish LIPA owned test instruments at the Producer's cost.

Results of tests shall be formally transmitted to LIPA for review and approval no later than 10 working days after completion.

1. Electrical Tests After Installation

All electrical equipment, including wire and cable, shall be tested after completion of installation in accordance with the specifications herein or otherwise required by LIPA.

All wire and cable shall be subject to an insulation resistance test using a "megger" with the following D-C voltage applied between the connected system and ground:

120V/240V equipment - 500V test voltage for one (1) minute
480V equipment - 1000V test voltage for one (1) minute

The resistance measured shall not be less than ten megohms.

2. Equipment and System Maintenance

The auxiliary station power and telephone line shall be maintained operational by the Producer for the term of the Agreement.

All material and work installed and performed under these requirements shall be maintained operational by the Producer for the term of the Parallel Generation Agreement.

LIPA shall be the sole source in determining the correct performance of all equipment and systems and in setting the requirements for replacement or repair of any such equipment and/or system by the Producer.