Contents

1. Document Purpose

Step by step procedure for first calls to High Voltage Shore Connection (HVSC) system. First call procedure must be followed if either of the below cases are true:

a) Ships first call to Plug HVSC

b) Last call to Bergen HVSC was over 12 months ago

c) Modifications on shore- or ship-side

if the shore- or ship HVSC system has been out of service or unused for more than 30 months additional testing is required as per section 9 of this document.

2. Persons in Charge of First Call

In this section the persons in charge from both ship and shore signs that the below procedure is followed, and all relevant boxes are checked. If a step is excluded a comment must be made next to the line.

2.1. From ship

Name	
Company	
Date	
Signature	

2.2. From shore

Name	
Company	
Date	
Signature	

3. Ship Information

Date	
Ship's name	
Ship's IMO number	
Ship's mains voltage	
Ship's mains frequency	
Ships phase sequence	
Ship's short circuit current	

4. Prior to Ship Docking

These procedures should be completed prior to ship arriving.

☐ Check that the compatibility assessment has been completed and necessary actions have been taken (only the first time a ship connects to this specific HVSC system)

☐ Check switchgear SDEU is in the grounded position through the window on the switch

☐ PIC lock switchgear SDEU with personal padlock in the grounded position

☐ Remove the live end covers only from the socket to be used and inspect for damage. Connect the Cable Management System

5. After Docking

After the ship is docked, the ship crew and shore crew must follow the procedures below.

- ☐ Establish means of communication between ship crew and shore crew
- ☐ Prepare ship HVSC for handling by performing the necessary grounding and lockout tagout manoeuvres
- ☐ Ship crew padlocks the earth switch cabinet SDEU
- ☐ Go to shell door of the ship and bring the cables in
- ☐ Remove covers and inspect for damage
- ☐ Connect plugs in the following order in ship:
  - ☐ Connect 4 power plugs
  - ☐ Connect neutral plug
  - ☐ Connect 110V control plug
  - ☐ Connect 24V control plug
- ☐ Ensure sufficient cable length

6. Signalling Test

In this section the signalling devices and safety circuits are tested.

6.1. Bond Monitoring Check

Ship crew goes to ship and disconnects the equipotential bond monitoring terminations one at a time, and shore confirms that the monitoring system registers this on the HMI.

- ☐ Disconnect termination 1, acknowledged by shore
- ☐ Disconnect termination 2, acknowledged by shore
- ☐ Disconnect termination 3, acknowledged by shore
- ☐ Disconnect termination 4, acknowledged by shore

6.2. Emergency Stop Test

Ship crew tests their emergency stops and confirms with shore after each one to receive positive affirmation that they register on shore. Fill lines below with relevant emergency stops.

- ☐ _____, acknowledged by shore
- ☐ _____, acknowledged by shore
- ☐ _____, acknowledged by shore
- ☐ _____, acknowledged by shore
- ☐ _____, acknowledged by shore
- ☐ _____, acknowledged by shore
- ☐ _____, acknowledged by shore
- ☐ _____, acknowledged by shore

6.3. Signals from Shore to Ship

Shore goes to HMI and selects signal test mode to set the following signals high, ship acknowledges state.

Note: HVSC plant does not utilize capacitor banks, but instead uses power electronics to compensate for reactive power. All standard signals relating to capacitor banks are therefore not utilized.

	Connector	Pin no.
☐ Supply Circuit Breaker (either 6.6 or 11 kV)		
☐ 6.6 kV	110 VDC	5, 6
☐ 11 kV	110 VDC	14, 15
☐ Shore grounded indicator	110 VDC	7, 8
☐ Reduce power warning	110 VDC	11, 12
☐ Shutdown expected warning	110 VDC	11, 13
☐ Temperature warning	24 VDC	9, 10
☐ Temperature alarm	24 VDC	11, 12

6.4. Signals from Ship to Shore

Ship sets the following signals to high; shore goes to HMI and acknowledges state.

Note: Plug HVSC plant does not utilize capacitor banks, but instead uses power electronics to compensate for reactive power. All standard signals relating to capacitor banks are therefore not utilized.

	Connector	Pin no.
☐ Permission to close shore circuit breaker (either 6.6 or 11 kV)		
☐ 6.6 kV	110 VDC	1, 2
☐ 6.6 kV	24 VDC	1, 2
☐ 11 kV	110 VDC	16, 17
☐ 11 kV	24 VDC	16, 17
☐ Check that ship frequency selection matches with ships expectations		
☐ High=50Hz	110 VDC	9, 10
☐ Low=60Hz	110 VDC	9, 10

7. Cable Test

The next step is to energize the high voltage cables, to test phase rotation and to do a live emergency stop.

- ☐ Prepare ship for shore power
- ☐ Go to shore and remove pad locks from the earth unit SDEU
- ☐ Select mains voltage on HMI (6,6kV or 11kV)
- ☐ Select frequency on HMI (50Hz or 60Hz)
- ☐ Confirm that no earth fault is present
- ☐ Ship crew checks the correct voltage and frequency is selected
- ☐ Ship gives permission to close shore breaker via automation. Start button turns green
- ☐ Shore pushes activation button, Press Green start button

- ☐ Ship gets permission to close and syncs to shore
- ☐ Ship crew checks phase rotation and informs shore crew
- ☐ Perform load transfer with maximum 3 MVA/min or agreed level
- ☐ Ship crew activates emergency stop and system trips. Shore crew informs ship of system status

8. Additional testing

If the HVSC system on the shore-side or ship-side, has been out of service or not in use (voltage free) for more than 30 months the following test shall be performed:

- ☐ Power frequency test for HV switchgear assemblies
- ☐ Voltage test for cables
- ☐ Insulation resistance measurement
- ☐ Measurement of the earthing resistance

Note: These tests have been conducted as part of the original commissioning, so for more information have a look at those documents.

9. Disconnection

At the end of a successful shore connection, the following steps must be completed to ensure a successful disconnection.

- ☐ Ship notifies shore that it is ready to disconnect and gets permission to restore power
- ☐ Perform necessary manoeuvres on ship to restore power
- ☐ Perform load transfer with maximum 3 MVA/min or agreed level
- ☐ Open shore connection breaker on ship when ready
- ☐ Ship withdraws “Permission to close” stopping the system
- ☐ PIC checks that the switch is grounded and padlocks SDEU
- ☐ Ship padlocks earth switch cabinet SDEU
- ☐ Remove all plugs, inspect for damage and re-attach covers
- ☐ Ship goes to shore and removes padlock from switch cabinet
- ☐ PIC removes personal padlock from switch and live end covers and places the main padlocks