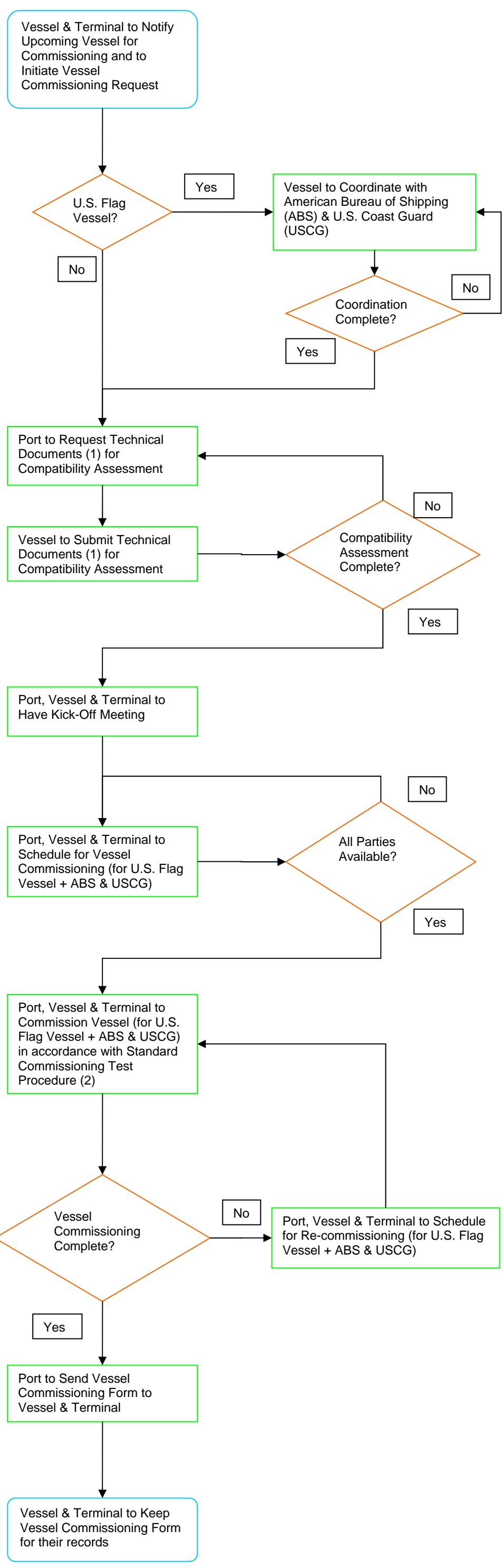


Port of Oakland Typical Shore Power Vessel Commissioning Process



Technical Documents (1) for Compatibility Assessment

- Generator specification sheet for the largest and smallest generator which will parallel with on-shore grid
- Electrical One-Line diagram of on board HVSC (High Voltage Shore Connection) equipment
- Electrical Three-line diagram of on board HVSC equipment
- Make & model of all protective devices associated with the HVSC equipment (using ANSI Standard Device Numbers for key components)
- Proposed settings of all protective devices associated with the HVSC equipment, must include synchronizing relay/controller with settings (+/- 10% voltage, +/- 10 degree phase angle and 0.1 Hz or less of slip frequency)
- Safety Circuit Pilot Loop wire control schematic diagrams, physical pin assignment diagrams with wiring identifications, cable plug orientations and pilot pin locations
- Ship's HVSC sequence of operation control flow diagrams
- Ship's HVSC equipment acceptance test reports (i.e.: 3rd party independent testing agency certifications, Ship's HVSC system's register /classification certificate of quality assurance or etc.)
- Location(s) of the HVSC cable plugs on the ship (i.e. starboard or port side and at the house or at the stern, distance from bow/stern)
- Ship Engineer's operations standards for HVSC connection/disconnection procedures
- Contact information for Shipboard HVSC Commissioning Engineers and technical support personnel

Standard Commissioning Test Procedure (2)

1. Board ship for an initial walkthrough. Review the ship's electrical single-line diagram and go through the proposed commissioning test procedure.
2. Review the test reports and settings for ship's shore connection power breaker protection relays, most importantly the functions and settings (+/- 10% voltage, +/- 10 degree phase angle and 0.1 Hz or less of slip frequency) of the synchronizing relay/controller for the ship's shore power connection breaker.
3. Establish communication protocol and initiate standard shore power connection procedure.
4. Verify Safety Circuit Pilot Loop Pin assignment at the Cable Plugs.
5. Plug in ship's shore power cable and secure cable Kellems grip.
6. Activate cable auto tension systems, observe auto tension system operation and adjust as necessary.
7. Simulate Safety Circuit Pilot Loop operation by actuating ship and shore emergency stops confirm the appropriate breakers will trip.
8. Energize shore power up to the ship's shore power cable reel switchgear.
9. Perform phase sequence verification at the ship's shore power cable reel switchgear.
10. Actuate ship and shore emergency stops to confirm the appropriate breakers trip.
11. Place the ship's shore power connection breaker in the "Test" position (primary contacts disconnected, secondary control contacts connected).
12. Perform phase sequence verification at the ship's shore power connection breaker.
13. Simulate shore power synchronization with the breaker in the test position and confirming that the breaker closes only within the acceptable tolerances.
14. Place the ship's shore power connection breaker in the "Connected" position.
15. Perform actual shore power synchronization test. The system must automatically synchronize and transfer power between the shipboard generator and shore power.
16. Repeat synchronization test with every shipboard generator that is capable on paralleling with the ship's shore power connection breaker.
17. Follow standard shore power disconnect procedure to disconnect after completion of commissioning test.

Note: For Port's specific Berth Shore Power Substation Commissioning, Port will coordinate PG & E's inspector and BAAQMD's inspector to witness the commissioning process.