Base Load Power Hub (BLPH)

OTP – Hydrogen Fuel Cell Package

Document Number: 123A90-PML-COM-PRO-03062

Document Class: 2

{ DOCUMENT PREPARED IN COLLABORATION WITH CROSSWIND PMT }

01	30/01/2025	Accepted for Construction (AFC)	G.DELMISSIER	A.IVESON	M.BRUNELLI
00	18/12/2024	Issue for Review (IFR)	G.DELMISSIER	A.IVESON	M.BRUNELLI
Rev.	Date	Description	Prepared	Reviewed	Approved

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

Revision / Change Log

Rev.	Description
00	Issue for Review (IFR)
01	Accepted for Construction (AFC)

HOLDS LIST

No.	Description
1	Awaiting details of commissioning spare parts from Ballard
2	
3	

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

Table of Contents

1 INTRODUCTION 6
1.1 Project Overview 6
1.2 Project Location 6
1.3 Project Concept 7
2 DOCUMENT SCOPE 8
3 OTP SUMMARY 9
3.1 Test Objective 9
3.2 System Boundary Limits 10
3.3 Test and System Description 12
3.4 Safety Devices 13
3.4.1 HSE Management 13
3.5 Acceptance Criteria 13
4 DOCUMENTS REFERENCES AND ABBREVIATIONS 16
4.1 Reference Documents 16
4.1.1 Company Documents and Standards 16
4.1.2 Project Documents 16
4.1.3 Vendor Documents 18
4.2 Acronyms and Abbreviations 18
5 OTP AT ONSHORE WORKSITE 19
5.1 Planning and Manpower 19
5.1.1 Planned tasks with estimated manpower 19
5.1.2 Pre-Commissioning duration estimate: 19
5.1.3 Test duration estimate 19
5.1.4 Vendor Assistance 19
5.1.5 Summary of interface signals to be tested: 19
5.2 OTP Test Requirements – Onshore WORKSITE 19
5.2.1 Pre-Commissioning Achievement 19
5.2.2 Commissioning Achievement 20
5.2.3 Status of Required Associated Subsystems 20
5.2.4 Special Tools & Test Equipment 21
5.2.5 Commissioning Spare Parts 21
5.2.6 Temporary Facilities 22
5.3 OTP Description – Onshore WORKSITE 22
5.3.1 OTP Test Preparation 22

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

5.3.2 Electrical Preparation 23
5.3.3 Mechanical Preparation 23
5.3.4 Instrument Preparation 23
5.3.5 Piping Preparation 24
5.3.6 Additional Discipline Preparation 24
5.4 Test Steps – Onshore WORKSITE - PHASES 1-2 (NOT PART OF THIS OTP) 24
5.4.1 OTP Steps WORKSITE - PHASE 3 24
5.4.2 OTP Steps WORKSITE - PHASE 4 25
5.4.2.1 Hydrogen Fuel Cell Integrated Testing ONSHORE 26
5.4.2.2 Hydrogen Fuel Cell Integrated Testing ONSHORE - Certifying Authority Table of Attendances 29
5.4.2.3 Hydrogen Fuel Cell Integrated Testing ONSHORE - Final Signatures and Company Acceptance 29
5.5 Post-test Conditions 30
5.6 Reinstatement and Preservation Tasks 30
6 OTP AT SITE 31
6.1 Planning and Manpower 31
6.1.1 Offshore Site overview 31
6.1.2 Planned tasks with estimated manpower 31
6.1.3 Test duration estimate 31
6.1.4 Vendor Assistance 31
6.1.5 Items Postponed to C&E OTP 31
6.1.6 HOLDS 31
6.2 OTP Test Requirements – Offshore SITE 31
6.2.1 Pre-Commissioning Achievement 31
6.2.2 Commissioning Achievement 31
6.2.3 Status of Required Associated Subsystems 32
6.2.4 Special Tools & Test Equipment 32
6.2.5 Consumable List 33
6.2.6 Commissioning Spare Parts 33
6.2.7 Temporary Facilities 33
6.3 OTP Description – SITE 33
6.3.1 OTP Test Preparation 33
6.3.2 Electrical Preparation 34
6.3.3 Mechanical Preparation 34
6.3.4 Instrument Preparation 34
6.3.5 Piping Preparation 34
6.3.6 Additional Discipline Preparation 35
6.4 OTP Test Steps – Offshore PHASE 4 35

6.4.1.1 Hydrogen Fuel Cell Integrated Testing OFFSHORE 35
6.4.1.2 Hydrogen Fuel Cell Integrated Testing OFFSHORE Notes and Remarks 37
6.4.1.3 Hydrogen Fuel Cell Integrated Testing OFFSHORE - Certifying Authority Table of Attendances 38
6.4.1.4 Hydrogen Fuel Cell Integrated Testing OFFSHORE - Final Signatures and Company Acceptance 38
6.5 Post-test Conditions 39
6.6 Reinstatement tasks 39
7 APPENDICES 40
7.1 Vendor SAT Procedure 41
7.2 Proverlis Summary System Reports 42
7.3 Equipment Related Technical Queries 43
7.4 As Built Documentation 44
7.5 Management of Change – Summary Table of Tasks and Details of Affected Related Documentation 45

List of Figures

Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map 6
Figure 2 - Wind Park Details 7
Figure 3 – BLPH Concept 8
Figure 4 – OTP System Boundary Limits 12

List of tables

Table 1: Acronyms and Abbreviations 18

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

1 INTRODUCTION

1.1 Project Overview

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.2 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

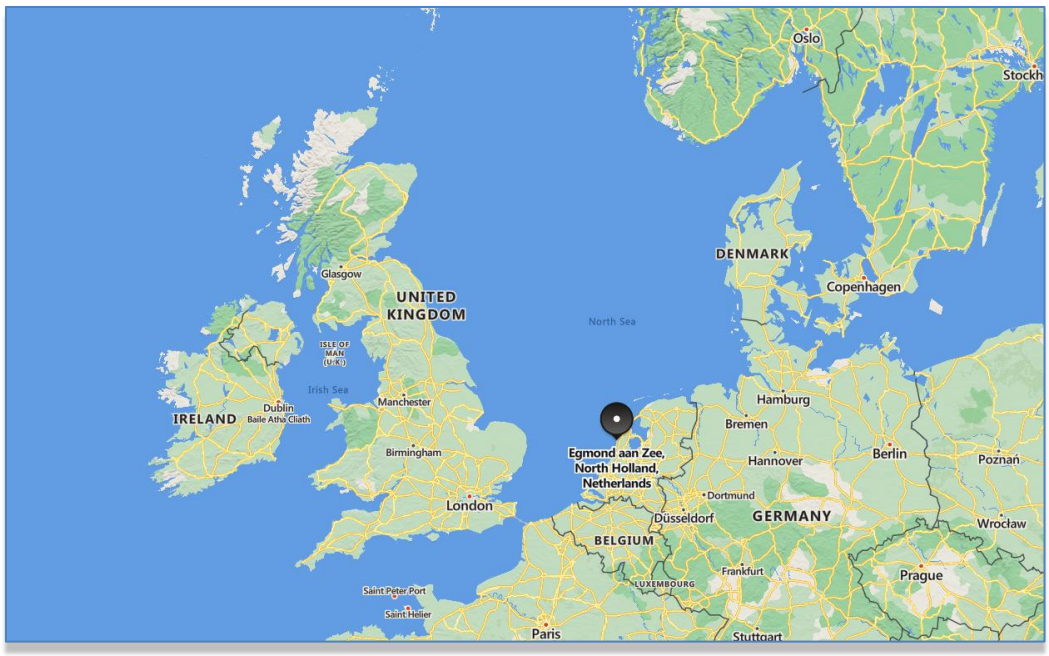


Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

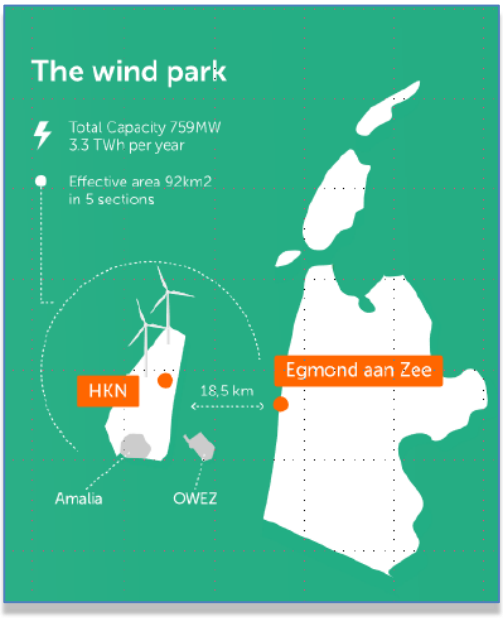


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile is located on coordinates E 590719.1, N 5841602.3 and is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.3 Project Concept

All components included in the BLPH will be integrated onshore on a topside and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

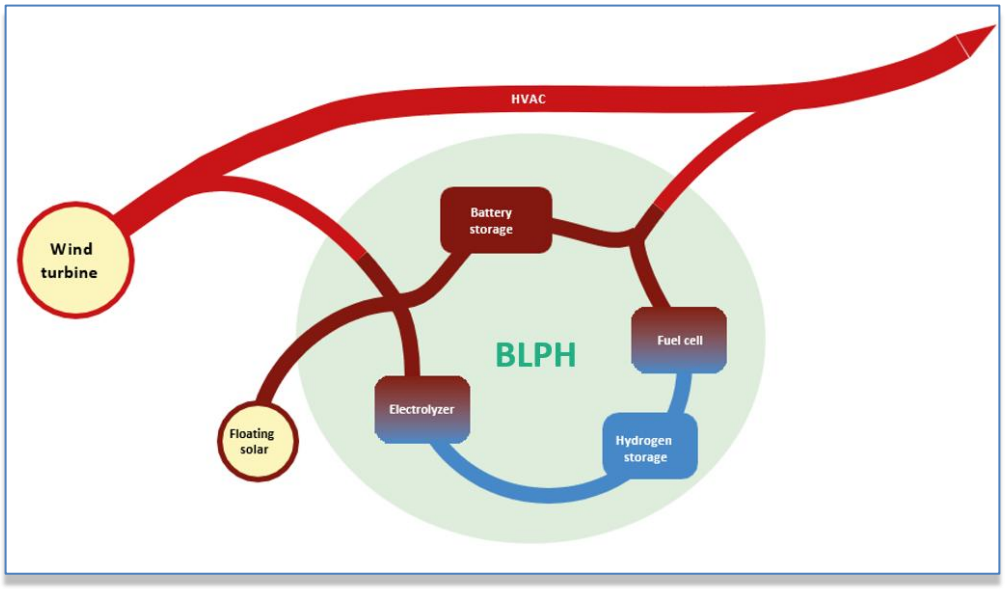


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.
The purpose of the BLPH is to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

2 DOCUMENT SCOPE

The purpose of this document is to describe the dedicated Commissioning procedure together with the detailed test steps to be implemented for the preparation and execution of the operation testing of the Hydrogen Fuel Cell Package

The document will cover all related test steps to be performed at both the onshore Worksite construction yard and the offshore SITE.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

3 OTP SUMMARY

3.1 Test Objective

The operating test of the Hydrogen Fuell Cell system is executed to ensure that the system is started up in a safe and controlled manner and to verify the correct operation according to the project requirements.

Aim of this document is to provide the sequence and appropriate actions to verify the safety systems of the system along with ability for the system to produce electrical power.

Please note that Pre-commissioning activities are described in detail in the method statement document K559-2254-CWIWP4202202-J99-009 as well as in the Vendor SAT procedure K559-2254-CWIWP4202202-J99-001. For the sake of completeness, these activities will be mentioned here as part of necessary steps but will not be part of the OTP.

Activities shall be developed as follows:

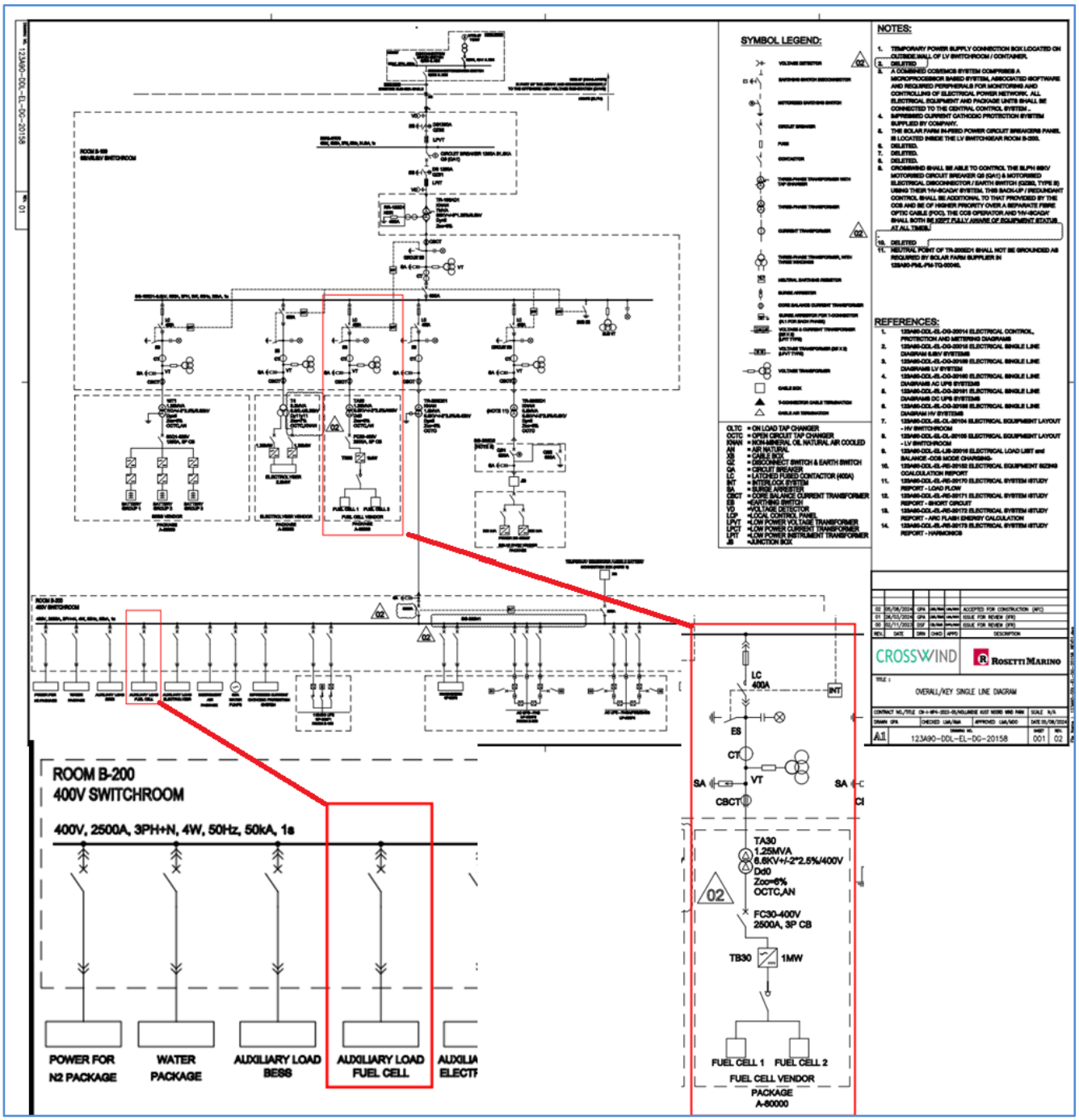
- Onshore pre-commissioning and commissioning activities at Contractor site (WORKSITE)
  - PHASE 1: Pre-commissioning (powered) activities including the following (NOT PART OF THIS OTP):
    - Leak Testing of modified H2 heater manifold assembly and coolant system leak test.
    - Aux first power on
    - Collant System fill and degas
  - PHASE 2: Pre-commissioning (powered) activities including the following (NOT PART OF THIS OTP):
    - IO test (package internal)
    - Platform communication check
    - Testing of 6.6 kV Trafo
    - Software upgrades testing
    - H2 supply check
    - External interface checks
    - Software upgrade testing
  - PHASE 3: Vendor SAT & Integrated function test of Hydrogen Fuel Cell package.
- Offshore commissioning (SITE)
  - PHASE 4: Integrated function test of Hydrogen Fuel Cell package (OFFSHORE).

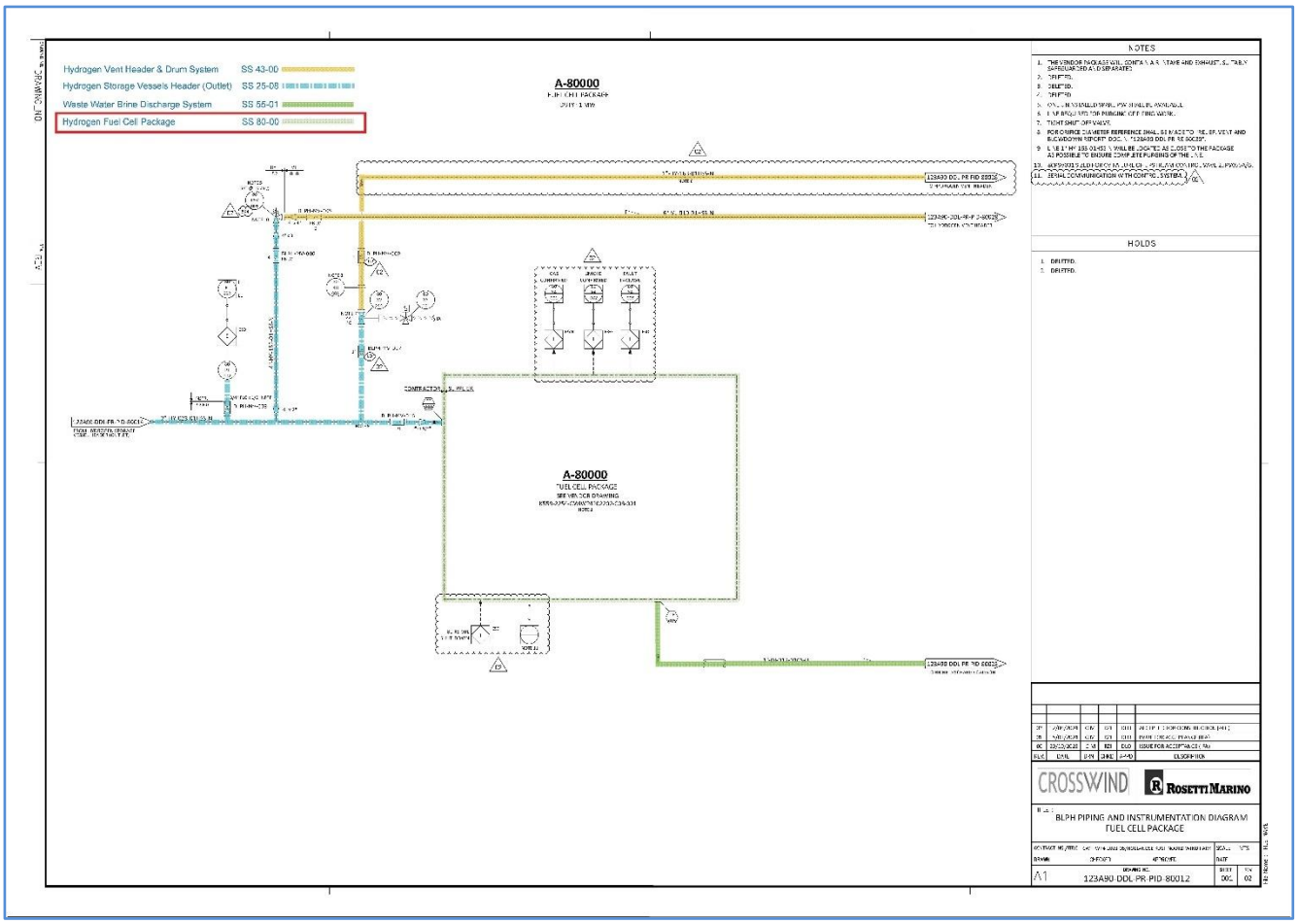
PHASES 1 – 2 are covered by and contained within the vendor Method Statement. PHASES 3 - 4 are included within this OTP document, and the Vendor SAT procedure.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

3.2 System Boundary Limits

See below the interested systems and subsystems on the Overall Single Line Diagram





This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

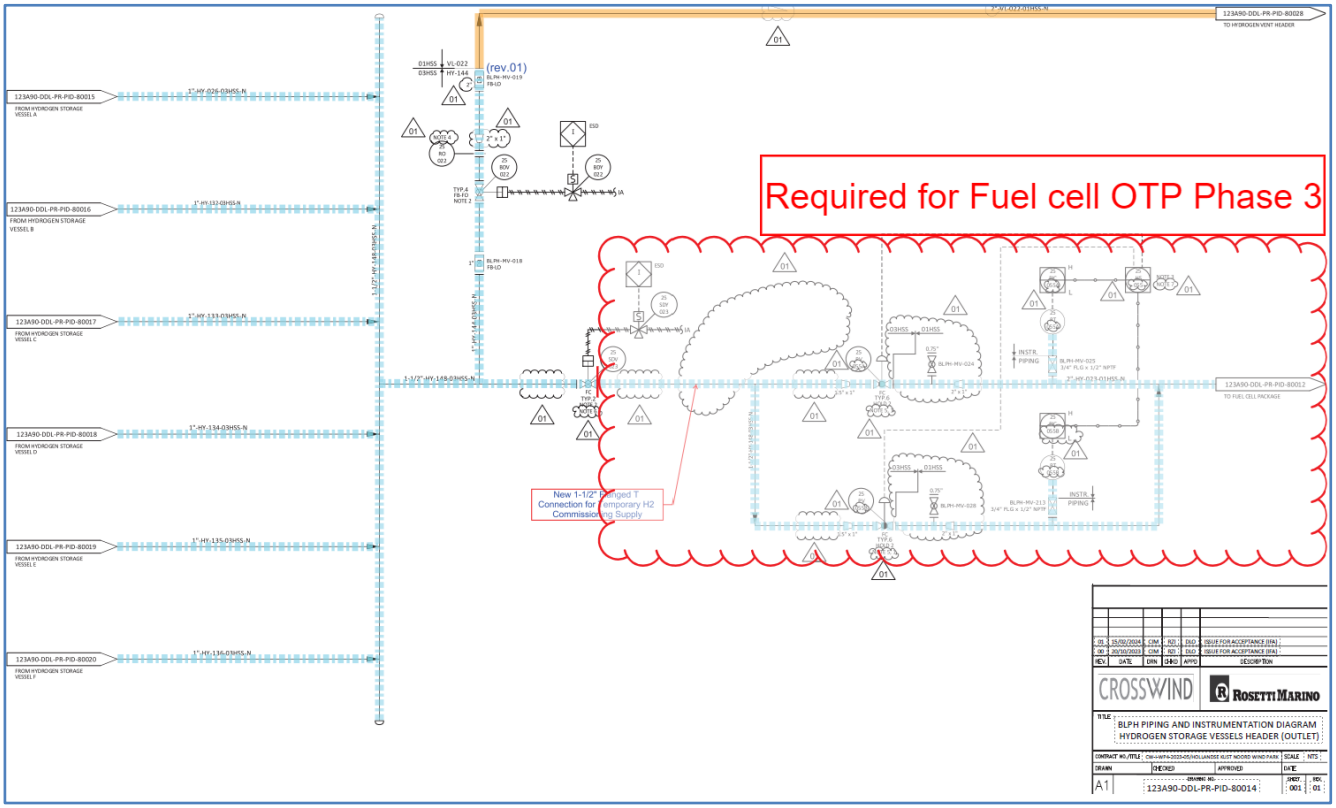


Figure 4 – OTP System Boundary Limits

3.3 Test and System Description

Proceeding with this OTP is confirmation that the following system:

- 80-00 Hydrogen Fuel Cell

That all equipment is installed in accordance with the following vendor documents:

- K559-2254-CG-PHI-001 Commissioning Philosophy
- ELO-INN-PBH-DWG-0005 General Arrangement Drawing
- ELO-ELE-BPH-DWG- 0005 Electrical Single Line Diagram Power Distribution
- ELO-INN-BPH-CKT-0006 Alarm warning list
- ELO-INN-BPH-DWG-0008 Process Flow Diagrams
- K559-2254-EL-ELL-002 BLPH - Electrical Load List (CCS MODE 2(A) 'HOT STANDBY')
- K559-2254-EL-ELL-003 BLPH - Electrical Load List (CCS MODE 3(C) 'DISCHARGING')
- K559-2254-EL-ELL-004 BLPH - Electrical Load List (CCS MODE 4(A) 'COLD STANDBY')
- K559-2254-EL-ELL-005 BLPH - Electrical Load List (CCS MODE 4A(D) 'EMERGENCY MODE (Island))
- K559-2254-EL-ELL-006 BLPH - Electrical Load List (CCS MODE 5(D) 'POWER OUT (Blackout))
- K559-2254-PR-PHI-001 - Main process control philosophy

3.4 Safety Devices

- Appropriate Personnel Protective Equipment (PPE) and safety equipment e.g., safety shoes, hand gloves, helmet, earplugs etc. are available and must be used in line with the site requirements.
- For entry into the 40' container standard PPE as stated above must be worn. Phones are not permitted within the 40' container.
- Access to the 10' transformer container is not permitted during operation and the container is to be double locked, the second lock being controlled by the CONTRACTOR.
  This is in addition to all normal PPE in line with site requirements.
- Warning safety signs are to be posted with restricted access to essential personnel only.
- Adequate firefighting equipment must be present at site.

3.4.1 HSE Management

- All necessary safety precautions must be taken to avoid any risk of personnel injury.
- All personnel involved in this operational test shall be competent for the tasks they will be required to undertake
- Place safety / warning signs and segregate the entire area with barrier tapes (safety barriers) of a colour distinguished (blue and white) from those used for construction activities
- Restrict access into area only to authorized personnel
- Conduct "Toolbox Talk" with all personnel prior to starting test work
- Appropriate Personnel Protective Equipment (PPE) and safety equipment e.g. safety shoes, hand gloves, helmet, earplugs etc. are available and must be used in line with the site requirements. Flame retardant coveralls should be worn.
- ATEX Field radios or Walkie-Talkies will be required for communication during testing.
- Portable gas detectors to be used by all personnel after H2 introduction.
- All activities carried out on the project shall be performed in accordance with the "Permit to Work" system Doc. PRO-HSE-23
- Electrical and mechanical isolations are to be assured as per Doc. PRO-HSE-08 and "Commissioning and start-up operation" procedure.
- Observe and enforce all international codes and regulations to safeguard personnel, plant and environment.
- Ensure that the working area is clean, tidy, well illuminated and that access and escape routes are free from obstructions.

Before starting work on any of the activities in this OTP it is the responsibility of the persons performing the work to:

- Familiarize themselves with the plant/equipment to be worked on
- Ensure they are aware of all other work activities that are taking place, or due to take place
- If necessary, re-plan any situation/activity
- Ensure proper communications between parties involved in the execution of the OTP
- Read the relevant Vendor documentation for the equipment covered by this OTP and observe any special requirements and limitations recommended or imposed by Vendor
- Verify that all personnel involved in the implementation of this procedure are familiar with its content as well as the associated safety requirements (Toolbox Talk)

3.5 Acceptance Criteria

- Before Power ON:

Visual inspection and verification are a crucial step to identify any obvious issues with the installation, such as loose connections, missing components, or damage to the equipment.

Crosschecking the installation with engineering documentation ensures that the installation is done correctly and according to the manufacturer's guidelines. These steps can help identify any missing or incorrect components, and wrong connections - – Refer to Vendor SAT chapters 7.1, through 7.4

All package ITRs to be completed & RFC issued for sub-system 80-00.

Apply padlocks on all necessary Breakers per LoTo Procedure.

Applicable locations:
- AC Power Distribution (BA20+UC50)
- Control System, Container #1 (LA01+UC20)
- Coolant Skid Cabinet, Container #1 (HE01+UC30
- DCDC Cabinets #1-6 (+UC01 to +UC06)
- Control System, Container #2 (LA01+UC31)
- Power Conversion Output, Container #2 (BA30+DA03)

See Ballard produced document "BLPH Project – Electrical Single Line Diagrams" – BPSE-ELE-BPH-DWG-00005

Powering ON the unit is an essential step to verify that the equipment is functioning correctly. Observing if everything is OK and any alarm will help detect possible errors or malfunctions.

Phase 1 (Not in the OTP) will prove correct (NOT PART OF THIS OTP):
- All piping (H2 and cooling) installed correctly.
- All cooling systems are filled correctly.
- Energization of the AUX circuits is successful; all the subsystems are working according to specification.
- All necessary Software updates are performed, and the package internal communication is proven successful.
- The safety critical functions integrated in the Hydrogen Fuel Cell package are working according to specification.

Phase 2 (Not in the OTP) will prove correct (NOT PART OF THIS OTP):
- All necessary Software updates are performed, and the package internal communication is proven successful.
- Functionality checks of the Package VFDs.
- The communication with the EMCS/PCS.
- The installation and functionality of the 6.6kv Trafo.

Phase 3 will prove correct:
- Completion of the Vendor SAT procedure.
- Functionality of the Hydrogen Fuell Cell package in coordination with Required Associated Subsystems packages on BLPH. (ONSHORE)

Phase 4 will prove correct:
- Functionality of the Hydrogen Fuel Cell package in coordination with the other packages on BLPH (OFFSHORE).

Performing the steps in this OTP as per engineering documents is crucial to ensure that the equipment is operating correctly and that it meets the desired design specifications. Observing the results will help identify any issues that may arise during the operation.

Overall, following these steps shall provide a comprehensive and effective way to verify the equipment installation and functionality.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

4 DOCUMENTS REFERENCES AND ABBREVIATIONS

4.1 Reference Documents

4.1.1 Company Documents and Standards

Document ID	Document Title
[1] K559-2254-CG-PHI-001	Commissioning Philosophy
[2] K559-2254-EL-ELL-002	BLPH Electrical Load List (CCS MODE 2(A) 'HOT STANDBY')
[3] K559-2254-EL-ELL-003	BLPH Electrical Load List (CCS MODE 3(C) 'DISCHARGING')
[4] K559-2254-EL-ELL-004	BLPH Electrical Load List (CCS MODE 4(A) 'COLD STANDBY')
[5] K559-2254-EL-ELL-005	BLPH Electrical Load List (CCS MODE 4A(D) 'EMERGENCY MODE (Island))
[6] K559-2254-EL-ELL-006	BLPH Electrical Load List (CCS MODE 5(D) 'POWER OUT (Blackout))
[7] K559-2254-PR-PHI-001	Main process control philosophy

Table 1: Company Documents and Standards

Note – These documents were produced in FEED and made available to RM for info. They have subsequently been superseded by Detailed Design, similar or same deliverables.

4.1.2 Project Documents

Document ID	Document Title
[1] 123A90-PML-PM-LIS-01001	Master Document Register
[2] 123A90-PML-PM-PL-00001	Project Execution Plan
[3] 123A90-PML-QHSE-PL-00001	Project HSE Plan
[4] 123A90-PRO-HSE-23	RM Yard Permit To Work Procedure
[5] 123A90-PML-COM-PL-03002	Mechanical Completion & Commissioning Exec. Plan
[6] 123A90-PML-COM-PRO-03007	Commissioning Strategy
[7] 123A90-PML-COM-LIS-03011	System/Sub-Systems List
[8] 123A90-PML-COM-LIS-03012	System/Sub-System Boundary Limit Diagrams
[9] 123A90-PML-COM-PRO-03038	Leak Test Procedure
[10]123A90-PML-COM-SP-03032	Pre-Commissioning Functional Test Sheet Template Collection (ITR-B)
[11]123A90-PML-COM-SP-03014	Commissioning TDS - Temporary Equipment & Facilities
[12]123A90-PML-COM-PRO-03019	OTP – Onshore Performance & Integrated Test Procedure
[13]123A90-PML-COM-LIS-03034	Inhibit-Override Register

Document ID	Document Title
[14]123A90-PML-COM-LIS-03035	PSV Calibration Register
[15]123A90-PML-COM-PRO-03036	OTP - Black Start Procedure
[16]123A90-PML-COM-LIS-03024	Commissioning Spare Parts and Consumables List
[17]123A90-PML-COM-PRO-03022	Initial offshore START-UP procedures
[18]123A90-PML-COM-SP-03057	Worksite WEF (Work Execution Flow Scheme)
[19]123A90-PML-COM-SP-03058	Site WEF (Work Execution Flow Scheme)
[20]123A90-PML-COM-RE-03001	Commissioning Final Dossier (ITR-B)
[21]123A90-PML-QHSE-PRO-00116	Flushing and Cleaning Procedures
[22]123A90-PML-QHSE-SP-00118	Mechanical Completion Check Sheet Template Collection (ITR-A)
[23]123A90-PML-QHSE-RE-00115	Mechanical Completion Final Dossier (ITR-A)
[24]123A90-PML-QHSE-PRO-00117	Punch list Management Procedure
[25]123A90-PML-COM-PRO-03041	OTP - Hydrogen Storage & Venting Systems
[26]123A90-PML-COM-PRO-03042	OTP - Sea Water Intake & Fresh Water Treatment Systems
[27]123A90-PML-COM-PRO-03043	OTP - Instrument Air System
[28]123A90-PML-COM-PRO-03055	OTP - Nitrogen Generation System
[29]123A90-PML-COM-PRO-03044	OTP - HVAC Systems
[30]123A90-PML-COM-PRO-03045	OTP - HV Switchgear & 66 kV Transformer Systems
[31]123A90-PML-COM-PRO-03046	OTP - 6.6 kV Switchgear & Transformer Systems
[32]123A90-PML-COM-PRO-03047	OTP - LV Switch Board & LV Distribution Board Systems
[33]123A90-PML-COM-PRO-03048	OTP - Lighting & Small Power Systems
[34]123A90-PML-COM-PRO-03049	OTP - Electrical Heat Tracing Systems
[35]123A90-PML-COM-PRO-03050	OTP - UPS Systems
[36]123A90-PML-COM-PRO-03051	OTP - Data Network Systems
[37]123A90-PML-COM-PRO-03052	OTP - Telecom & Surveillance Systems
[38]123A90-PML-COM-PRO-03053	OTP - Navaid System
[39]123A90-PML-COM-PRO-03054	OTP - F&G and ESD C&E Logics
[40]123A90-PML-QHSE-PRO-00120	Proverlis Management Procedure
[41]123A90-PML-COM-PRO-03056	OTP – Document Template
[42]123A90-DDL-IN-RE-40095	Process Control Logics Description

Table 2: Reference Project Deliverables

4.1.3 Vendor Documents

Document ID	Document Title
[1] K559-2254-CWIWP4202202-C06-001Rev007	Electrical Single Line Diagram
[2] K559-2254-CWIWP4202202-B01-001Rev009	General Arrangement
[3] K559-2254-CWIWP4202202-N01-001Rev001	Integration Manual
[4] K559-2254-CWIWP4202202-N01-002Rev002	Operators Manual
[5] K559-2254-CWIWP4202202-E03-007Rev001	Electrical Interface Document
[6] K559-2254-CWIWP4202202-K03-001Rev001	Performance Test Results (FAT)
[7] K559-2254-CWIWP4202202-J99-001-Rev003	SAT Procedure
[8] K559-2254-CWIWP4202202-C08-001Rev004	Control Philosophy & Block Logic Diagrams
[9] K559-2254-CWIWP4202202-J99-009	Method Statement

Table 3: Company Key Reference Documentation

4.2 Acronyms and Abbreviations

Acronyms / Abbreviations	Description
BLPH	BaseLoad Power Hub
CO	Carbon monoxide
EMCS	Electrical Monitoring & Control System
ESD	Emergency Stop Devices
FAT	Factory Acceptance Test
FTE	Full Time Employees
F&G	Fire and Gas
PPE	Personal Protective Equipment
ITR	Inspection & Test Record
LOTO	Lock Out Tag Out
OTP	Operational Test Procedure
PCS	Power Conversion System
SAT	Site Acceptance Test
SOC	State Of Charge

Table 1: Acronyms and Abbreviations

5 OTP AT ONSHORE WORKSITE

This chapter refer to the activities on the Contractor worksite (construction yard).

5.1 Planning and Manpower

5.1.1 Planned tasks with estimated manpower

Estimated manpower for the different phases of the OTP are:

- 2 Vendor FTE.
- 1 Commissioning Supervisor from Company
- 1 Commissioning Supervisor from Contractor
- 1 Operator from EMCS vendor
- 1 Operations Engineer from Company.

5.1.2 Pre-Commissioning duration estimate:

- PHASE 1: 12 days approx. (Not in the OTP)
- PHASE 2: 12 days approx. (Not in the OTP)

5.1.3 Test duration estimate

The test duration should be as follows:

- PHASE 3: 3 days approx.
- PHASE 4: 2 days approx.

If necessary, the estimated time can be extended in order to complete all required pre-commissioning and commissioning activities.

5.1.4 Vendor Assistance

Vendor Ballard will lead and/or supervise the onshore commissioning activities. For offshore commissioning Ballard will provide remote support.

5.1.5 Summary of interface signals to be tested:

Please refer to the following documents;

- BPSE-INN-BPH-REG-00006 – Modbus Table
- BPSE-INN-BPH-OTH-00012 - BLPH - FC Package Modbus Table

5.2 OTP Test Requirements – Onshore WORKSITE

5.2.1 Pre-Commissioning Achievement

Prior to commencement of commissioning activities, the relevant pre-commissioning documentation be fully signed.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

5.2.2 Commissioning Achievement

The commissioning achievement will be the full successful operation, functionality and integration of the Hydrogen Fuel Cell package installed on BLPH.

5.2.3 Status of Required Associated Subsystems

- PHASE 3

Subsystems required RFC for Commissioning of the Hydrogen Fuel Cell Package

- 83-00 400V Switchboard SG200N1
- 83-00 Auxiliary power supply
- 83-20 Distribution board
- 88-00: Earthing System
- 83-99: Temporary Yard 400/230V Main and auxiliary power supplies
- 87-00: EMCS
- 87-10: PCS
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-10: Power Transformer 1.25 MVA
- 82-99: MV 6.6 kV Temporary Yard Supply Integrated Test
- 70-00: F&G Control System
- 79-00: Emergency Shutdown Systems (SIS)
- 25-01 to 25-08 (Partial): Hydrogen Storage Vessels & Header
- 43-00: Hydrogen Vent Header and Drum System
- 55-01: Waste Water Brine Discharge System

- PHASE 4

- Subsystems required RFC for OFFSHORE Commissioning of the Hydrogen Fuel Cell Package
- 83-00 400V Switchboard SG200N1
- 83-00 Auxiliary power supply
- 83-20 Distribution board
- 88-00: Earthing System
- 87-00: EMCS
- 87-10: PCS
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-10: Power Transformer 1.25 MVA
- 70-00: F&G Control System
- 79-00: Emergency Shutdown Systems (SIS)
- 25-01 to 25-08: Hydrogen Storage Vessels & Header
- 43-00: Hydrogen Vent Header and Drum System
- 55-01: Waste Water Brine Discharge System
- 81-20: Power Transformer 7 MVA (TR-100AD1)
- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-00: 66 kV Subsea Cable

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

5.2.4 Special Tools & Test Equipment

The following special tool and Test Equipment are required:

S.No.	DESCRIPTION	QTY
1	General PPE	3
2	Various tools for electrical wiring	1
3	Various tools for mechanical installation	1
4	H2 Sniffer - Sewerin Snooper Mini H2	1
5	Pressure sensor - Fluke 700RG07 500PSIG	1
6	Test gas - Formier gas 5% hydrogen	1
7	Sniffer test station - Sewerin SPE-HG	1
8	Pressure regulator	1
9	Pressure relief valve	1
10	Smoke generator for fire detector test	1
11	H2 test gas for detector test	1
12	Coolant pumping/filling equipment	1
13	CE multitester	1
14	Multimeter	1

- H2 Sniffer - Sewerin Snooper Mini H2, Detection instrument to sniff/locate source of potential leaks.
- Pressure sensor - Fluke 700RG07 500PSIG, measuring device to accurately adjust and monitor gas pressure during leakage test.
- Test gas - Formier gas 5% hydrogen. Test gas for pressurizing pipework where the 5% hydrogen acts as tracer agent for sniffing
- Sniffer test station - Sewerin SPE-HG. Test instrument that emits a reference gas to check the correct function of the Snooper Mini H2 sniffer.
- Pressure regulator, Test gas pressure regulator for pressurizing the DUT.
- Pressure relief valve, Safety valve to ensure safe pipework pressurization during test.

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

5.2.5 Commissioning Spare Parts

HOLD 2

5.2.6 Temporary Facilities

Phase 3: Temporary emergency stop and/or fire and gas detection may be required if deemed necessary after suitable risk assessment. This will depend on the availability of interacting sub-systems.

If a temporary H2 connection is provided by Rosetti to ensure testing can progress this will be subject to a separate risk assessment & permit for installation/operation.

5.3 OTP Description – Onshore WORKSITE

5.3.1 OTP Test Preparation

Step	Description	Result	Verified by	Date
1	System Ready for Commissioning Certificate (RFC) is issued and approved.			
2	No Mechanical Completion or Pre-commissioning punch list 'A' items are outstanding against the system to be commissioned.			
3	Factory Acceptance Test Procedure has been carried out successfully (refer to Doc. K559-2254-CWIWP4202202-K03-001Rev001)			
4	All personnel involved in the implementation of this procedure are familiar with its content as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			
5	A final walkdown of the system has been completed, to ensure that the system and the area are ready for commissioning.			
6	Check that areas are free for work and escape routes are clear of any obstructions.			
7	All safety barriers and warning signs have been installed.			
8	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			
9	Verify availability of test equipment and spares as per section 5.2.			
10	With reference to Commissioning Temporary equipment & Facilities (refer on Doc. 123A90-PML-COM-SP-03014), check that power is available to any temporary equipment or test equipment (if any).			
11	System(s) isolations as per LOTO procedure defined within HSSE Permits to Work and Commissioning procedures duly prepared and approved			
12	All yard personnel have been duly notified by dedicated LUN (Livening Up Notification) that the system(s) is ready for commissioning.			

Step	Description	Result	Verified by	Date

5.3.2 Electrical Preparation

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
2	Verify that all relevant associated systems / subsystems are completed.			
3	Check that grounding and bonding are in accordance with applicable documents.			
4	Verify and confirm the correct circuit breaker protection settings according to latest protection study revision.			
5	Verify and confirm the completion of the final connections between the LV 400V Switchboard and the FC, the MV 6.6kV and FC, and the EMCS.			
6	Assess the need for additional temporary F&G or E-Stop protection during ONSHORE phases and implement necessary changes.			

5.3.3 Mechanical Preparation

Step	Description	Result	Verified by	Date
1	Check the correct flow direction of the valves.			
2	Confirm leak testing is complete and documented.			
3	Ensure package PSV setpoints are correct for the designed operating pressure.			
4	Ensure all unnecessary isolations are removed and package is ready to receive hydrogen.			

5.3.4 Instrument Preparation

Step	Description	Result	Verified by	Date
1	Check related punch list 'B' items and confirm acceptability for start of commissioning			

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

Step	Description	Result	Verified by	Date
	activities.			
2	Verify that all relevant associated systems / subsystems are ready.			
3	Check Inhibit and Override register has been prepared and validated.			
4	Verify that relevant equipment/ components are available and in operation for start of commissioning activities.			
5	Verify availability of test equipment as per section 5.2.4.			

5.3.5 Piping Preparation

Step	Description	Result	Verified by	Date
1	Ensure Process Water drain connection is correctly connected to the Rosetti system			
2	Ensure H2 supply connection is correctly connected from the Rosetti system			
3	Review Rosetti flange management and confirm all interface connections have been torqued and leak tested with details recorded and signed for.			
4	Ensure Blind flange/ positive isolation is in place at test boundary.			

5.3.6 Additional Discipline Preparation

Not applicable.

5.4 Test Steps – Onshore WORKSITE - PHASES 1-2 (NOT PART OF THIS OTP)

The previous chapters must be successfully performed prior to commissioning of the Hydrogen Fuel Cell Package.

Please refer to the following documents for Phase 1-2 pre-commissioning Onshore activities:

- Method Statement, Doc No: K559-2254-CWIWP4202202-J99-009.
- SAT Procedure, Doc No: K559-2254-CWIWP4202202-J99-001

5.4.1 OTP Steps WORKSITE - PHASE 3

It is foreseen that previous sections are successfully performed.

Please refer to SAT document K559-2254-CWIWP4202202-J99-001 *section 7 and 8* for Phase 3 commissioning Onshore activities.

5.4.2 OTP Steps WORKSITE - PHASE 4

It is foreseen that previous sections are successfully performed.

In the following steps the functionality of the Hydrogen Fuel Cell package shall be tested for operation in all BLPH operating modes.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

Hydrogen Fuel Cell Integrated Testing ONSHORE

Step	Description	Result	Verified by	Date
Fuel Cell operating modes to be controlled from PCS via ECMS.				
1	Confirm on PCS that CCS operating mode is in "IDLE". Confirm Fuel Cell Package is in sleep mode.			
2	On PCS, change CCS operating mode to "IMPORT". Confirm no change at Fuel Cell package.			
3	On PCS, change CCS operating mode to "HOT STANDBY". Confirm Fuel Cell is now in Standby mode.			
4	Confirm H2 storage is available. This requires a reading of ≥ 20 barg on at least one of the following pressure transmitters: • 25-PT-035 • 25-PT-037 • 25-PT-040 • 25-PT-043 • 25-PT-046 • 25-PT-049			
NOTE: Pressure control via valves 25-PV-055A & 25-PV-055B should already be successfully tested via Hydrogen Venting & Storage OTP 123A90-PML-COM-PRO-03042				
5	On PCS, change CCS operating mode to "EXPORT". Confirm Fuel Cell status changes to running.			
6	Confirm that power output can be controlled via the EMCS over modbus. Test power output at increments of 0.25MW up to and including 1MW.			
7	On PCS, change CCS operating mode to "COLD STANDBY". Confirm Fuel Cell shuts down and returns to Sleep mode.			
8	On PCS, change CCS operating mode to "EMERGENCY (Island Mode)". Confirm Fuel Cell recommences discharge of power.			
9	On PCS, change CCS operating mode to "MAINTENANCE". Confirm Fuel Cell can only be operated locally.			

Step	Description	Result	Verified by	Date
10	On PCS, return CCS operating mode to "EXPORT". Initiate Fuel Cell F&G event via 1 of the 3 hydrogen detectors located inside the container and confirm the following: • Safety trip of all 6 FC Wave modules. • All hydrogen safety valves are closed. • Safe Torque Off of all Power Converters • Safe Torque Off of all Motor Drives			
11	On PCS, return CCS operating mode to "EXPORT". Operate the Fuel Cell Package Emergency Stop and confirm the following: • Safety trip of all 6 FC Wave modules. • All hydrogen safety valves are closed. • Safe Torque Off of all Power Converters • Safe Torque Off of all Motor Drives			

Full details of the EMCS HMI control graphics can be found in Document Number: 123A90-DDL-EL-SP-20039 Functional and Technical Design Specification, IDS and DDS for Electrical Monitoring and Control System (EMCS)

Hydrogen Fuel Cell Integrated Testing ONSHORE Notes and Remarks

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

5.4.2.1 Hydrogen Fuel Cell Integrated Testing ONSHORE - Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature

5.4.2.2 Hydrogen Fuel Cell Integrated Testing ONSHORE - Final Signatures and Company Acceptance

Name and Surname	Company Representative	Position	Signature

5.5 Post-test Conditions

Throughout Phase 1 to 4, AUX power shall be maintained active to ensure monitoring of the package and functionality of its safety features.
All other sub-systems shall be de-energized and, if deemed necessary, LOTO.
No AUX power will be provided during sea transport.

5.6 Reinstatement and Preservation Tasks

Generally, the system/ sub-system shall be reinstated at its initial condition; and the following activities must be carried out as minimum:

- all inhibition performed for the test shall be removed (as per Inhibit / Override List)
- all equipment/devices shall be returned in healthy functional conditions.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

6 OTP AT SITE

6.1 Planning and Manpower

6.1.1 Offshore Site overview

It is expected that all pre-commissioning tests, systems energization and commissioning steps will have been successfully performed during the Onshore Phases.
Consequently, during the offshore SITE phase, the respective systems will be inspected prior to re-energization. No additional test steps will be required on these items of equipment, correct operation and functioning will be verified.

6.1.2 Planned tasks with estimated manpower

Estimated manpower for the entire duration of the Test:

- 1 Operations Engineer from Client
- 1 Commissioning representative from Client
- 1 operator from EMCS vendor
- 1 Supervisor from Contractor

6.1.3 Test duration estimate

The test duration should be as follows:

- 2 days approx.

If necessary, the estimated time can be extended to complete all required pre-commissioning and commissioning activities.

6.1.4 Vendor Assistance

- For offshore commissioning Ballard will provide remote support.

6.1.5 Items Postponed to C&E OTP

- Not Applicable

6.1.6 HOLDS

- Not Applicable

6.2 OTP Test Requirements – Offshore SITE

6.2.1 Pre-Commissioning Achievement

- Not applicable

6.2.2 Commissioning Achievement

The commissioning achievement will be the full successful operation, functionality and integration of the Hydrogen Fuel Cell package installed on BLPH.

The successful commissioning result, achieved during the WORKSITE commissioning phase for the functionality and safeguard of the Hydrogen Fuel Cell Package, will allow for a smoother commissioning phase of the offshore SITE.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

- The systems and subsystems involved:
- 83-00 400V Switchboard SG200N1
- 83-00 Auxiliary power supply
- 83-20 Distribution board
- 88-00: Earthing System
- 87-00: EMCS
- 87-10: PCS
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-10: Power Transformer 1.25 MVA
- 70-00: F&G Control System
- 79-00: Emergency Shutdown Systems (SIS)
- 25-01 to 25-08: Hydrogen Storage Vessels & Header
- 55-01: Waste Water Brine Discharge System
- 81-20: Power Transformer 7 MVA (TR-100AD1)
- 81-10: GIS 66 kV (HNA6-AFA70)
- 81-00: 66 kV Subsea Cable

6.2.3 Status of Required Associated Subsystems

The systems involved has been already energized and commissioned in WORKSITE Phase

6.2.4 Special Tools & Test Equipment

The following special tool and Test Equipment are required:

S.No.	DESCRIPTION	QTY
1	General PPE	3
2	Various tools for electrical wiring	1
3	Various tools for mechanical installation	1
4	H2 Sniffer - Sewerin Snooper Mini H2	1
5	Pressure sensor - Fluke 700RG07 500PSIG	1
6	Test gas - Formier gas 5% hydrogen	1
7	Sniffer test station - Sewerin SPE-HG	1
8	Pressure regulator	1
9	Pressure relief valve	1
10	Smoke generator for fire detector test	1
11	H2 test gas for detector test	1
12	Coolant pumping/filling equipment	1
13	CE multitester	1
14	Multimeter	1

- H2 Sniffer - Sewerin Snooper Mini H2, Detection instrument to sniff/locate source of potential leaks.
- Pressure sensor - Fluke 700RG07 500PSIG, measuring device to accurately adjust and monitor gas pressure during leakage test.
- Test gas - Formier gas 5% hydrogen. Test gas for pressurizing pipework where the 5% hydrogen acts as tracer agent for sniffing
- Sniffer test station - Sewerin SPE-HG. Test instrument the emits a reference gas to check the correct function of the Snooper Mini H2 sniffer.
- Pressure regulator, Test gas pressure regulator for pressurizing the DUT.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

- Pressure relief valve, Safety valve to ensure safe pipework pressurization during test.

TESTING & MEASUREMENT INSTRUMENT USED			
Type	Serial N.	Calibration certificate	Validity

6.2.5 Consumable List

- Not applicable

6.2.6 Commissioning Spare Parts

HOLD 2

6.2.7 Temporary Facilities

- Not applicable

6.3 OTP Description – SITE

The SITE test will consist of a repeat of the onshore integration testing with the BLPH now installed situ to it's permanent connections. In the following steps the functionality of the Hydrogen Fuel Cell package shall be tested for operation in all BLPH operating modes.

6.3.1 OTP Test Preparation

Step	Description	Result	Verified by	Date
1	System Ready for Operation (RFO) Certificate is issued and approved.			
2	No blocking punch list items are outstanding against the system to be commissioned.			
3	System(s), (de)isolations as per LOTO procedure enclosed within commissioning Work Permits procedures prepared and approved			
4	Verify and confirm that all steps performed at WORKSITE of this procedure are completed without any pending issues that would prevent from proceeding with the offshore SITE PROCEDURE			

Step	Description	Result	Verified by	Date
5	All personnel involved in the implementation of this procedure are familiar with this procedure as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			
6	A final walkdown after hook-up of the system has been completed, any preservation items have been removed and to ensure that the system and the area are ready for energization.			
7	Check that areas are free for work and escape routes are clear of any obstructions.			
8	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			
9	Verify availability of test equipment and consumables as per chapters 6.2.4.			
10	All personnel have been duly notified during dedicated daily SIMOPS meetings that the system(s) is ready for operation.			

6.3.2 Electrical Preparation

Step	Description	Result	Verified by	Date
1	No blocking punch list items are outstanding against the system to be commissioned.			
2	Review and confirm no changes are required to be performed on existing protection settings.			

6.3.3 Mechanical Preparation

Step	Description	Result	Verified by	Date
1	No blocking punch list items are outstanding against the system to be commissioned.			
2	Ensure Fuel Cell package correctly connected to upstream H2 supply.			
3	Ensure Fuel Cell package correctly connected to downstream process waste water line.			

6.3.4 Instrument Preparation

Not applicable.

6.3.5 Piping Preparation

Not applicable

6.3.6 Additional Discipline Preparation

Not applicable.

6.4 OTP Test Steps – Offshore PHASE 4

The previous chapters must be successfully performed prior to final operational test of the Hydrogen Fuel Cell

6.4.1.1 Hydrogen Fuel Cell Integrated Testing OFFSHORE

Step	Description	Result	Verified by	Date
	Hydrogen Fuel Cell operating modes to be controlled from PCS via ECMS.			
1	Confirm on PCS that CCS operating mode is in "IDLE". Confirm Fuel Cell Package is in sleep mode.			
2	On PCS, change CCS operating mode to "IMPORT". Confirm no change at Fuel Cell package.			
3	On PCS, change CCS operating mode to "HOT STANDBY". Confirm Fuel Cell is now in Standby mode.			
4	Confirm H2 storage is available. This requires a reading of ≥ 20 barg on at least one of the following pressure transmitters: • 25-PT-035 • 25-PT-037 • 25-PT-040 • 25-PT-043 • 25-PT-046 • 25-PT-049			
	NOTE: Pressure control via valves 25-PV-055A & 25-PV-055B should already be successfully tested via Hydrogen Venting & Storage OTP 123A90-PML-COM-PRO-03042			
5	On PCS, change CCS operating mode to "EXPORT". Confirm Fuel Cell status changes to running.			
6	Confirm that power output can be controlled via the EMCS over modbus. Test power output at increments of 0.25MW up to and including 1MW.			
7	On PCS, change CCS operating mode to "COLD STANDBY". Confirm Fuel Cell shuts down and returns to Sleep mode.			
8	On PCS, change CCS operating mode to "EMERGENCY (Island Mode)". Confirm Fuel Cell recommences discharge of power.			

Step	Description	Result	Verified by	Date
9	On PCS, change CCS operating mode to "MAINTENANCE". Confirm Fuel Cell can only be operated locally.			
10	On PCS, return CCS operating mode to "EXPORT". Initiate Fuel Cell F&G event via 1 of the 3 hydrogen detectors located inside the container and confirm the following: • Safety trip of all 6 FC Wave modules. • All hydrogen safety valves are closed. • Safe Torque Off of all Power Converters Safe Torque Off of all Motor Drives			
11	On PCS, return CCS operating mode to "EXPORT". Operate the Fuel Cell Package Emergency Stop and confirm the following: • Safety trip of all 6 FC Wave modules. • All hydrogen safety valves are closed. • Safe Torque Off of all Power Converters Safe Torque Off of all Motor Drives			

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

6.4.1.2 Hydrogen Fuel Cell Integrated Testing OFFSHORE Notes and Remarks

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

6.4.1.3 Hydrogen Fuel Cell Integrated Testing OFFSHORE - Certifying Authority Table of Attendances

Name and Surename	**Certifying Authority**	**Position**	**Signature**

6.4.1.4 Hydrogen Fuel Cell Integrated Testing OFFSHORE - Final Signatures and Company Acceptance

Name and Surname	**Company Representative**	**Position**	**Signature**
Name and Surename	**Certifying Authority**	**Position**	**Signature**

6.5 Post-test Conditions

After functional tests have been completed, system / sub-systems are left in healthy and safety condition and operational.

6.6 Reinstatement tasks

Generally, the system/ sub-system shall be reinstated at its initial condition; and the following activities must be carried out as minimum:

- all inhibition done for the test shall be removed (as per Inhibit / Override List)
- all equipment/devices shall be returned in healthy functional conditions.

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

7 APPENDICES

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

7.1 Vendor SAT Procedure

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

7.2 Proverlis Summary System Reports

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

7.3 Equipment Related Technical Queries

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

7.4 As Built Documentation

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062

7.5 Management of Change – Summary Table of Tasks and Details of Affected Related Documentation

This document undergoes an issuance cycle within EDMS "FusionLive". Its distribution is electronically controlled.
Once printed shall be considered as "NOT CONTROLLED" copy.
File: 123A90-PML-COM-PRO-03062