



**CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
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NEW YORK, NY 10003**

**DISTRIBUTION ENGINEERING DEPARTMENT
NETWORK SYSTEMS SECTION**

**SPECIFICATION EO-4133
REVISION 2
OCTOBER, 2006**

**GENERAL REQUIREMENTS FOR THE
OPERATION AND MAINTENANCE
OF EQUIPMENT AT ON-SITE
GENERATING CUSTOMERS' PREMISES**

FILE: SYSTEM OPERATION MANUAL NO. 5

TARGET AUDIENCE	DISTRIBUTION ENGINEERING REGIONAL ENGINEERING
NESC REFERENCE	ALL SECTIONS

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**GENERAL REQUIREMENTS FOR THE
OPERATION AND MAINTENANCE
OF EQUIPMENT AT ON-SITE
GENERATING CUSTOMERS' PREMISES**

1.0 SCOPE

This specification is issued by Consolidated Edison Company of New York, Inc. ("Con Edison" or "the Company") and is applicable to Customers with onsite generation (Customers). The specification covers the general operating and maintenance requirements for cable, switchgear, transformers, generators, inverters, protective relaying and other associated equipment owned by the on-site generating Customer and connected beyond the point of termination of the Consolidated Edison Company's electric service. It also covers maintenance responsibilities for equipment (such as revenue metering devices) owned by Con Edison, and located on the Customer's premises. This specification is applicable to Customers receiving either high-tension or low-tension service (defined in paragraphs 3.2 and 3.3).

2.0 APPLICATION

This specification applies to all Districts.

3.0 DEFINITIONS

- 3.1** In this specification, the operating authority responsible for the Customer's electrical equipment shall be referred to as the "Customer's Load Dispatcher." The operating authority responsible for the Company's operations shall be referred to the "Company's District Operator."
- 3.2** High-tension (HT) service is defined as electrical supply to the Customer at 2400 volts line-to-ground or above.
- 3.3** Low-tension (LT) service is defined as electrical supply to the Customer operating at 120 volts or 265 volts line-to-ground.
- 3.4** Point of service termination is defined as the point at which the Company cables are connected to the Customer's cables.

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4.0 **GUIDELINE FOR HIGH-TENSION CUSTOMERS**

- 4.1 For Customers receiving high-tension service, the latest revision of specification EO-4035, "Operation and Maintenance of Equipment on High-Tension Customer's Premises" shall also apply except where otherwise instructed in this specification.

5.0 **EMERGENCY TELEPHONE COMMUNICATIONS**

- 5.1 For parallel operation, communications regarding emergency operation of Company high tension feeders and Customer-owned equipment energized directly from these feeders shall be made between the Company's District Operator and the Customer's Load Dispatcher. The District Operator may be reached at:

<u>Division</u>	<u>Emergency Telephone No.</u>
Brooklyn and Queens	(212) 580-6748 or 6749
Manhattan and Bronx	(212) 580-6750,6751,6752
Staten Island	(212) 580-6753 or 6754

Each Customer shall provide the telephone number of his Load Dispatcher. This telephone number will be included in the Company's individual operation and maintenance specification described in paragraph 7.0 of this specification. All other communications (except as provided in paragraph 9.1 of this specification) shall be between the Customer and the Energy Service Representative, unless otherwise designated.

6.0 **COMPANY ACCESS, INSPECTION AND SYSTEM EMERGENCIES**

- 6.1 Company access to the Customer's interconnection equipment will be required for maintenance of Company equipment, for routine inspection, and in emergency situations (such as where there exists a condition which imminently endangers life, property or Company service). Access to the interconnection equipment must be available at all times in case of emergencies. In cases other than emergencies, reasonable advance notice of the need for access will be given to

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Customers. Only Company employees bearing Company identification cards and authorized representatives of the Customer should be permitted access to vaults, rooms, manholes or enclosures containing on-site generating and/or interconnection equipment.

- (1) Company maintenance - The Company will require access to Customer premises to maintain any splice connecting the Company and Customer's cables, and to maintain meters, metering devices and current and potential transformers used for metering.
- (2) Inspection - Where there is parallel operation the Company reserves the right to inspect, with reasonable advance notification, the Customer's generator operation, equipment, protective relay maintenance, testing procedures, measurement records and maintenance and operating logs. Customers failing to follow the Customer's Company-approved relay testing procedures, or to maintain maintenance, operation and test records, may be required to cease parallel operation and to take Con Edison service through isolated (nonparallel) operation.
- (3) Emergency Conditions - In case of emergency, such as where Company service is in imminent danger of interruption, or where there exists imminent danger to persons or property, the Company may disconnect and lock open the interconnection feeder switches and/or the Customer's on-site generating equipment switches. Such disconnections will only be made when necessary in emergency conditions. The Customer shall be given as much advance notice of such disconnections as possible under the circumstances. Service shall be restored to the Customer as soon thereafter as the emergency condition subsides and system conditions permit.

7.0 DESCRIPTION OF INTERCONNECTION

7.1 The Company shall prepare an individual operation and maintenance specification for each specific Customer. This individual specification shall follow the format of the general specification and shall contain a description of the interconnection and include the following information:

- a. High or low-tension service, nominal service voltage, and number of phases.

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- b. Service Rate Classification (as defined in Specification EO-2115, "General Requirements for Electric Service to On-Site Generating Customers").
- c. Energy source or generator ratings and detail descriptions.
- d. Number and operating conditions of all energy storage devices and/or generators.
- e. Generator characteristics and impedances including type of fuel supply.
- f. Load flows in the intertie feeders and the generator-load characteristics.
- g. Feeder number(s) serving the Customer.
- h. One-line diagram of the overall installation including indication of the revenue metering points, interconnecting feeders and their ratings.
- i. Protective relays and auxiliary trip relay designations.
- j. Limits for voltage, current, power flow and frequency.

8.0 PARALLEL OPERATION

8.1 The Customer's intertie breaker(s) shall open to separate the Company's and Customer's facilities for faults on either the Company's incoming supply feeder(s), low tension service or the Customer's equipment. They shall also open, either manually or automatically, when the Company's incoming supply feeder(s) or low tension service is (are) de-energized for scheduled work. The intertie circuit breaker shall be closed manually and only after the Company's District Operator has determined that the situation which caused the breaker to open no longer requires the breaker to remain open. The District Operator shall make such determination promptly after the Customer notifies the District Operator that the breaker is ready for closing.

8.2 Customers shall not be permitted to energize a de-energized Company high-tension feeder. The interconnecting feeder breaker must open and lock out on loss of the Company supply.

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- 8.3** The Customer shall operate his equipment within the Company specified voltage, current, power and frequency limits. These limits shall be detailed in the individual operation and maintenance specification prepared for each Customer.
- 8.4** For a Customer generating DC power (as in case of generation by photovoltaic cells , windmills, etc.), the total maximum voltage or current harmonic distortion produced by the Customer's on-site generating equipment shall not exceed five percent (5.0%) of the fundamental 60 cycle voltage or current waveform measured at the point of service termination. No single harmonic shall exceed three percent (3%) of the fundamental. This shall be demonstrated by a "before and after" measurement. See EO-2115, "Handbook Of General Requirements For Electrical Service To Dispersed Generation Customers."
- 8.5** Before work is to be performed on a Company feeder, which is normally worked on dead, an authorized Company employee shall lock open (with a Company padlock) the circuit breaker (for high-tension Customers) for all on-site generating Customers receiving service from that feeder. See paragraphs 11 and 12 of this specification for scheduling of work affecting supply to the Customer.
- 8.6** If Customer is served at high-tension, the Customer's Load Dispatcher shall promptly notify the Company's District Operator of any circumstances endangering Company service. The Customer's Load Dispatcher shall also notify the Company's District Operator of any automatic operation of the intertie circuit breaker(s) or any other main protective device at the Customer's installation. The Customer's Load Dispatcher shall inform the District Operator of the exact time of operation, breaker position (open or close), relay targets and condition of breaker control power (DC or AC tripping and closing voltages). The equipment on the Customer's premises causing the above operation shall not be re-energized until it is isolated, repaired or replaced, and until the District Operator has determined that the condition which caused such operation has been corrected. The District Operator shall make such determination promptly after the Customer notifies the District Operator that the equipment is ready to be re-energized.
- 8.7** If the incoming breaker of a high-tension customer opens automatically, the Customer shall not operate this breaker. The Customer's Load Dispatcher shall contact the Company's District Operator and the District Operator shall promptly dispatch Company

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personnel to perform such switching after the District Operator determines that the condition which caused service to be interrupted has been corrected.

**9.0 OPERATION OF GROUND AND TEST DEVICE
(High-Tension Service Only)**

9.1 For the protection of Company personnel, only authorized Company employees shall ground incoming Company high-tension feeder(s). If grounding of the Company feeder(s) is required, the Customer shall contact the Company's District Operator. (See paragraph 11.0 for scheduling Customer work.) All other switching within the Customer's premises shall be performed by qualified employees of the Customer. The Customer shall notify the Company's Energy Service Representative at least fifteen business days before Customer switching is planned to enable the Company to determine whether the presence of Company personnel is required to supervise the switching that is to be performed. A shorter notice period will be acceptable where such switching is necessary to restore service to the Customer.

10.0 PARALLEL OPERATION-CONNECTION AND DISCONNECTION FROM COMPANY SYSTEM

10.1 Synchronous Generators - For Customers with synchronous generators, whenever a Customer's generator is to be paralleled with, or disconnected from, the Company's system, such operations shall be performed in a manner that minimizes voltage flicker and power surges on the Company's system. Synchronizing facilities are required to prevent closing the intertie and/or generator breaker that is out-of-phase with the Company system.

10.2 Induction Generators - An induction generator may be started as a motor if the voltage dip caused by current inrush is within the limits specified in the latest revision of Company Specification EO-2008, "Service Voltage Flicker Limits." If the voltage dip is not within those limits, the Company will determine and state in the Company's detailed operation and maintenance specification whether a greater voltage dip can be tolerated.

10.3 Inverters - Inverter equipment shall incorporate a "walk-in" feature, where the power level is gradually increased (over a few tenths of a second to a few seconds) to the full level available from the DC source at the time of system turn-on. Similarly, the power level should

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gradually decrease (over a few tenths of a second to a few seconds) to zero at the time of system turn-off.

Line-commutated inverters do not require synchronizing equipment when paralleling with the Company's system since they draw their timing, voltage and phase signals from the Company's wave form. They cannot operate isolated from the Company's system.

Self-commutated inverters may operate isolated from the Company's system. Therefore synchronizing equipment is required when paralleling the Customer's generator with the Company's system. Some self-commutated inverters may have synchronizing equipment incorporated in their internal design.

11.0 SCHEDULING WORK BY THE CUSTOMER (High-tension service only)

11.1 Company feeders are removed from service for work on closely restricted schedules. If the Customer requires that a Company feeder be taken out of service, the Customer should contact the Company's Energy Service Representative to arrange a mutually agreeable date for the work to be performed. The Company will normally require a 30-day period to schedule this work.

12.0 COMPANY WORK AFFECTING SUPPLY TO THE CUSTOMER (High-Tension Service Only)

12.1 When connections of new customers or other work such as routine maintenance will interrupt service to a Customer, the Company will contact the Customer to arrange a mutually agreeable time for such Company work to be performed. Where interruption is required, service will be restored as quickly as possible.

12.2 The Company occasionally applies a high-potential proof test to check the condition of its feeders. The values and length of time applied are in accordance with the latest revision of Company specification EO-4019, "Testing of A-C Feeders Operating at 2.4 kV and above." That portion of the service equipment on the supply side of the first disconnecting device on the Customer's premises will normally be included in those high-potential proof tests.

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13.0 MAINTENANCE OF CUSTOMER-OWNED EQUIPMENT AND CABLE

- 13.1** The Customer shall be responsible for the maintenance of all service conduits, cables, overhead lines and equipment, including the mounting equipment for the meters and metering devices (but not the meters and metering devices themselves), beginning with the point of service termination as defined in paragraph 3.4 of this specification. Maintenance tests shall be performed by the Customer's qualified maintenance personnel identified in the Request for Service to On-Site Generating Facility or by such maintenance personnel subsequently designated by the Customer pursuant to paragraph 13.5. The tests shall include: relay settings, relays, breakers and trip coils, AC and DC circuit continuity, insulation impedances of the protective circuits and current and potential transformers. A confirmation of the Customer's periodic inspection, including the status of DC and AC control power for circuit breakers, reference one-line diagrams, relay protection diagrams and coordination test data must accompany test reports. Each relay test shall include a calibration check and an actual trip of the circuit breaker from the relay being tested.
- 13.2** In the event it is necessary, in the conduct of maintenance by the Customer, for the Customer to disconnect Company service, the Customer shall notify the Company's District Operator of the planned disconnection at least seven business days in advance of the disconnection.
- 13.3** Verification testing shall be performed by the Customer by the means of a calibrated and certified test set prior to initial energization and every 36 months thereafter (or in shorter intervals if recommended by the equipment manufacturer) and the most recent certified relay-test reports shall be kept at the location and be made available for Company inspection. The Company reserves the right to inspect the facility and /or witness the test itself. The Customer shall notify the Company at least ten business days in advance of the relay-test to give the Company the opportunity to determine whether Company personnel should be present during the test.
- 13.4** The Customer shall also perform periodic maintenance on circuit breakers, transformers, generators, inverters, batteries, and other equipment. A maintenance and operation log sheet shall be kept at the Customer's premises and be made available for Company inspection. On the log sheet, all relay targets are to be registered whenever breaker operation occurs.

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- 13.5** The Customer shall provide written notification to the Company in the event the individual or firm responsible for maintenance of on-site generating equipment, breakers and/or relays is replaced. Such written notification shall be given within seven business days and include the name, address and telephone number of the new individual or firm.
- 13.6** High voltage cable beyond the point of service termination should be inspected by the Customer approximately every 24 months at all accessible points.

14.0 **PREPARATION AND ACCEPTANCE OF DETAILED SPECIFICATION**

- 14.1** The Company shall use this general specification to prepare a detailed operation and maintenance specification. The Customer shall signify acceptance of the terms of the detailed specification by returning to the Company a signed copy of the detailed specification within thirty days of its issuance, or within that time notifying the Company in writing of objections to the detailed specification. In the event the Customer objects to the detailed specification and the Company and the Customer cannot resolve their differences, the Public Service Commission shall be requested to resolve the matter.

15.0 **APPENDIX**

- 15.1** Appendix I - "Acceptance By Customer of Detailed Specification" form.

16.0 **REFERENCES**

- 16.1** Listed below are reference specifications (to be furnished to the Customer where applicable):
- a. Specification No. [EO-4035](#), "Operation and Maintenance of Equipment on High-Tension Customers premises," Manual No. 5.
 - b. Specification No. [EO-2115](#), "General Requirements for Service to On-Site Generating Customers" Manual No. 4.
 - c. Specification No. [EO-2022](#), "General requirements for Service to High Tension Customer," Manual No. 4.

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- d. Specification No. [EO-2008](#), “Service Voltage Flicker Limits,” Manual No. 4.
- e. Specification No. [EO-4019](#), “Testing of A-C Feeders Operating at 2.4 kV and above “, Manual No. 5.

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APPENDIX 1

ACCEPTANCE BY CUSTOMER OF DETAILED SPECIFICATION

Customer's Name: _____

Customer's Address: _____

Customer's Representative:

Name: _____

Title: _____

Company: _____

The Customer or its authorized representative shall sign below to indicate acceptance of the provisions of the foregoing specification and return two copies of this Acceptance Form to the Company.

Accepted: _____

Date: _____

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