CHAPTER 13
Technical & Special Service Requirements

Limits of Service & Service Equipment
Only nominal 60 Hz alternating current is available.

All metering shall be at the service voltage, unless other arrangements are agreed to in writing.

SCL’s stock of transformers for supplying standard voltages consists of oil-filled, non-PCB types only.

Special Technical Provisions
SCL reserves the right to impose special requirements for unusual service installations.

The customer’s electrical load must be balanced between phases to a level acceptable to SCL.

1. **AN OXIDE INHIBITOR** must be used when terminating stranded aluminum.

2. **SPECIAL VOLTAGES** If the customer requires voltages or phases other than those available, the customer must supply the necessary equipment and space for it. All such equipment must be installed on the customer’s side of the meter, unless otherwise agreed to in writing.

3. **INTERFERENCE** Whenever the customer’s equipment causes interference with his own service or that of other customers, SCL may require the customer to provide (and pay for) special equipment that will correct the interference. Interference problems may arise when:

   a. The customer needs voltage control within unusually close tolerances
   b. There is an unbalance of single phase and three phase loads
   c. Where the customer intermittently switches large loads on and off, such as electric boilers, heaters, or motors

Requirements for motors, low power factor lighting, and welding equipment are given in Chapter 12.

4. **FAULT CURRENT LIMITERS** When the customer installs fault current limiters on the line side, SCL’s side, of the first disconnect or main breaker, the customer must install a current limiter enclosure that meets the requirements below:

   a. The enclosure shall be sealable and separate from our service termination point. The customer’s weatherhead, service terminal box, meter socket, and current transformer enclosures are not acceptable locations for current limiters.
   b. The current limiter enclosure shall be clearly marked “Fault Current Limiters,” and it may not be used for any other purpose, such as a connection point for taps or extensions.
   c. The customer is responsible for maintaining and replacing fault current limiters. If repair or maintenance operations require SCL to temporarily disconnect the service, the customer will be billed for this labor. After any maintenance operation, the customer must notify us for replacement of meter seals.
Limitations to Specified Service Areas
Overhead service will not be installed in Local Improvement Districts, Road Improvement Districts, underground arterials, voluntary underground areas, ordinance underground area, or network areas. The main downtown business district, the University business district, and First Hill are served from underground network distribution systems. Other areas may be in the process of being converted to such systems or may be in the planning stages for conversion.

SCL will not upgrade existing overhead distribution on houseboat piers. If additional loads require the wires to be upgraded, the customer will be responsible for:
   a. Submitting plans of the proposed design for our approval
   b. Contracting the work
   c. Maintaining the distribution systems supports and complying with provisions of Chapter 5

Closed Transition Transfer Switches
Closed transition transfer switches are not permitted in underground network distribution areas.

APPROVAL All specifications and drawings of the closed transition transfer switch shall be submitted to SCL prior to construction.

The information shall include one- and three-line diagrams showing all electrical equipment and protective devices. All equipment and devices shall be identified by function, rating, manufacturer’s catalog number, and shall include installation and operation manuals, specifications, operating features and settings.

MEANS OF DISCONNECTION There must be a disconnect on the line side of the transfer switch. The disconnect must have a visible break and must have provisions to lock in the open position only.

SCL must have 24-hour access to the disconnect. The customer must immediately notify us in writing whenever the access route or operating procedures change.

Frequency, Phase & Voltage
FREQUENCY Seattle City Light’s frequency is 60 Hz nominal.

WAVEFORM The generator must deliver a sinusoidal waveform during transfer switch operation.

VOLTAGE MAGNITUDE The voltage magnitude at the emergency supply terminal of the transfer switch shall be the same as that of SCL at the service terminal point during transfer switch operation. The service voltage is determined by SCL.

PHASE SEQUENCE The phase sequence of the voltage at the emergency supply terminal of the transfer switch must be the same as that of SCL at the service terminal point.

PHASE VOLTAGE The phase voltage at the emergency supply terminal of the transfer switch must be in phase with that of SCL at the service terminal point during transfer switch operation.

MAINTENANCE OF EQUIPMENT The transfer switch and all related equipment must be furnished, installed and maintained by the customer, and must be capable of withstanding and interrupting the maximum fault current specified by SCL.

The customer shall provide us with a schedule of routine maintenance to be performed, and have the maintenance record available showing that it was done.
CHAPTER 13

Requirements for Electrical Service Connections

PROTECTIVE EQUIPMENT During the time the emergency power system is connected to SCL's service terminal point via the transfer switch, protective devices are required. They will separate this emergency supply from SCL's system to protect from faults or low voltages on the system, or for faults on the customer's equipment. These devices and their settings shall be approved by SCL.

SCL's distribution feeders are subject to automatic reclosing. Generally two reclosures may occur; the first within 2 seconds of the initial trip. Customers with synchronous machines are required to disconnect from the distribution system prior to the first reclosure in order to protect their equipment.

The customer is fully responsible for the protection of the load, the transfer switch, the emergency power system, and all associated equipment. Protection should be provided against all malfunctions or equipment failures and consideration should be given to:

a. Transient surges initiated by faults, lightning, switching, or other system disturbances
b. Generator overspeed or underspeed during operation of the transfer switch

PROTECTIVE RELAYS Protective relays shall protect Seattle City Light's (SCL's) system from phase-to-phase and phase-to-ground overcurrents on emergency power and shall disconnect customer emergency systems for faults or low voltage on SCL's system.

LOCKOUT RELAYS The customer must provide one or more frequency relays for disconnecting the emergency system from the Utility's system when the frequency exceeds 62 Hz for 0.5 seconds or when the frequency fails below 59 Hz for 1.0 second.

VOLTAGE RELAYS The customer must provide voltage relays to disconnect the generator when the distribution voltage (on a 120-volt basis) exceeds these limits when the voltage is:

a. 140 volts or more, the relay shall operate within 50 milliseconds (3 cycles)
b. 130 volts or more for one second, the relay shall operate without intentional delay
c. 90 volts or less for one second, the relay shall operate without intentional delay

SYNCHRONIZATION OF EQUIPMENT The customer must provide equipment for synchronizing the generator to SCL's system and protective relaying independent of the system.

The synchronizing device must be installed to control the closing of the generator to SCL's system. The system parameters shall all be within these tolerances before closing:

- Frequency difference less than 0.2 Hz
- Angular difference less than five degrees
- Voltage difference less than five percent

Synchronous generators may be manually synchronized within these parameters, using automatic relay supervision. Synchro-check type relays are not acceptable.

LOCKS ON DISCONNECT SWITCHES Provisions must be made by SCL for the installation of a Best Lock Company cylinder lock, or padlock, to lock the disconnect switch in the open position. The disconnect switch shall not be lockable in the closed position.

When de-energization of an in-building transformer vault is required, SCL will open and tag the required disconnect switch and lock it in the open position.
**Electromagnetic Interference (EMI)**

Electric and magnetic fields are a physical phenomenon characteristic of the flow of electricity from the generation source to the electrical load. Magnetic fields increase with increasing amounts of current in the electrical system that is determined by the customer's consumption of electricity. The electric and magnetic fields associated with the customer's vault and their building's electrical system may interfere with the use of certain sensitive electronic equipment, including computers, computer monitors, and other business and medical equipment. Such electromagnetic interference (EMI) may occur in equipment and devices that are susceptible.

It is our customers' responsibility to determine how to best protect their buildings and equipment from the use of electricity on the premises, including EMI, by designing and locating their electrical systems and vaults to minimize such interference. Some possible measures are: moving sensitive electronic equipment away from the walls, floor or ceiling of the vault; purchasing and installing protective equipment to reduce or manage the electric and magnetic fields. The costs of such measures are the customer's responsibility as well as their design and implementation. Please refer to the City ordinance. SMC21.49.110(G) and (Q)

Seattle City Light personnel are available to assist with information regarding EMI. However such consultations are not a substitute for professional advice from the customer's contractors and their own professional electrical engineers.

**Power Surges, Faults, Transients, and Outages**

Electrical equipment and the availability of electricity to a building can be affected by power surges, faults, natural and switching transients, planned and emergency power outages, natural mechanical failure and other events not within the control of the City Light Department. Customers may avoid such problems by installing protective devices or backup generation equipment in the case of power outages. It is the customer's responsibility to take the above steps as provided by Seattle City ordinance (SMC 21.49.110(G) and (Q).

Surge protective devices purchased and installed by the customer should provide protection from surge voltages generated within customer premises and generated by lightning, switching, and arcing on the Department's system to the full range of parameters described in “IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits, C62.41-1991,” or latest revision.

Seattle City Light personnel are available to provide information regarding such problems. However such consultations are not a substitute for professional advice from the customer's contractors and their own professional electrical engineers.