
Installation of Solar Generation Facilities

1. Scope

This standard covers the requirements for the installation of solar generation facilities with a total generation nameplate capacity less than or equal to 500 kW AC in the Seattle City Light (SCL) Looped Radial and Network electric distribution systems.

Installations larger than 500 kW total generation nameplate capacity are outside the scope of this standard. For these installations, additional protection relay-related equipment may be required following SCL engineering study results.

2. Application

This standard is for SCL personnel, customers, and contractors involved with installing, inspecting, and maintaining solar photovoltaic (solar) generation equipment and related devices, such as safety disconnect switches and protection relays.

3. Conflict

Where conflict exists, the following order of precedence shall apply:

1. Project-specific, SCL-approved Customer Requirements Package, including Service Construction Drawing
2. This standard
3. SCL Requirements for Electric Service Connection (RESC)
4. Authority Having Jurisdiction (AHJ) requirements
5. City of Seattle Standard Specifications and Plans
6. Washington Administrative Code (WAC)
7. National Electrical Code (NEC) and National Electrical Safety Code (NEC)
8. Other industry standards

Standard Coordinator
Sunny Kim



Standards Engineering Supervisor
Brett Hanson



Division Director
Bob Risch



4. Requirements

4.1 General

Different solar generation sizes/levels require different equipment and devices like protection relays.

The customer or contractor shall coordinate the location of all required equipment and devices with SCL and the Seattle Department of Construction and Inspections (SDCI) or other local Authority Having Jurisdiction (AHJ).

The customer shall ensure proper working clearance, grounding, and bonding per NEC and any applicable codes. Consult SDCI or other local AHJ for more information. Equipment shall be inspected by SDCI or other local AHJ prior to energization.

Requirements vary depending on whether the installation is in the Looped Radial or Network system within the SCL electric system. The customer shall verify the location with an SCL Electric Service Representative (ESR) or Electrical Service Engineer (ESE), and the solar installation's ratings with an SDCI or other local AHJ reviewer.

Figure 4.1a is a simplified diagram of a solar installation without a protection relay. Figure 4.1b is a simplified diagram of a solar installation with a protection relay.

Figure 4.1a. Solar Installation without a Protection Relay (Typical)

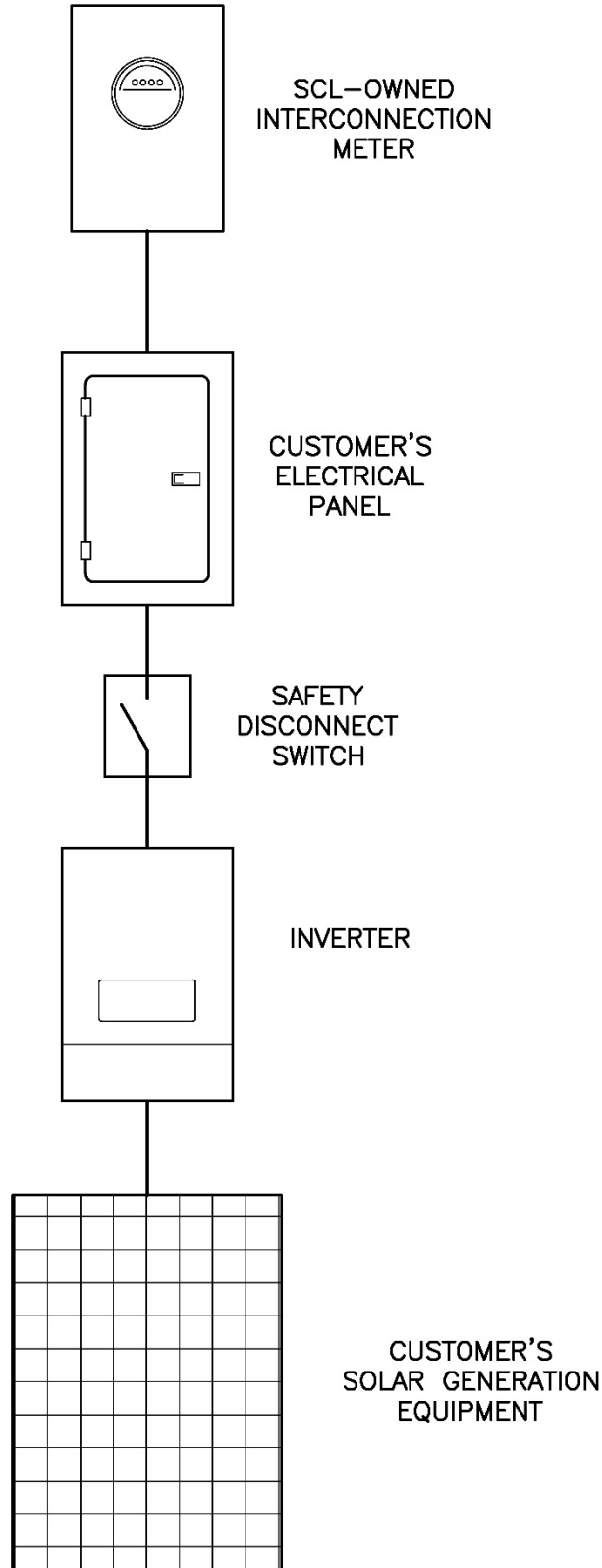
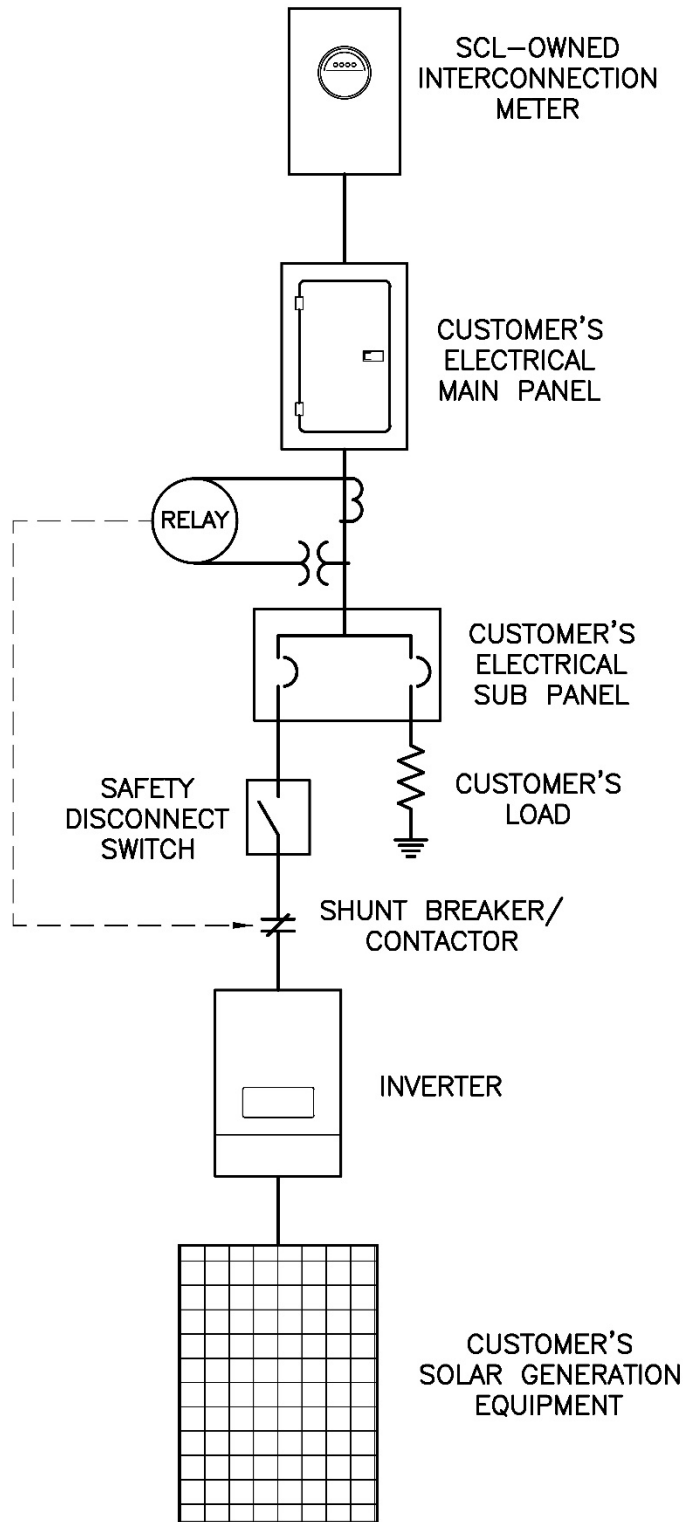


Figure 4.1b. Solar Installation with a Protection Relay (Typical)



4.2 Inverters

All solar installations require installation of only IEEE 1547-2018 and UL 1741-SB-certified inverters.

4.3 Safety Disconnect Switches

Safety disconnect switches are devices designed to isolate the solar installation from the SCL electric service. The primary purpose of a safety disconnect switch is to ensure the safety of operators, such as emergency responders, and utility workers during emergencies, maintenance, or repairs.

All solar installations shall include an Underwriters Laboratories (UL)-approved AC safety disconnect switch capable of fully disconnecting the solar generation facility from the electrical distribution system.

The customer shall furnish and install the safety disconnect switch on the load (customer) side of the utility meter.

The safety disconnect switch shall be:

- A visible break type in a metal enclosure
- Lockable in an open (de-energized) position by a padlock
- Labeled as "PV SYSTEM DISCONNECT" per NEC 705.20 (8) and NEC 690.13 (B)
- Labeled with warnings per NEC 110.21 (B)
- Accessible 24 hours a day from the ground level to Utility personnel as defined in Seattle Municipal Code Chapter 21.49.110, Section N
- Mounted within sight of the interconnection meter(s) and no more than 10 feet from these meter(s)

Note: If the customer believes it is not practical to mount the disconnect switch in this manner, the customer may seek City Light approval to mount the disconnect switch at a mutually agreeable location. If City Light approval is granted, the customer shall install a permanent, easily visible sign describing disconnect switch placement adjacent to the interconnection meter(s).

For three-phase interconnections, the safety disconnect switch shall be gang-operated.

4.4 Protection Relays

In the Looped Radial system, protection relays are only required when determined by SCL engineering review.

In the Network system, protection relays that prevent reverse power flow are required in all installations. For these protection relays, an SCL engineer will review the relay settings as well as the relay's current transformer (CT) and power transformer (PT) locations to make sure that the relay operates correctly.

Protection relay equipment and installation shall comply with NEC 690.

See Figure 4.1b.

5. References

Institute of Electrical and Electronics Engineers (IEEE) 1547-2018; Standard for Interconnecting Distributed Resources with Electric Power Systems

National Electrical Code (NEC) 110; Requirements for Electrical Installations

National Electrical Code (NEC) 690; Solar Photovoltaic (PV) Systems

National Electrical Code (NEC) 705; Interconnected Power Production Sources

National Electrical Safety Code (NESC)

SCL Requirements for Electric Service Connection (RESC)

Seattle Municipal Code (SMC) 21.49.110; Electric service connection provisions

Washington Administrative Code (WAC) 480-108-020; Eligibility and technical requirements for Tier 1, Tier 2, and Tier 3 interconnection

Underwriters Laboratory (UL) 1741-SB; Standard for Inverters, Converters, Controllers, and Interconnection System Equipment for Use with Distributed Energy Resources

6. Sources

Dalaq, Amer; SCL Electrical Engineer, Electrification and Strategic Technology, and subject matter expert for 0097.03

Gebrewold, Mehari; SCL Supervisor, Network Engineering, and subject matter expert for 0097.03

Kim, Sunny; SCL Standards Engineer, originator and subject matter expert for 0097.03

Martek, Joseph; SCL Supervisor, ESE and subject matter expert for 0097.03

Rankin, David; SDCI Manager, Electrical Plan Review and subject matter expert for 0097.03