PORT OF LONG BEACH
Shore to Ship Power

Design Standards

Listed below are the design assumptions for the Shore to Ship Power for a ship at berth, which shall be the basis for the design of the substation, feeders and shore power receptacles and ship plugs. The Port of Long Beach will design and provide installation in conformance with items 1 through 11 listed below. Points 12.1 through 12.4 are clarification notes.

1. The incoming service voltage to the shore power substation will be 12,000 volts to be supplied by the local utility company or a feeder from an electrical substation.

2. The shore power system will provide power to the wharf outlets at 6,600 volts, 3 phases, 60 Hertz with a grounding circuit conductor.

3. The design load for each ship is 7,500 KVA.

4. Each berth shall have access to shore power outlets at five locations along the wharf, spaced approximately 220 Feet (67 Meters) apart, each of which will be designed to supply 7,500 KVA of electric power. (Berth is defined as the space one ship occupies along the wharf). In the future a fewer number of power outlets may be installed due to improved standard system design.

5. A substation with a capacity of approximately 7,500 KVA will be designed, with capacity for powering one berth at the design load of 7,500 KVA per berth.

6. At each berth, the substation will have capacity for a maximum of one shore power outlet operating at any one time, at full load. A physical interlocking device, such as a key interlock, will be designed into the shore power outlets and the associated circuit breakers at the substation to prevent personnel from connecting to the outlets unless the circuit breaker is open, and the circuit is not energized.

7. The substation switchgear will be designed to power one of the five shore power outlets at a time, per berth. The switchgear will be designed for five outlet locations. One circuit breaker for each outlet feeder will be provided in the switchgear design. Each of the paralleled conductors used for feeders, shall have an electrical current sensor to monitor the conductor ampacity. This current sensor will cause the circuit breaker to trip in the event maximum ampacity is exceeded in either parallel conductor. This will be implemented to limit current capacity to prevent burnout of the conductors.

8. The shore power outlet will consist of two 350 Amp. receptacles rated for 6,600 volts, housed in a single weatherproof enclosure. The receptacles will utilize a push-pull coupling device which will be factory built into the receptacle units. One receptacle shall be identified with a red color and another receptacle with a blue color. Each receptacle shall have a separate keyway to assure plugs cannot be switched from one receptacle to another. These receptacles shall be Cavotec Co. part numbers PC5-VX04-K1850R for the
red, and PC5-VX04-K1850B for the blue. These receptacles will be housed inside a “Power Unit” manufactured by Cavotec Co. catalog number PC5-AX04-K1855. (Receptacles are also referred to as sockets). Furthermore, each receptacle shall have a separate Kirk® Key to keep the receptacle cover in place when de-energized. After the plugs from the ship are engaged to the receptacles on shore, both Kirk® Keys from the receptacles will be required at the feeder circuit breaker to allow the circuit breaker to activate and energize the feeder.

9. Each of the receptacles specified in item 8 will have two special pins reserved for Ground Check control wires, in addition to the three power pins. These control wires will be energized from the switchgear where the circuit breaker for the feeder of the outlet is located, utilizing a ground check relay. The intent of the ground check relay and this wiring is to trip the circuit breaker when personnel disengage the plug from the receptacle while the plug and receptacles are energized. Since the Ground Check pins will disengage first, before the power pins do, the ground check circuit will therefore be interrupted and thus send a signal to the ground check relay to trip the respective circuit breaker. Ground Check wiring aboard the ship must conform to the shore-side wiring to assure proper operation of the ground check system when plugs from the ship are engaged with the receptacles on shore.

10. The shore power substation will be located near the wharf, but not on the wharf, to avoid interference with terminal operations.

11. The shore power substation will be designed with dry-type transformers, instead of liquid filled transformers. One 7,500 KVA dry-type transformer will be designed at the substation, with capacity to supply continuous power to a ship.

THE FOLLOWING ARE NOTES FOR CLARIFICATION

12. The following notes are listed here to clarify additional requirements to complete the shore to ship power system design. However the design and equipment needed for these additional requirements shall be the responsibility of the ship owner/operator and shall be located on the ship.

12.1. The shore power design will not include synchronizing switchgear, therefore when a ship connects to the shore power system, there will be a break in its on-board power during the switchover. If the ship has synchronizers and is capable of putting them to use, the ship may do so.

12.2. Cable handling to accommodate tide changes and vessel movement will be achieved with equipment on the ship and the design and procurement of this equipment shall be the responsibility of the ship owner/operator. The landside shore power receptacles will be fixed and unmovable inside their respective outlets. This implies that the cable manager system, such as a Cavotec Co. manufactured unit, shall be located on the ship.
12.3. The plugs on the ship’s cable manager system shall match the receptacles that the Port of Long Beach will provide in the wharf outlet. The shipside plugs shall be Cavotec Co. part number PC5-SX04-K1850FOR for red colored plug and PC5-SX04-K1850FOB for blue colored plug. These plugs have provisions to accommodate fiber optic cable as part of the cable manager system located on the ship. If the use of fiber optic cable is not desired, the same plug may be used for power cables only, or same plug with no fiber optic provisions may be substituted. Both of the specified plugs must be connected to shore-side receptacles to successfully transmit shore power to the ship. Furthermore, the cables from the shipside plugs to the ship’s electrical switchgear must be of equal length and terminated at a single overcurrent device or single bus.

12.4. The Port of Long Beach will not provide fiber optic cable, or electrical control wires of any type within the wharf outlets except for those controls that are explicitly identified and specified above. Should the ship or terminal operator choose to install fiber optic cable or electric control wires, the wharf structure will contain spare conduits for this purpose.