Base Load Power Hub (BLPH)

OTP- BLACK START PROCEDURE

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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.

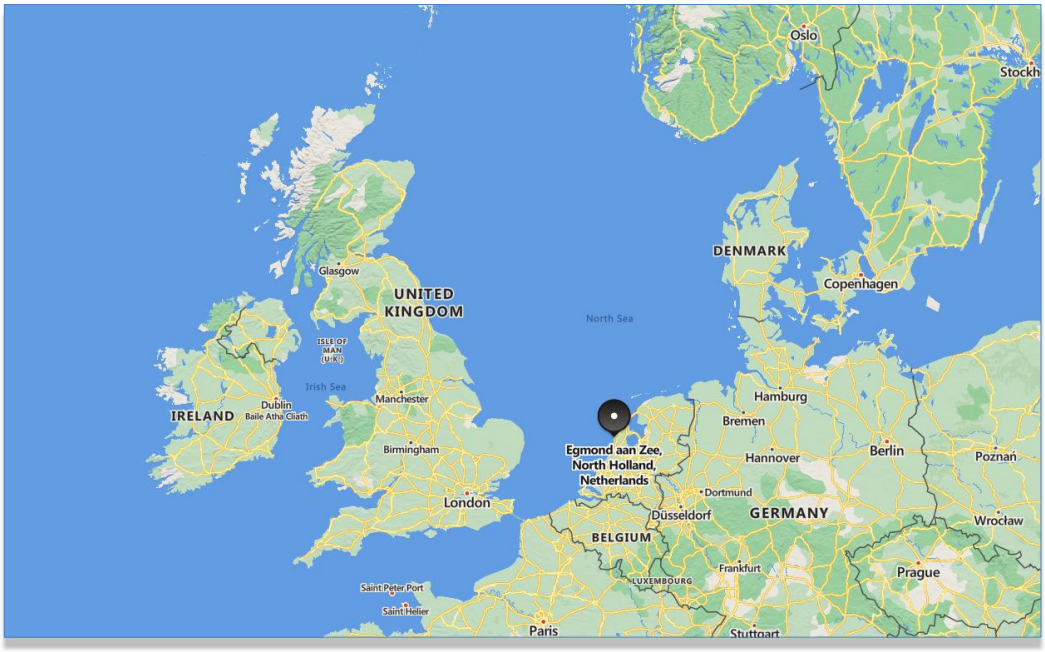


Figure 1 *- HOLLANDSE KUST NOORD WIND PARK Location Map*

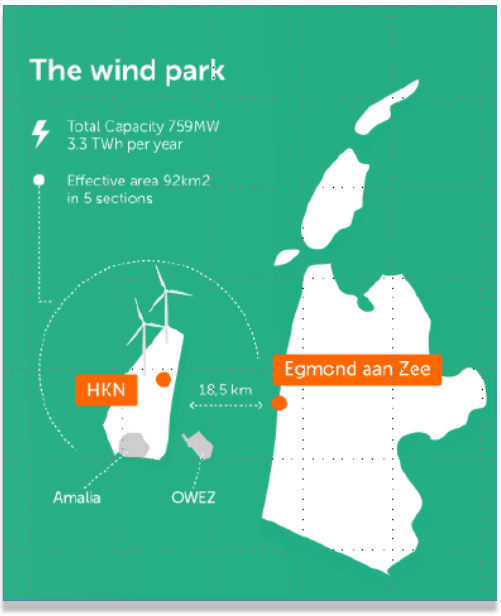


Figure 2 *- Wind Park Details*

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.

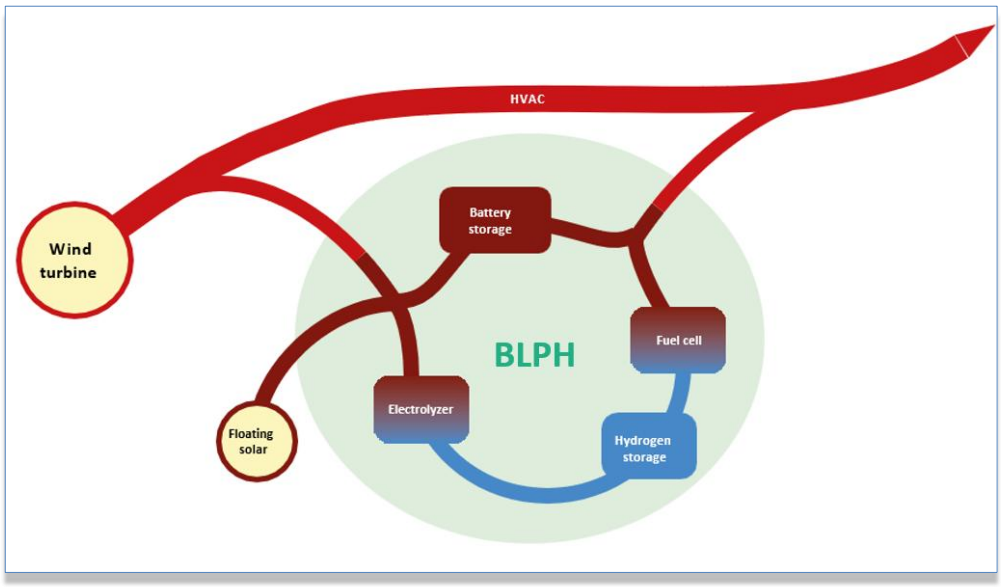


Figure 3 *– BLPH Concept*

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 methodology and the planned actions to be implemented for the preparation and execution of Mechanical Completion, Pre-commissioning, Commissioning & Start-Up activities to be performed on the PLANT, including COMPANY PROVIDED ITEMS, at the onshore premises of CONTRACTOR located in Milan (Italy) offices and Piomboni yard - Marina di Ravenna (Italy).

CONTRACTOR, pursuant to CONTRACT and PROJECT requirements, shall implement an exacting methodology, complete with a distinct set of tools and documentation to meet the following key objectives:
Perform the Mechanical Completion, Pre-commissioning and Commissioning on the WORKSITE to the maximum extent possible so as to minimise the commissioning operations on SITE;

- Ensure safety for the people, environment and facilities during the execution of the Commissioning activities at WORKSITE,
- Ensure integrity and operation of the equipment for their lifetime in accordance with PROJECT design and specifications,
- Plan a smooth and flawless execution of the Commissioning activities avoiding unforeseen downtimes and delays.

Achievement of the above objectives shall be obtained by:

- Defining and prioritizing a predetermined sequence of the Mechanical Completion checks, Pre-commissioning and Commissioning tests and tasks,
- Checking, testing systematically and exhaustively all the components of PLANT in compliance with PROJECT approved procedures and CONTRACT terms, managed by a dedicated team of inspectors, technicians and field engineers who will perform the Mechanical Completion, Pre-commissioning, Commissioning and Start-Up tasks and subsequently record the results via discipline specific check, inspection and test sheets (ITR's) & where applicable via discrete Operational Test Procedures (OTP's).
- Ensuring full traceability of the performed checks and tests, through implementation of a dedicated Project Completions Management System (CMS) containing individual references to all tagged items.

3 OTP SUMMARY

3.1 Test Objective

The operating test of Black Start is executed to ensure that the BLPH platform is started up in a safe and controlled manner and to verify the correct operation according to the project requirements.

Activities shall be developed as follows:

- Onshore pre-commissioning and commissioning activities at Contractor site (WORKSITE)
    - BLACK START OPERATIONAL
- Offshore commissioning (SITE)
    - Visual inspection of all components, Black Start with Power generator.

3.2 System Boundary Limits

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

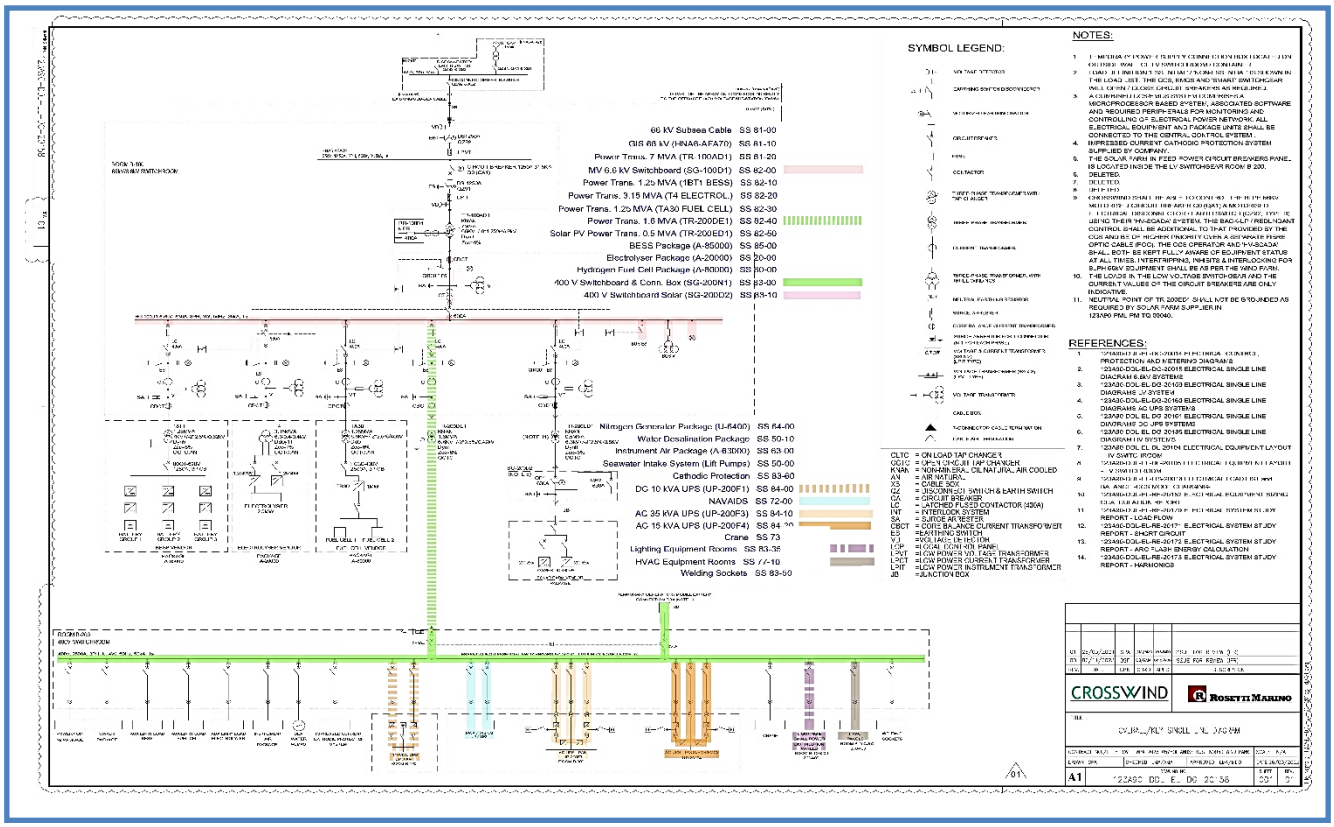


***Figure 4** – OTP System Boundary Limits*

3.3 Test and System Description

This document is related to the following systems/ subsystems:

- 70-00: F&G Control System
- 72-00: NAVAID
- 77-10: HVAC HV/MV Switchgear Room B-100
- 77-20: HVAC LV Switchgear Room B-200
- 77-30: HVAC UPS Equipment Room B-300
- 77-40: HVAC I&T Equipment Room B-400
- 79-00: Emergency Shutdown System (SIS)
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-40: Power Transformer 1.6 MVA (TR-200DE1)
- 82-99: MV 6.6kV Temporary Yard Supply Integrated test
- 83-00: 400/230V Switchboard SG-200N1
- 83-20: 400/230V Distribution Board DP-200N1
- 83-35: Emergency lighting Upper Deck
- 83-36: Emergency lighting Lower Deck

- 83-37: Emergency lighting Stairs/Transition Piece
- 83-40: Normal lighting Upper Deck
- 83-41: Normal lighting Lower Deck
- 83-42: Normal lighting Stairs/Transition Piece
- 83-99: 400V Temporary Yard Supply
- 84-00: 110V DC 10kVA UPS System (UP-200F1)
- 84-10: 230V AC UPS - 35KVA (UP-200F3)
- 84-20: 230V AC UPS – 15KVA (UP-200F3)
- 86-00: Data Networks
- 87-00: Power Distribution System (EMCS)
- 87-10: PROCESS CONTROL SYSTEM (PCS)
- 87-20: PROCESS CONTROL SYSTEM (PCS) - Instrumentation

All equipment is installed inside Technical Room B-100/B-200/B-300/B-400 and in all decks.

These parts of the system have been tested on worksite and at site.

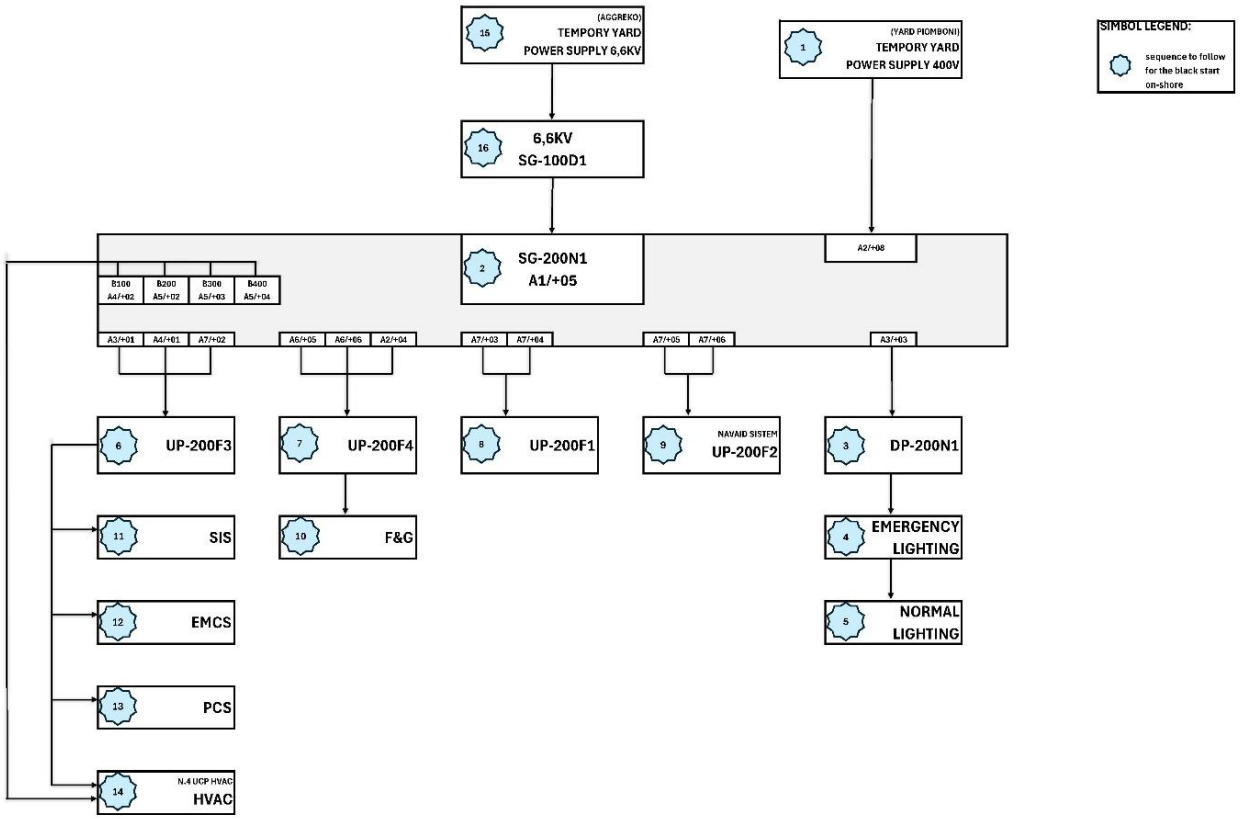


Figure 5 – Black Start WORKSITE Single Line Block Diagram and Sequence

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.
- Warning safety signs are to be posted with restricted access to essential personnel only.
- Adequate firefighting equipment.

3.5 HSE Management

All necessary safety precautions must be taken to avoid any risk for 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
- 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)

3.6 Acceptance Criteria (Functional & Communication Tests)

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.

After Power ON:
Execution of individual test steps will demonstrate the safe startup of the BLPH platform and consequently ensure that the temporary overrides required for the black start will not cause successive trips once they will be restored to normal working operations,

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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 Key Reference Documentation

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 & Comm. Execution Plan
[6] 123A90-PML-COM-LIS-03011	System/Sub-Systems List
[7] 123A90-PML-COM-LIS-03012	System/Sub-System Boundary Limit Diagrams
[8] 123A90-PML-COM-PRO-03038	Leak Test Procedure
[9] 123A90-PML-COM-SP-03032	Pre-Commissioning Functional Test Sheet Template Collection (ITR-B)
[10] 123A90-PML-COM-SP-03014	Commissioning TDS - Temporary Equipment & Facilities
[11] 123A90-PML-COM-PRO-03019	OTP – Onshore Performance & Integrated Test Procedure
[12] 123A90-PML-COM-LIS-03034	Inhibit-Override Register
[13] 123A90-PML-COM-LIS-03035	PSV Calibration Register
[14] 123A90-PML-COM-PRO-03036	OTP - Black Start Procedure

Document ID	Document Title
[15] 123A90-PML-COM-LIS-03024	Commissioning Spare Parts and Consumables List
[16] 123A90-PML-COM-PRO-03022	Initial offshore START-UP procedures
[17] 123A90-PML-COM-SP-03057	Worksite WEF (Work Execution Flow Scheme)
[18] 123A90-PML-COM-SP-03058	Site WEF (Work Execution Flow Scheme)
[19] 123A90-PML-COM-RE-03001	Commissioning Final Dossier (ITR-B)
[20] 123A90-PML-QHSE-PRO-00116	Flushing and Cleaning Procedures
[21] 123A90-PML-QHSE-SP-00118	Mechanical Completion Check Sheet Template Collection (ITR-A)
[22] 123A90-PML-QHSE-RE-00115	Mechanical Completion Final Dossier (ITR-A)
[23] 123A90-PML-QHSE-PRO-00117	Punch list Management Procedure
[24] 123A90-PML-COM-PRO-03041	OTP - Hydrogen Storage & Venting Systems
[25] 123A90-PML-COM-PRO-03042	OTP - Sea Water Intake & Fresh Water Treatment Syst.
[26] 123A90-PML-COM-PRO-03043	OTP - Instrument Air System
[27] 123A90-PML-COM-PRO-03055	OTP - Nitrogen Generation System
[28] 123A90-PML-COM-PRO-03045	OTP - HV Switchgear & 66 kV Transformer Systems
[29] 123A90-PML-COM-PRO-03046	OTP - 6.6 kV Switchgear & Transformer Systems
[30] 123A90-PML-COM-PRO-03047	OTP - LV Switch Boards & LV Distribution Board Syst.
[31] 123A90-PML-COM-PRO-03048	OTP - Lighting & Small Power Systems
[32] 123A90-PML-COM-PRO-03049	OTP - Electrical Heat Tracing Systems
[33] 123A90-PML-COM-PRO-03050	OTP - DC UPS System 10kVA UP-200F1
[34] 123A90-PML-COM-PRO-03051	OTP - Data Network Systems
[35] 123A90-PML-COM-PRO-03053	OTP - Navaid System
[36] 123A90-PML-COM-PRO-03054	OTP - F&G and ESD C&E Logics
[37] 123A90-PML-QHSE-PRO-00120	Proverlis Management Procedure
[38] 123A90-PML-COM-PRO-03056	OTP – Document Template
[39] 123A90-PML-COM-PRO-03059	OTP - AC UPS System 35kVA UP-200F3
[40] 123A90-PML-COM-PRO-03060	OTP - AC UPS System 15kVA UP-200F4
[41] 123A90-PML-COM-PRO-03007	Commissioning Strategy

Table 2: Reference Project Deliverables

4.2 Acronyms and Abbreviations

Acronyms / Abbreviations	Description
AIS	Automatic Identification System
AHU	Air Handling Unit
AOC	Achievement of Commissioning
C&E	Cause & Effects
CCS	Central Control System
CCTV	Closed Circuit Television
CMS	Completions Management System
CPI	Company Provided Item
CRS	Comments Response Sheet
CSU	Commissioning & Start-Up
E&I	Electrical & Instrumentation
EMCS	Electrical Monitoring & Control System
ESD	Emergency Shut Down
FAT	Factory Acceptance Test
FT	Functional Test
F&G	Fire & Gas
GALT	Gross Air Leak Test
HAZID	Hazard Identification Studies
HAZOP	Hazard and Operability Studies
HKN	Hollandse Kust Noord
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning
HSE	Health, Safety, & Environment
ICSS	Integrated Control and Safety System
ITR	Inspection & Test Record
LC	Locked Closed
LO	Locked Open
LoSH	Limits of System Handover
LOTO	Lock-Out / Tag-Out
LV	Low Voltage
MC	Mechanical Completion
MDR	Master Document Register
MOC	Management of Change
NUI	Normally Unmanned Installation

Acronyms / Abbreviations	Description
OEM	Original Equipment Manufacturer
OMAR	Operating Modes Assurance Review
OTP	Operational Test Procedure (Commissioning)
OR	Operations Readiness
ORR	Operations Readiness Review
PACO	Process Automation, Control and Optimisation
PCS	Process Control System
PID (P&ID)	Piping and Instrumentation Diagram
PSV	Pressure Safety Valve
PTW	Permit to Work
PVP	Piping and Vessels Preparation
PC&C	Pre-Commissioning & Commissioning
PSUA	Pre Start-Up Audit
PSSR	Pre Start-up Safety Review
RFC	Ready for Commissioning
RFO	Ready for Operation
RFSA	Ready For Sail Away
RFSU	Ready For Start-Up
SAT	Site Acceptance test
SECE	Safety Environmental Critical Element
SIF	Safety Instrumentation Function
SIL	Safety Integrity Level
SIMOPS	Simultaneous Operations & Maintenance
SIS	Safety Instrumented System
SLD	Single Line Diagram
SoF	Statement of Fitness
TA	Technical Authority
TQ	Technical Query
TIV	Technical Integrity verification
UPS	Uninterruptible Power Supply
VHF	Very High Frequency
VSAT	Very Small Aperture Terminal

Table 3: 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 entire duration of the Test:

- 1 E&I commissioning superintendent
- 1 E&I commissioning supervisor from Contractor
- 1 E&I commissioning technicians from Contractor
- 1 PCS/ESD Workstation Operators (phase 3)

5.1.2 Test duration estimate

The test duration should be as follows:

- 0.5 day approx.

If necessary, the estimated time can be extended in order to complete all required steps.

5.1.3 Vendor Assistance

Not applicable

5.1.4 Items Postponed to C&E OTP

Not applicable

5.1.5 HOLDS

Not applicable

5.2 OTP Test Requirements – Onshore WORKSITE

5.2.1 Pre-Commissioning Achievement

Prior the commissioning operation starts, the relevant pre-commissioning ITR's should be fully signed.

5.2.2 Commissioning Achievement

The commissioning achievement will be the successful operation, functionality and safeguarding test of all the equipment, installed and put in operation during the WORKSITE phase:

- 70-00: F&G Control System
- 72-00: NAVAID
- 77-10: HVAC HV/MV Switchgear Room B-100
- 77-20: HVAC LV Switchgear Room B-200
- 77-30: HVAC UPS Equipment Room B-300
- 77-40: HVAC I&T Equipment Room B-400
- 79-00: Emergency Shutdown System (SIS)
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-40: Power Transformer 1.6 MVA (TR-200DE1)
- 82-99: MV 6.6kV Temporary Yard Supply Integrated test

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- 83-00: 400/230V Switchboard SG-200N1
- 83-20: 400/230V Distribution Board DP-200N1
- 84-00: 110V DC 10kVA UPS System (UP-200F1)
- 84-10: 230V AC UPS - 35KVA (UP-200F3)
- 84-20: 230V AC UPS – 15KVA (UP-200F3)
- 86-00: Data Networks
- 87-00: Power Distribution System (EMCS)
- 87-10: PROCESS CONTROL SYSTEM (PCS)
- 87-20: PROCESS CONTROL SYSTEM (PCS) - Instrumentation

5.2.3 Special Tools & Test Equipment

The following special tool and Test Equipment are required (see vendor document 1723002197-EL-LIS-00053):

- Voltage, frequency, continuity tester (Multimeter)
- Phases sequence tester
- Portable radios
- Amperometric clamp

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

5.2.4 Consumable List

Not applicable

5.2.5 Temporary Facilities

Temporary YARD Power Supply 400V and Temporary YARD Power Station AGGREKO 6.6kV.

5.3 OTP Description – Onshore WORKSITE

5.3.1 OTP Test Preparation

Step	**Description**	**Result**	**Verified by**	**Date**
1	All systems Ready for Commissioning Certificate (RFC) are issued and approved.			
2	No Mechanical Completion or Pre-commissioning punch list 'A' items are outstanding against the systems to be commissioned.			
3	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).			
4	A final walkdown of the system has been completed, to ensure that the system and the area are ready for the Black Start.			

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Step	Description	Result	Verified by	Date
5	Check that areas are free for work and escape routes are clear of any obstructions.			
6	All safety barriers and warning signs have been installed.			
7	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			
8	Verify availability of test equipment and consumables as per section 3.2.4.			
9	System(s) isolations as per LOTO procedure defined within HSSE Permits to Work and Commissioning procedures duly prepared and approved. Particular attention will be given to LOTO isolation of ALL outgoing MCB feeders.			

5.3.2 Electrical Preparation

Step	Description	Result	Verified by	Date
10	Check that grounding and bonding are in accordance with applicable documents.			

5.3.3 Mechanical Preparation

Not applicable.

5.3.4 Instrument Preparation

Step	Description	Result	Verified by	Date
11	Verify that all relevant associated systems / subsystems are ready.			
12	Check Inhibit and Override register has been prepared and validated.			
13	Verify that relevant equipment/ components are available and in operation for start of Black Start activities.			

5.3.5 Piping Preparation

Not applicable

5.3.6 Additional Discipline Preparation

Not applicable.

5.3.7 Test Preparation

Need to Verify:

- All feeders are locked as LOTO procedure.
- All systems and subsystems involved in this procedure must be available and ready for Black Start.

5.4 BLACK START: BLPH Start-Up Procedure

Step	Description	Result	Verified by	Date
START-UP BLACK START				
	Energization from 400V YARD PIOMBONI: 400V Power Supply by "400V YARD PIOMBONI" circuit JB-200E2			
1	Verify and confirm on SG-200N1 that the INCOMING BREAKER QF1 of JB-200E2 is open and the drawer A2/+08 (Switchboard SG-200N1, column 2) is in extract position.			
2	Verify Voltage and phase rotation in YARD_BRK-01 (400V YARD PIOMBONI).			
3	Close the breaker YARD_BRK-01 for energise the drawer A2/+08 in SG-200N1			
4	Verify the voltage and the phase sequence L1, L2, L3, on the input power of the drawer A2/+08.			
5	Now the system LV SG-200N1 is ready to energize			

5.4.1 Energization of Low Voltage SWBD SG-200N1

Step	Description	Result	Verified by	Date
Energization of Low Voltage SWBD SG-200N1				
1	The selector QU1 Auxiliary Voltage Switch located on CUBICLE A2/+02 must be closed on POS.1			
2	Close protection FUSE QU3 located inside the cubicle A2/+02 for the auxiliary voltage from temporary generator.			
3	Measure presence of 230V on incoming protection QU3 located inside cubicle A2/+02			
4	Check MCB QA1 (auxiliary) of Drawer A2/+08 is closed (inside the drawer)			
5	Verify on the terminal strip X1 11-12 of the drawer A2/+08 permissive to close command to main breaker QF1 (the contact must be N.C.)			
6	VERIFICATION DRAWER IN TEST POSITION (test is already done in the OTP Ref. Document 123A90-PML-COM-PRO-03047)			
7	Place drawer (A2/+08) in test position and verified: - Green lamp L1 open circuit breaker should be on - Red lamp L2 circuit breaker closed must be off - Amber lamp L3 tripped circuit breaker must be off			
8	Close manually QF1: - Green lamp L1 open circuit breaker should be off - Red lamp L2 circuit breaker closed must be on - Amber lamp L3 tripped circuit breaker must be off			
9	Extract drawer A2/+08 and located test button on QF1, then press test button to simulate fault condition. After			

Step	Description	Result	Verified by	Date
	reinserting the drawer and put it in service position			
10	Close the main breaker QF1 on A2/+08			
11	Verification of interlock between Main Incomer QF1 (A1/+05) and "400V YARD PIOMBONI" JB-200E1 Incomer QF1 (A2/+08). Inhibit to close Main Incomer (A1/+05) - Confirm breaker QF1 (A2/+08) is closed - On drawer A1/+05 verify open circuit between terminals X2:3-4 (Breaker closing circuit) - Press push button SC1 closing command and confirm that main breaker QF1 (A1/+05) does NOT close			
12	The SWBD SG-200N1 is now available to energise the respective BOP platform loads			

5.4.2 Energization of Distribution Panel DP-200N1

Step	Description	Result	Verified by	Date
	Energization of Distribution Panel DP-200N1			
1	Close the circuit breaker QA1 for the aux power supply in the drawer A3/+03 (DP-200N1) on SG-200N1			
2	Put the drawer in service position and the selector SA1 in Local position			
3	All the functionality of this Drawer has been tested on the document: "OTP - LV Switch Boards & LV Distribution Board System"			
4	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to DP-200N1			
5	Verify the correct phase sequence L1, L2, L3, on the input power of the INCOMER on the terminal X1: 1-2-3 (DP-200N1)			
6	Close the general incoming circuit breaker Q1 of DP-200N1 manually			
7	The Cumulative Trip Signal has been tested on the document: "OTP - LV Switch Boards & LV Distribution Board System"			
8	The Distribution Board DP-200N1 is now available to energise the respective platform BOP loads.			
9	To energise all the external lights, now, switch on: - QT1: TWILIGHT SWITCH AND AUXILIARY - Q2: NORMAL LIGHTING UPPER DECK - Q3: NORMAL LIGHTING LOWER DECK - Q4: NORMAL LIGHTING STARS - Q8: EMERGENCY LIGHTING UPPER DECK - Q9: EMERGENCY LIGHTING LOWER DECK			

Step	Description	Result	Verified by	Date
	- Q10: EMERGENCY LIGHTING STAIRS			
10	Verify all the lights are switched on.			

5.4.3 Energization UP-200F3

Step	Description	Result	Verified by	Date
Energization of UPS UP-200F3				
1	In UP-200F3A and UP-200F3B set load interrupter switch Q1 to the "OFF" position			
2	Set the manual bypass switch Q29 to position "2 - Service operation"			
3	On the Battery Banks Cut-off breakers put the selector switch S2 in OVERRIDE position			
4	In SG-200N1, close the breakers QA1 for the aux power supply in the drawers A3/+01 (AC UPS PAS - 30 MIN UP-200F3 - LINE A), A4/+01 (AC UPS PAS - 30 MIN UP-200F3 - LINE B) and A7/+02 (AC UPS PAS - 30 MIN UP-200F3 - BY PASS)			
5	Push the drawers in service position			
6	Manually close the circuit breakers QF1 for each drawer and consequently energize the power supplies to UP-200F3			
7	In DP-200N1 closing the breaker Q41 for energize the auxiliary circuit			
8	In UP-200F3A check status: The bypass is starting up; the green and yellow LEDs are flashing. LCD: "Main menu" is displayed			
9	Wait for status: The bypass is ready; the green light is flashing. LCD: "By pass symbol OK" is displayed			
10	Set the manual bypass switch Q29 to position "1 - Inverter operation". The green and yellow LEDs flash.			
11	Set the load interrupter switch Q1 to the "ON" position			
12	Wait for status: The REC is ready; the green LED is flashing. LCD: "INV symbol OK" is displayed			
13	Check the battery bank voltage and polarity: _____ V (BANK A) _____ V (BANK B)			
14	Close the battery cut off breaker Q0			

Step	Description	Result	Verified by	Date
15	Press the "~I" key on the HMI. LCD: "INV symbol" flashes			
16	Wait for status: Bypass switches to normal operation, green LED lights up. LCD: "Energy flow display via INV" is displayed			
17	Verify the battery bank is in charge by display			
18	The first UPS unit is now in operation, repeat the above STEPS to start the second UPS unit from point 7			
19	The essential circuit breakers to switch on are the following: - QF37: SERVER CABINET ITER - LINE A - QF38: SERVER CABINET ITER - LINE B - QF43: SIS - CONTROLLER AND I/O CABINET - LINE A - QF44: SIS - CONTROLLER AND I/O CABINET - LINE B - QF45: PCS – CONTR. AND I/O CABINET - LINE A - QF46: PCS – CONTR. AND I/O CABINET - LINE B - QF47: EMCS – CONTR. AND I/O CABINET - LINE A - QF48: EMCS – CONTR. AND I/O CABINET - LINE B - QF49: LV SWITCHBOARD AUXILIARY - QF50: LV SWITCHBOARD 800/460V AUXILIARY			

5.4.4 Energization UP-200F4

Step	Description	Result	Verified by	Date
Energization of UPS UP-200F4				
1	In UP-200F4A and UP-200F4B set load interrupter switch Q1 to the "OFF" position			
2	Set the manual bypass switch Q29 to position "2 - Service operation"			
3	On the Cut-offs put the selector S2 in OVERRIDE position			
4	In SG-200N1, close the circuit breakers QA1 for the aux power supply in the drawers A6/+05 (AC UPS F&G - 8H UP-200F4 - LINE A), A6/+06 (AC UPS F&G - 8H UP-200F4 - LINE B) and A2/+04 (AC UPS F&G - 8H UP-200F4 - BY PASS)			
5	Push the drawers in service position			
6	Manually close the circuit breakers QF1 for each drawer and consequently energize the power supply to UP-200F4			
7	In DP-200N1 closing the breaker Q42 for energize the auxiliary circuit			
8	In UP-200F4A check status: The bypass is starting up; the green and yellow LEDs are flashing. LCD: "Main menu" is displayed			

Step	Description	Result	Verified by	Date
9	Wait for status: The bypass is ready; the green light is flashing. LCD: "By pass symbol OK" is displayed			
10	Set the manual bypass switch Q29 to position "1 - Inverter operation". The green and yellow LEDs flash.			
11	Set the load interrupter switch Q1 to the "ON" position			
12	Wait for status: The REC is ready; the green LED is flashing. LCD: "INV symbol OK" is displayed			
13	Check the battery bank voltage and polarity: _____ V (BANK A) _____ V (BANK B)			
14	Close the battery cut off breaker Q0			
15	Press the "~I" key on the HMI. LCD: "INV symbol" flashes			
16	Wait for status: Bypass switches to normal operation, green LED lights up. LCD: "Energy flow display via INV" is displayed			
17	Verify the battery bank is in charge by display			
18	The first UPS unit is now in operation, repeat the above STEPS to start the second UPS unit from point 7			
19	The essential circuit breaker to switch on are: - QF31: FGS PANEL LINE A - QF32: FGS PANEL LINE B - QF36: NETWORK CABINET LINE A - QF37: NETWORK CABINET LINE B			

5.4.4.1Energization UP-200F1A

Step	Description	Result	Verified by	Date
Energization of UPS UP-200F1A				
1	Set the load interrupter switch Q1 to the "OFF" position			
2	In SG-200N1 closing the breaker QA1 for the aux power supply in the drawer A7/+03 (DC BATTERY SYSTEM SWTG CONTROL - FEEDER A)			

Step	Description	Result	Verified by	Date
3	Push the drawer in service position			
4	Manually close the circuit breaker QF1 for the drawer and consequently energize the power supply to UP-200F1A			
5	In DP-200N1 closing the breaker Q43 for energize the auxiliary circuit			
6	Set the load interrupter switch Q1 to the "ON" position			
7	Check the functionality of rectifier on the controller display A300			
8	Set the output interrupter switch Q2 to "ON" position			
9	Check the battery bank voltage and polarity: _____V (between 120 and 121Vdc)			
10	On the Cut-off put the selector S2 in OVERRIDE position			
11	Set the battery interrupter switch Q3 to "ON" position			
12	Set the external battery cut off interrupter switch Q0 to "ON" position			
13	Verify the battery bank is in charge by display			
14	The first UPS 'A' unit is now in operation			

5.4.5 Energization UP-200F1B

Step	Description	Result	Verified by	Date
	Energization UP-200F1B			
1	Set the load interrupter switch Q1 to the "OFF" position			
2	In SG-200N1 closing the breaker QA1 for the aux power supply in the drawer A7/+04 (DC BATTERY SYSTEM SWTG CONTROL - FEEDER B)			
3	Push the drawer in service position			
4	Manually close the circuit breaker QF1 for the drawer and consequently energize the power supply to UP-200F1B			
5	Set the load interrupter switch Q1 to the "ON" position			

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Step	Description	Result	Verified by	Date
6	Check the functionality of rectifier on the controller display A300			
7	Set the output interrupter switch Q2 to "ON" position			
8	Verify the battery bank is in charge by display			
9	The second UPS unit is now in operation			
10	The essential circuit breaker to switch on are: - Q12 (110Vdc Supply A) - Q13 (110Vdc Supply B)			

5.4.5.1Energization NAVAIDS - NC-200F2

Step	Description	Result	Verified by	Date
Energization NAVAIDS - NC-200F2				
1	Verify that all the terminals with fuses have the fuse installed and inserted (locked)			
2	In SG-200N1, closing the breaker QA1 for the aux power supply in the drawer A7/+05 (NAVAID SYSTEM FEEDER A)			
3	Manually close the circuit breaker QF1 for energize the NC-200F2 LINE A NORMAL POWER SUPPLY			
4	In SG-200N1, closing the breaker QA1 for the aux power supply in the drawer A7/+06 (NAVAID SYSTEM FEEDER B)			
5	Manually close the circuit breaker QF1 for energize the NC-200F2 LINE B ESSENTIAL POWER SUPPLY			
6	In NC-200F2 close the circuit breaker Q2 for NORMAL POWER SUPPLY (LINE A)			
7	In NC-200F2 close the circuit breaker Q3 for ESSENTIAL POWER SUPPLY (LINE B)			
8	In NC-200F2 close the circuit breaker Q4 for powered-on the battery charger BC-200F2A			
9	In NC-200F2 close the circuit breaker Q5 for powered-on the battery charger BC-200F2B			
10	In CB-200F2 close the circuit breaker Q1 for connect the BATTERY BANK BA-200F2 to the NAVAIDS CENTRAL CONTROL PANEL (NC-200F2)			
11	In NC-200F2 close the circuit breaker Q1 for connect the 24Vdc battery bus bar			
12	In NC-200F2 close the circuit breaker Q6 for energize the MEDIUM INTENSITY AOL 1/2 (EOL-200-01/02)			
13	In NC-200F2 close the circuit breaker Q7 for energize the MEDIUM INTENSITY AOL 3/4 (EOL-200-03/04)			

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Step	Description	Result	Verified by	Date
14	In NC-200F2 close the circuit breaker Q8 for energize the MARINE YELLOW LIGHT 1 (EML-200-01)			
15	In NC-200F2 close the circuit breaker Q9 for energize the MARINE YELLOW LIGHT 2 (EML-200-02)			
16	In NC-200F2 close the circuit breaker Q10 for energize the BOAT LANDING STATUS LIGHT (ESL-200-01)			
17	In NC-200F2 close the circuit breaker Q11 for energize the VISIBILITY METER (EVM-200-01), the Control System, the astro time KA1 and the earth insulation relay KE1			
18	The local display panel installed on cover of the enclosure B of the NCCP have its own On/Off switch. The user has to verify that the mentioned switch (accessible from the internal side of the enclosure) is switched on			
19	The Inverter INV1/INV2 installed inside the NCCP have their own ON/OFF/ECO switch. The user has to verify that the mentioned switch is in ON position (I)			
20	Put the selector S1, located on the cover of the enclosure B of the NCCP, in AUTO position. In this position the Marine lights are switched on/off accordingly to the photocell detection, the visibility meter detection and the astronomical time switch detection. The Obstruction lights are always activated regardless of the above.			
21	Now the System of Navaids is in AUTO operation, confirm that we haven't alarms in the HMI			

5.4.5.2 Energization ICSS (F&G, SIS, PCS, DATA NETWORKS & EMCS)

Step	Description	Result	Verified by	Date
Energization ICSS (F&G, SIS, PCS, DATA NETWORKS & EMCS)				
1	In UPS UP-200F4 switch on: - QF31: FGS PANEL LINE A - QF32: FGS PANEL LINE B - QF36: NETWORK CABINET LINE A - QF37: NETWORK CABINET LINE B			
2	In UPS UP-200F3 switch on: - QF37: SERVER CABINET ITER - LINE A - QF38: SERVER CABINET ITER - LINE B - QF43: SIS - CONTROLLER AND I/O CABINET - LINE A - QF44: SIS - CONTROLLER AND I/O CABINET - LINE B - QF45: PCS – CONTR. AND I/O CABINET - LINE A - QF46: PCS – CONTR. AND I/O CABINET - LINE B - QF47: EMCS – CONTR. AND I/O CABINET - LINE A - QF48: EMCS – CONTR. AND I/O CABINET - LINE B - QF49: LV SWITCHBOARD AUXILIARY - QF50: LV SWITCHBOARD 800/460V AUXILIARY			
3	Verify in the respective system cabinets if the incoming supply voltage is present			

Step	Description	Result	Verified by	Date
4	In NETWORK & SERVER ITER B400-NET-001 B400-SRV-001 switch on the following MCBs: - QF5 - QF6: NETWORK CABINET - LINE A - QF8 - QF9: NETWORK CABINET - LINE B - QF50: UTILITY - QF51: SOCKET - QF52: LIGHT - QF54: FAN - QF61: 24V LINE A DISTRIBUTION - QF62: 24V LINE B DISTRIBUTION			
5	In FGS B400-FGS-001 switch on: - QF6: G1 - LINE A - QF7: PW RACK1 - LINE A - QF8: PW RACK2 - LINE A - QF9: PW RACK3 - LINE A - QF10: PW RACK4 - LINE A - QF11: PW RACK5 - LINE A - QF12: PW RACK6 - LINE A - QF24: FAN PROSAFE - LINE A - QF14: G2 - LINE B - QF15: PW RACK1 - LINE B - QF16: PW RACK2 - LINE B - QF17: PW RACK3 - LINE B - QF18: PW RACK4 - LINE B - QF19: PW RACK5 - LINE B - QF20: PW RACK6 - LINE B - QF25: FAN PROSAFE - LINE B - QF1: UTILITY - QF2: SOCKET - QF3: LIGHT - QF5: FAN - QF22: 24V LINE A DISTRIBUTION - QF23: 24V LINE B DISTRIBUTION			
6	In SIS B400-SIS-001 switch on: - QF55: G1 - LINE A - QF56: PW RACK1 - LINE A - QF57: PW RACK2 - LINE A - QF58: PW RACK3 - LINE A - QF67: FAN PROSAFE - LINE A - QF60: G2 - LINE B - QF61: PW RACK1 - LINE B - QF62: PW RACK2 - LINE B - QF63: PW RACK3 - LINE B - QF68: FAN PROSAFE - LINE B - QF50: UTILITY			

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Step	Description	Result	Verified by	Date
	- QF51: SOCKET - QF52: LIGHT - QF54: FAN - QF65: 24V LINE A DISTRIBUTION - QF66: 24V LINE B DISTRIBUTION			
7	In PCS B400-PCS-001 switch on: - QF6: G1 - LINE A - QF1: PW RACK1 - LINE A - QF2: PW RACK2 - LINE A - QF3: PW RACK3 - LINE A - QF4: PW RACK4 - LINE A - QF20: G3 - LINE A - QF12: G2 - LINE B - QF13: PW RACK1 - LINE B - QF14: PW RACK2 - LINE B - QF15: PW RACK3 - LINE B - QF16: PW RACK4 - LINE B - QF21: G4 - LINE B - QF1 UTILITY - QF2: SOCKET - QF3: LIGHT - QF5: FAN - QF18: 24V LINE A DISTRIBUTION - QF19: 24V LINE B DISTRIBUTION			
8	In EMCS B400-EMCS-001 switch on: - QF6: G1 - LINE A - QF8: G2 - LINE B - QF1: UTILITY - QF2: SOCKET - QF3: LIGHT - QF5: FAN - QF10: 24V DISTRIBUTION			

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5.4.5.3 Energization HVAC B100-HSB-001

Step	Description	Result	Verified by	Date
Energization HVAC B100-HSB-001				
1	In SG-200N1, close the breakers QA1 for the aux power supply in the drawers A5/+03(HVAC PANEL UPS ROOM)			
2	Put the drawer in service position and the selector SA1 in Local position			
3	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to B300-HSB-001			
4	In UP-200F3 closing the breaker QF41 for energize the auxiliary circuit			
5	The HVAC Board B300-HSB-001 is now available to energise the respective platform consumers.			
6	Inside the panel B300-HSB-001, the user must switch on these circuit breakers: - QF400: measure MVA-1 with multimeter - QF1: MODULE LIGHT AND EMERGENCY LIGHT - QF3: INTERNAL AUX 230V - QF2: MODULE INTERNAL SOCKET - QF6: HEATING CABLE HHC-77-002 - QM1: ELECTRICAL HEATER HSS-77-007/8/9 - QM1A: PRESSURING FAN 1 - HFM-77-301 - QM2A: SUPPLY FAN HFM-77-302 - QM3A: COMPRESSOR 1A HCO-77-301 - QM4A: ELECTRICAL HEATER HSS-77-301 - QF1A: INTERNAL AUX 230V - QM5A: CONDENSER FAN 1/2 HFM-77-305/6 - QM1B: PRESSURING FAN HFM-77-303 - QM2B: SUPPLY FAN HFM-77-304 - QM3B: COMPRESSOR 1A HCO-77-302 - QM4B: ELECTRICAL HEATER HHS-77-305 - QF1B: INTERNAL AUX 230V - QM5B: CONDENSER FAN 1/2 HFM-77-307/8 - QF4: POWER ON FOR AC/DC CONVERTER 230V/24Vdc - QF5: INTERNAL AUX 24Vdc			
7	Close the panel and Switch on the QS1 to energize all the system, then close: - QFA: HHU-77005 UNIT - QFB: HHU-77006 UNIT			
8	Push the button, CELS-B300H-F1-L1-01 or CELS-B300H-F1-L1-01, near the door for switch on the light			

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5.4.5.4Energization HVAC B200-HSB-001

Step	Description	Result	Verified by	Date
Energization HVAC B200-HSB-001				
1	In SG-200N1, close the breakers QA1 for the aux power supply in the drawers A5/+02 (HVAC PANEL - LV ROOM)			
2	Put the drawer in service position and the selector SA1 in Local position			
3	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to B200-HSB-001			
4	In UP-200F3 closing the breaker QF40 for energize the auxiliary circuit			
5	The HVAC Board B200-HSB-001 is now available to energise the respective platform consumers.			
6	Inside the panel B200-HSB-001, the user must switch on these circuit breakers: - QF400: measure MVA-1 with multimeter - QF1: MODULE LIGHT AND EMERGENCY LIGHT - QF3: INTERNAL AUX 230V - QF2: MODULE INTERNAL SOCKET - QF4: HEATING CABLE HHC-77-002 - QM1: ELECTRICAL HEATER HSS-77-004/5/6 - QM1A: PRESSURING FAN 1 - HFM-77-201 - QM2A: ELECTRICAL HEATER HSS-77-201 - QF1A: INTERNAL AUX 230V - QM1B: PRESSURING FAN 2 - HFM-77-202 - QM2B: ELECTRICAL HEATER - HHS-77-202 - QF1B: INTERNAL AUX 230V - QF5: POWER ON FOR AC/DC CONVERTER 230V/24Vdc - QF6: INTERNAL AUX 24Vdc			
7	Close the panel and Switch on the QS1 for energize all the system. After close: - QSA: HHU-77003 UNIT - QSB: HHU-77004 UNIT			
8	Push the button, CELS-B200H-F1-L1-02 or CELS-B200H-F1-L1-01, near the door for switch on the light			

5.4.5.5Energization HVAC B300-HSB-001

Step	Description	Result	Verified by	Date
Energization HVAC B300-HSB-001				
1	In SG-200N1, closing the breakers QA1 for the aux power supply in the drawers A5/+03 (HVAC PANEL UPS ROOM)			

2	Put the drawer in service position and the selector SA1 in Local position			
3	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to B300-HSB-001			
4	In UP-200F3 closing the breaker QF41 for energize the auxiliary circuit			
5	The HVAC Board B300-HSB-001 is now available to energise the respective platform consumers.			
6	Inside the panel B300-HSB-001, the user must switch on these circuit breakers: - QF400: measure MVA-1 with multimeter - QF1: MODULE LIGHT AND EMERGENCY LIGHT - QF3: INTERNAL AUX 230V - QF2: MODULE INTERNAL SOCKET - QF6: HEATING CABLE HHC-77-002 - QM1: ELECTRICAL HEATER HSS-77-007/8/9 - QM1A: PRESSURING FAN 1 - HFM-77-301 - QM2A: SUPPLY FAN HFM-77-302 - QM3A: COMPRESSOR 1A HCO-77-301 - QM4A: ELECTRICAL HEATER HSS-77-301 - QF1A: INTERNAL AUX 230V - QM5A: CONDENSER FAN 1/2 HFM-77-305/6 - QM1B: PRESSURING FAN HFM-77-303 - QM2B: SUPPLY FAN HFM-77-304 - QM3B: COMPRESSOR 1A HCO-77-302 - QM4B: ELECTRICAL HEATER HHS-77-305 - QF1B: INTERNAL AUX 230V - QM5B: CONDENSER FAN 1/2 HFM-77-307/8 - QF4: POWER ON FOR AC/DC CONVERTER 230V/24Vdc - QF5: INTERNAL AUX 24Vdc			
7	Close the panel and Switch on the QS1 for energize all the system. After close: - QFA: HHU-77005 UNIT - QFB: HHU-77006 UNIT			
8	Push the button, CELS-B300H-F1-L1-01 or CELS-B300H-F1-L1-01, near the door for switch on the light			

5.4.5.6Energization HVAC B400-HSB-001

Step	Description	Result	Verified by	Date
Energization HVAC B400-HSB-001				
1	In SG-200N1, close the breakers QA1 for the aux power supply in the drawers A5/+04 (HVAC PANEL ITER ROOM)			
2	Put the drawer in service position and the selector SA1 in Local position			

3	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to B400-HSB-001			
4	In UP-200F3 closing the breaker QF42 for energize the auxiliary circuit			
5	The HVAC Board B400-HSB-001 is now available to energise the respective platform consumers.			
6	Inside the panel B400-HSB-001, the user must switch on these circuit breakers: - QF400: measure MVA-1with multimeter - QF1: MODULE LIGHT AND EMERGENCY LIGHT - QF3: INTERNAL AUX 230V - QF2: MODULE INTERNAL SOCKET - QF6: HEATING CABLE HHC-77-004 - QM1: ELECTRICAL HEATER HSS-77-010/11/12 - QM1A: PRESSURING FAN - HFM-77-401 - QM2A: SUPPLY FAN HFM-77-402 - QM3A: COMPRESSOR 1A HCO-77-401 - QM4A: ELECTRICAL HEATER HSS-77-401 - QF1A: INTERNAL AUX 230V - QM5A: CONDENSER FAN 1/2 HFM-77-405/6 - QM1B: PRESSURING FAN HFM-77-403 - QM2B: SUPPLY FAN HFM-77-404 - QM3B: COMPRESSOR 1A HCO-77-402 - QM4B: ELECTRICAL HEATER HHS-77-405 - QF1B: INTERNAL AUX 230V - QM5B: CONDENSER FAN 1/2 HFM-77-407/8 - QF4: POWER ON FOR AC/DC CONVERTER 230V/24Vdc - QF5: INTERNAL AUX 24Vdc			
7	Close the panel and Switch on the QS1 for energize all the system. After close: - QFA: HHU-77007 UNIT - QFB: HHU-77008 UNIT			
8	Push the button, CELS-B400H-F1-L1-01 or CELS-B400H-F1-L1-01, near the door for switch on the light			

5.4.5.7 Energization Temporary Yard Power Generation Facility (AGGREKO 6.6kV)

Step	Description	Result	Verified by	Date
Energization AGGREKO 6.6kV				
1	Verify that circuit breakers in cabin 15kV from YARD, cabin TX1(3046)/TX2/TX3/DG are available			
2	Verify that the drawer in column A6 in SG-100D1 (MV Switchgear) is open and in extract position with the earth inserted			
3	Close the circuit breaker in the cabinet 15kV from YARD			

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Step	Description	Result	Verified by	Date
4	Verify the voltage presence in TX1(3046) on the warning lights or in the Schneider display on top of the transformer			
5	Open and lock the earth, charge the springs and close the circuit breaker A on the bottom of transformer for do the STEP DOWN (15kV-400V)			
6	Verify in TX2 the voltage presence on the Aggreko HMI.			
7	Open, lock the earths (Q5A and Q8) and charge the springs with the circuit breaker Q6. Push the green button near Q6 and after close the line switch Q7 for do the STEP UP (400V-6.6kV)			
8	Verify the voltage presence in TX3 on the warning lights in column H1			
9	Open, lock the earth and close, with the leverage "89L", the column H1			
10	Verify the voltage presence in TX3 on the warning lights in column H4			
11	Close, with the leverage "89L" the column H4			
12	Verify the voltage presence in DG on the warning lights (top of disconnector)			
13	Now AGGREKO is available to send 6.6kV on the SG-100D1			

5.4.5.8Energization Auxiliary Supply SG-100D1(6.6kV)

Step	Description	Result	Verified by	Date
Energization Auxiliary Supply SG-100D1(6.6kV)				
1	In UP-200F1 switch on Q12 (110Vdc Supply A) and Q13 (110Vdc Supply B)			
2	Verify and confirm the power by UPS supplies A&B 110V on column A5: - Supply A XM 1-2 - Supply B XM 3-4			
3	Close MCB QD01 and QD02 (110Vdc distribution)			
4	Verify and confirm the power supply 110V on Column A4: - Supply XC 1-3			
5	Close MCB QD1 (protection device) and QD2 (command circuits). Now the HMI panel is online			
6	Verify and confirm the power supply 110V on Column A6: - Supply XC 1-3			

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Step	Description	Result	Verified by	Date
7	Close MCB QD1 (protection device), QD2 (command circuits) and QD3 (spring charging motor). Now the HMI panel is online			
8	In column A5 switch on QD1 and QD2 for energize DC/DC converter GS1 and the commands			
9	Verify and confirm the power supply 24V on column A5: - measure 24Vdc on QD4 - close MCB QD4 (main breaker for 24Vdc) - close MCB QD5 (exetherm device) - close MCB QD6 (partial discharged monitoring) - close MCB QD21 (ethernet switch A) - close MCB QD22 (ethernet switch B + C)			
10	Verify the led on ethernet switches and on the exetherm are ON			
11	In column A4 switch on QD4 for energize the exetherm (24Vdc)			
12	In column A6 switch on QD4 for energize the terminal monitor (24Vdc)			
13	Close QV1, QV3, QV4, QV5 (Voltmetric measure for protection relay FP1) in column A5			

5.4.5.9Energization A5, A6 UNIT and main busbar

Step	Description	Result	Verified by	Date
Energization A5, A6 UNIT and main busbar				
1	Verify and confirm that Unit A6 is in safety status with following checks: - BGE Earthing Switch is locked in closed position. KEY-4 G3228/279 is locked on KD1 device. KEY-3 G3355 is locked on BGE Earthing Switch closed - QM Main Breaker is locked in extract position and opened. KEY-2 14466 is locked on 66kV upstream safety isolation device.			
2	Verify and confirm that Unit A5 is in safety status with following checks: - BGE Earthing Switch is locked in closed position. KEY-3 G3098/277 is locked on KD1 device - KEY-4 G3150 is unlocked and available to use in the LoTo Procedure			
3	The keys 278, 279, 280, 281, 282, 283 are interlocked on KD1. On Unit A5: - Take KEY-4 G3150 insert it on BGE and open Earthing Switch - KEY-3 G3098/277 is now available, withdraw it and insert in keys Interlock device KD1			

4	To unlock Incomer Unit A6 BGE Earthing Switch: - QM main Breaker is locked in extract position - KEY-1 G3260 is locked on LoTo procedure to keep breaker isolated in compliance with project PTW Procedure - KEY-2 14466 is locked on 66kV upstream safety isolation device - KEY-3 G3355 is used and locked on PTW procedure. Once it is available insert it on BGE Earthing Switch to allow opening switch procedure - KEY-4 G3228 has been released from KD1. Insert KEY-4 G3228 on BGE and open it - Led-7 "EARTHING SWITCH ENABLE" on protection relay REX640 will turn to green - Remove the safety isolation device, extract KEY-2 14466 and place it on rack in/out system to unlock the QM main breaker - Led-8 "RACK IN/OUT ENABLE" on protection relay REX640 will turn to green - Rack in QM Main Breaker in SERVICE position			
5	The test of the UNIT A6 in TEST POSITION and the hardwired I/O signals has been done during the OTP (Ref. Document: 123A90-PML-COM-PRO-03046)			
6	Confirm availability of the 6,6kV Main Temporary Yard Power Supply (AGGREKO) and prepare to energize.			
7	To allow closing QM breaker: - Keep open contact disconnecting cables on following terminal: - XM 11-12 (Trip Lockout relay from 66kV) - XM 43-44 (CB open command from 66kV) - XM 81-82 (CB 66kV opened to electrolyser) - XM 83-84 (CB 66kV open to BESS) - Ensure close contact connecting a jumper between terminals: - XM 25-26 (Permissive 66kV)			
8	Now the user can take the Key 'A' (interlocked with the key of the earth UNIT A6) and go in local DG of AGGREKO for switch on the 6,6 kV			
9	Open and lock the earth switch, insert the key A in the bottom of the disconnector. Charge the springs and close the circuit breaker A on the bottom of disconnector for send voltage in the SG-100D1 column A6			
10	Verify the voltage presence in the Switchgear SG-100D1 on the warning lights C1 in column A6			
11	Place the selector SA1, in UNIT A6, in local position			
12	All permissive interlock signals are authorizing the Circuit Breaker closing			
13	Close QM Breaker by pressing push button S1C			
14	See on FP1 Protection Relay Display if Breaker Closed is confirmed on REX640 HMI			

15	On Unit A5 the busbar voltage presence lamps C1 are ON			
16	The busbar is now energized			

5.4.5.10 Energization A5, A6 UNIT and main busbar

Step	Description	Result	Verified by	Date
Energization column A4 feeder for TR-200E1				
1	Verify and confirm that Unit A4 is in safety status with following checks: - BGE Earthing Switch is locked in closed position. KEY-4 G3135/280 is on KD1 device. KEY-3 G3398, that is mechanically coupled (ringed) with KEY-2 150901 of SG-200N1 main Incomer, it is locked on BGE Earthing Switch closed - K1 Contactor is locked in extract position and opened. KEY-2 19465 is locked as per LoTo Procedure			
2	Ensure voltage reference on REX640 Protection relay: - Close MCB QV4 - Close MCB QV5 The protection relay is now available and ready to operate			
3	The KEY-4 3135/280 is in KD1 device and it is withdrawable On UNIT A4: - Take KEY-4 G3135/280 insert it on BGE and open Earthing Switch - KEY-3 G3398/277 is now unlocked and withdrawable to use it on SG-200N1 SWBD Incomer			
4	To unlock Incomer Breaker of Unit A4: - K1 main contactor is locked in extract position - KEY-2 19465 is locked on LoTo procedure to keep breaker isolated in compliance with project PTW Procedure - KEY-3 G3398/277 is unlocked with BGE opened. - Led-7 "EARTHING SWITCH ENABLE" on protection relay REX640 HMI will turn to green - the internal Interlock is unlocking Rack in/out Contactor system. The KEY-2 19465 has been freed from PTW procedure, insert it on Rack in/out system and bring contactor in SERVICE position - Led-8 "RACK IN/OUT ENABLE" on protection relay REX640 will turn to green			
5	The test of the UNIT A4 in TEST POSITION and the hardwired I/O signals has been done during the OTP (Ref. Document: 123A90-PML-COM-PRO-03046)			
6	All permissive interlock signals are authorizing the Circuit Breaker closing			
7	Rack in K1 Contactor in SERVICE position and confirm that it is available on FP1 Protection relay REX640			
8	Confirm the conditions to close the K1 contactor following:			

Step	Description	Result	Verified by	Date
	- On Unit A5 the voltage presence lamps C1 are ON - Led-2 "BREAKER READY (TCS)" on Unit A4 protection relay REX640 is green			
9	Place the selector SA1 in Local position			
10	All permissive interlock signals are authorizing the contactor closing command			
11	Close K1 Contactor by pressing push button S1C			
12	See on FP1 Protection Relay Display if Contactor Closed is confirmed on REX640 HMI			
13	On Unit A4 the downstream voltage presence lamps C1 are ON			
IMPORTANT NOTE: Before making the switch from YARD to MV verify that the batteries of UPS F1/F2/F3/F4 are fully charged				

5.4.5.11 Switch from Temporary YARD 400V power supply to 6,6kV YARd power supply

Step	Description	Result	Verified by	Date
Switch from Temporary YARD 400V to 6,6kV power supply				
1	Verify the correct phase sequence L1, L2, L3 of the INCOMER power supply cables. Column A1/+02 SG-200N1			
2	Open and rack out the circuit breaker A2/+08 (circuit breaker for INCOMING TEMPORARY YARD POWER SUPPLY)			
N.B.: THE OPENING OF CIRCUIT BREAKER A2/+08 WILL CREATE A BLACK OUT AND THE LIGHTING WILL AUTOMATICALLY SWITCH OFF				
3	The selector QU1 Auxiliary Voltage Switch located on cubicle A2/+02 must be closed on POS.2			
4	Close protection fuse QU2, located inside the cubicle A2/+02, for the auxiliary voltage from main bus bar in upstream.			
5	Check and confirm that auxiliary circuit is available: - QU2 is closed and verify the voltage on selector QU1 terminals 5-1 - Place the selector QU1 in position 2 and circuit will be supplied (see the K30A should be on)			
6	Verify and confirm the voltage references are available Column A2/+02: - Close protection QV1 - Close protection QV2 - Verify voltage presence on terminals XV:1-2-3			
7	Verify the voltage reading on REF615 display			

Step	Description	Result	Verified by	Date
8	Close auxiliary breakers 230V located inside the cubicle A2/+02: - QA1 Motor spring charger incoming CB - QA2 protection device incoming CB - QA3 command circuit incoming CB - QA4 converter 230/24 Vdc - QA5 command circuits (feeders) - QA6 internal space heaters/lighting Now, the protections are working, the auxiliary circuits are powered, and the permissive signals are closed			

5.4.5.12 Electrical Interlock between 6.6 KV SWBD SG-100D1 (Column A4) and LV SWBD SG-200N1

Step	Description	Result	Verified by	Date
Electrical Interlock between 6.6 KV SWBD SG-100D1 (Column A4) and LV SWBD SG-200N1 Incomer				
1	Interlock On SG-200N1 main incomer Earthing switch BGE Column A4 is open, its KEY-3 G3398 is free and its KEY-4 G3135 is blocked on earthing switch: - Key G3398 is ringed with main incomer QF1 (A1/+05) Rack-In/Out system Key 151733 (2) of SG-200N1 SWBD - Insert the key 151733 on Rack- In/Out system of Main Incomer QF1 place the breaker in test or service position and the key 151733 will be blocked on Rack-In/Out system Interlock On SG-100D1 main incomer SG-200N1 Incomer is extract position the Key 151733 is free. Insert KEY-3 G3398 on the earth switch of column A4 (BGE), if possible close it and the G3398 key will remain blocked on the BGE until the BGE is opened and the key is free again.			
2	Rack in the Main incoming breaker QF1 (SG-200N1) in SERVICE position on column A1/+05			
3	The test of the incomer QF1 in TEST POSITION and the hardwired I/O signals has been done during the OTP (Ref. Document: 123A90-PML-COM-PRO-03047)			
4	In column A2/+02: - Place the selector SA1 in local position - Verify and confirm the SA2 Selector is in normal position - Push SC1 to close main breaker - Led-3 on the REF615 must be ON - On the REF615 display the circuit breaker symbol will change to closed - Rotate selector switch SA1 to remote position			
5	Now the user can put all in remote and remove all the remaining override (if necessary) by YOKOGAWA			

5.4.6 OTP SITE Tests Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature

5.4.7 OTP SITE - Tests Final Signatures and Company Acceptance

Name and Surname	Company Representative	Position	Signature

5.5 Post-test Conditions

All the electrical contacts which were disconnected for the testing purposes must be reconnected.
After functional tests have been completed, system / sub-systems are left in healthy and safety condition and that they are operational.

5.6 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.

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6 OTP AT OFFSHORE WORKSITE

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

6.1 Planning and Manpower

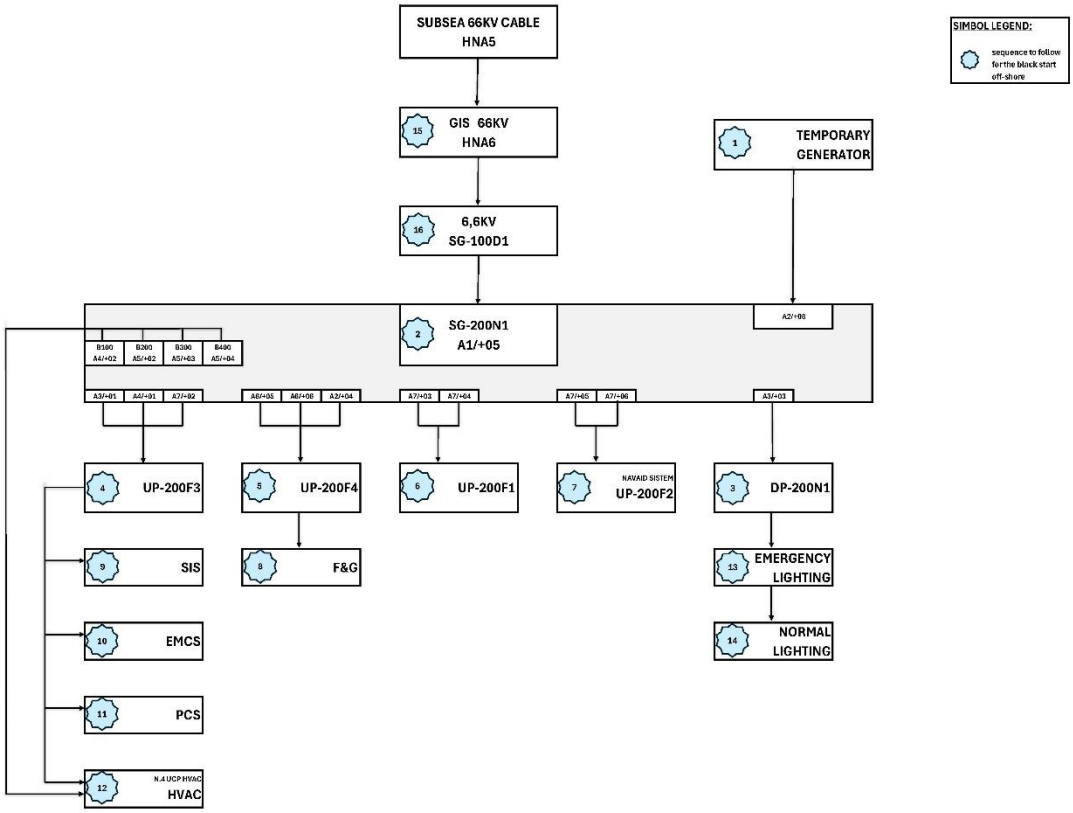


Figure 6 – Black Start SITE Single Line Block Diagram and Sequence

6.1.1 Offshore site test overview

It is expected that all precommissioning 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.

Estimated manpower for the entire duration of the Test:

- 1 E&I commissioning superintendent
- 1 E&I commissioning supervisor from Contractor
- 2 E&I commissioning technicians from Contractor
- 1 PCS/ESD Workstation Operators

6.1.2 Test duration estimate

The test duration should be as follows:

- 2 hours approx.

If necessary, the estimated time can be extended in order to complete all required steps.

6.1.3 Vendor Assistance

Not applicable

6.1.4 Items Postponed to C&E OTP

Not applicable

6.1.5 HOLDS

Not applicable

6.2 OTP Test Requirements – Offshore WORKSITE

Not applicable

6.2.1 Pre-Commissioning Achievement

Not applicable

6.2.2 Commissioning Achievement

The commissioning achievement will be the successful operation, functionality and safeguarding test of all the equipment, installed and put in operation during the WORKSITE phase:

- 70-00: F&G Control System
- 72-00: NAVAID
- 77-10: HVAC HV/MV Switchgear Room B-100
- 77-20: HVAC LV Switchgear Room B-200
- 77-30: HVAC UPS Equipment Room B-300
- 77-40: HVAC I&T Equipment Room B-400
- 79-00: Emergency Shutdown System (SIS)
- 82-00: MV 6.6 kV Switchboard (SG-100D1)
- 82-40: Power Transformer 1.6 MVA (TR-200DE1)
- 82-99: MV 6.6kV Temporary Yard Supply Integrated test
- 83-00: 400/230V Switchboard SG-200N1
- 83-20: 400/230V Distribution Board DP-200N1
- 84-00: 110V DC 10kVA UPS System (UP-200F1)
- 84-10: 230V AC UPS - 35KVA (UP-200F3)
- 84-20: 230V AC UPS – 15KVA (UP-200F3)
- 86-00: Data Networks
- 87-00: Power Distribution System (EMCS)
- 87-10: PROCESS CONTROL SYSTEM (PCS)
- 87-20: PROCESS CONTROL SYSTEM (PCS) – Instrumentation

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6.2.3 Special Tools & Test Equipment

The following special tool and Test Equipment are required (see vendor document 1723002197-EL-LIS-00053):

- Voltage, frequency, continuity tester (Multimeter)
- Phases sequence tester
- Portable radios
- Amperometric clamp
- Portable radios

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

6.2.4 Consumable List

Not applicable

6.2.5 Temporary Facilities

Not applicable

6.3 OTP DESCRIPTION – OFFSHORE

Step	**Description**	**Result**	**Verified by**	**Date**
Energization Temporary Generator, 400V Power Supply by "Temporary generator mobile battery pack" circuit JB-200E2				
1	Verify and confirm the INCOMING QF1 breaker of JB-200E2 is open and the drawer A2/+08 (Switchboard SG-200N1, column 2) is in extract position.			
2	Verify that the temporary generator key is in the closed position.			
3	Energise the Temporary Generator with the START button.			
4	Verify the correct phase sequence L1, L2, L3, on the input power of the drawer A2/+08.			
5	Now the system LV is ready to energize			
Step	**Description**	**Result**	**Verified by**	**Date**
Energization of Low Voltage SWBD SG-200N1				

Step	Description	Result	Verified by	Date
1	The selector QU1 Auxiliary Voltage Switch located on CUBICLE A2/+02 must be closed on POS.1			
2	Close protection FUSE QU3 located inside the cubicle A2/+02 for the auxiliary voltage from temporary generator.			
3	Measure presence of 230V on incoming protection QU3 located inside cubicle A2/+02			
4	Check MCB QA1 (auxiliary) of Drawer A2/+08 is closed (inside the drawer)			
5	Verify on the terminal strip X1 11-12 of the drawer A2/+08 permissive to close command to main breaker QF1 (the contact must be N.C.)			
6	VERIFICATION DRAWER IN TEST POSITION (test is already done in the OTP Ref. Document 123A90-PML-COM-PRO-03047)			
7	Place drawer (A2/+08) in test position and verified: - Green lamp L1 open circuit breaker should be on - Red lamp L2 circuit breaker closed must be off - Amber lamp L3 tripped circuit breaker must be off			
8	Close manually QF1: - Green lamp L1 open circuit breaker should be off - Red lamp L2 circuit breaker closed must be on - Amber lamp L3 tripped circuit breaker must be off			
9	Extract drawer A2/+08 and located test button on QF1, then press test button to simulate fault condition. After reinsert the drawer and put it in service position			
10	Close the main breaker QF1 on A2/+08			
11	The SWBD SG-200N1 is now available to energise the respective platform consumers			

6.3.1 Energization of Distribution Panel DP-200N1

Step	Description	Result	Verified by	Date
	Energization of Distribution Panel DP-200N1			
1	Closing the breaker QA1 for the aux power supply in the drawer A3/+03 (DP-200N1) on SG-200N1			
2	Put the drawer in service position and the selector SA1 in Local position			
3	All the functionality of this Drawer has been tested on the document: "OTP - LV Switch Boards & LV Distribution Board System"			
4	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to DP-200N1			
5	Verify the correct phase sequence L1, L2, L3, on the input power of the INCOMER on the terminal X1: 1-2-3 (DP-200N1)			

Step	Description	Result	Verified by	Date
6	Closing the general incoming Q1 of DP-200N1 manually			
7	The Cumulative Trip Signal have been tested on the document: "OTP - LV Switch Boards & LV Distribution Board System"			
8	The Distribution Board DP-200N1 is now available to energise the respective platform consumers.			
9	For energise all the external lights, now, switch on: - QT1: TWILIGHT SWITCH AND AUXILIARY - Q2: NORMAL LIGHTING UPPER DECK - Q3: NORMAL LIGHTING LOWER DECK - Q4: NORMAL LIGHTING STARS - Q8: EMERGENCY LIGHTING UPPER DECK - Q9: EMERGENCY LIGHTING LOWER DECK - Q10: EMERGENCY LIGHTING STARS			
10	Verify all the lights are switched on.			

6.3.2 Energization UPS UP-200F3

Step	Description	Result	Verified by	Date
Energization UPS UP-200F3				
1	In UP-200F3A and UP-200F3B set load interrupter switch Q1 to the "OFF" position			
2	Set the manual bypass switch Q29 to position "2 - Service operation"			
3	On the Cut-offs put the selector S2 in OVERRIDE position			
4	In SG-200N1, closing the breakers QA1 for the aux power supply in the drawers A3/+01 (AC UPS PAS - 30 MIN UP-200F3 - LINE A), A4/+01 (AC UPS PAS - 30 MIN UP-200F3 - LINE B) and A7/+02 (AC UPS PAS - 30 MIN UP-200F3 - BY PASS)			
5	Put the drawers in service position			
6	Manually close the circuit breakers QF1 for each drawer and consequently energize the power supply to UP-200F3			
7	In DP-200N1 closing the breaker Q41 for energize the auxiliary circuit			
8	In UP-200F3A check status: The bypass is starting up, the green and yellow LEDs are flashing. LCD: "Main menu" is displayed			

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Step	Description	Result	Verified by	Date
9	Wait for status: The bypass is ready, the green light is flashing. LCD: "By pass symbol OK" is displayed			
10	Set the manual bypass switch Q29 to position "1 - Inverter operation". The green and yellow LEDs flash.			
11	Set the load interrupter switch Q1 to the "ON" position			
12	Wait for status: The REC is ready, the green LED is flashing. LCD: "INV symbol OK" is displayed			
13	Check the battery bank voltage and polarity: V (BANK A) V (BANK B)			
14	Close the battery cut off breaker Q0			
15	Press the "~I" key on the HMI. LCD: "INV symbol" flashes			
16	Wait for status: Bypass switches to normal operation, green LED lights up. LCD: "Energy flow display via INV" is displayed			
17	Verify the battery bank is in charge by display			
18	The first UPS unit is now in operation, repeat the above STEPS to start the second UPS unit from point 7			
19	The essential circuit breaker to switch on are: - QF37: SERVER CABINET ITER - LINE A - QF38: SERVER CABINET ITER - LINE B - QF43: SIS - CONTROLLER AND I/O CABINET - LINE A - QF44: SIS - CONTROLLER AND I/O CABINET - LINE B - QF45: PCS – CONTR. AND I/O CABINET - LINE A - QF46: PCS – CONTR. AND I/O CABINET - LINE B - QF47: EMCS – CONTR. AND I/O CABINET - LINE A - QF48: EMCS – CONTR. AND I/O CABINET - LINE B - QF49: LV SWITCHBOARD AUXILIARY - QF50: LV SWITCHBOARD 800/460V AUXILIARY			

6.3.3 Energization UPS UP-200F4

Step	Description	Result	Verified by	Date
Energization UPS UP-200F4				
1	In UP-200F4A and UP-200F4B set load interrupter switch Q1 to the "OFF" position			
2	Set the manual bypass switch Q29 to position "2 - Service operation"			
3	On the Cut-offs put the selector S2 in OVERRIDE position			
4	In SG-200N1, closing the breakers QA1 for the aux power supply in the drawers A6/+05 (AC UPS F&G - 8H UP-200F4 - LINE A), A6/+06 (AC UPS F&G - 8H UP-			

Step	Description	Result	Verified by	Date
	200F4 - LINE B) and A2/+04 (AC UPS F&G - 8H UP-200F4 - BY PASS)			
5	Put the drawers in service position			
6	Manually close the circuit breakers QF1 for each drawer and consequently energize the power supply to UP-200F4			
7	In DP-200N1 closing the breaker Q42 for energize the auxiliary circuit			
8	In UP-200F4A check status: The bypass is starting up, the green and yellow LEDs are flashing. LCD: "Main menu" is displayed			
9	Wait for status: The bypass is ready, the green light is flashing. LCD: "By pass symbol OK" is displayed			
10	Set the manual bypass switch Q29 to position "1 - Inverter operation". The green and yellow LEDs flash.			
11	Set the load interrupter switch Q1 to the "ON" position			
12	Wait for status: The REC is ready, the green LED is flashing. LCD: "INV symbol OK" is displayed			
13	Check the battery bank voltage and polarity: V (BANK A) V (BANK B)			
14	Close the battery cut off breaker Q0			
15	Press the "~I" key on the HMI. LCD: "INV symbol" flashes			
16	Wait for status: Bypass switches to normal operation, green LED lights up. LCD: "Energy flow display via INV" is displayed			
17	Verify the battery bank is in charge by display			
18	The first UPS unit is now in operation, repeat the above STEPS to start the second UPS unit from point 7			
19	The essential circuit breaker to switch on are: - QF31: FGS PANEL LINE A - QF32: FGS PANEL LINE B - QF36: NETWORK CABINET LINE A - QF37: NETWORK CABINET LINE B			

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6.3.3.1 Energization UPS UP-200F1A

Step	Description	Result	Verified by	Date
Energization UPS UP-200F1A				
1	Set the load interrupter switch Q1 to the "OFF" position			
2	In SG-200N1 closing the breaker QA1 for the aux power supply in the drawer A7/+03 (DC BATTERY SYSTEM SWTG CONTROL - FEEDER A)			
3	Put the drawer in service position			
4	Manually close the circuit breaker QF1 for the drawer and consequently energize the power supply to UP-200F1A			
5	In DP-200N1 closing the breaker Q43 for energize the auxiliary circuit			
6	Set the load interrupter switch Q1 to the "ON" position			
7	Check the functionality of rectifier on the controller display A300			
8	Set the output interrupter switch Q2 to "ON" position			
9	Check the battery bank voltage and polarity: V Between 120 and 121Vdc			
10	On the Cut-offs put the selector S2 in OVERRIDE position			
11	Set the battery interrupter switch Q3 to "ON" position			
12	Set the external battery cut off interrupter switch Q0 to "ON" position			
13	Verify the battery bank is in charge by display			
14	The first UPS 'A' unit is now in operation			

6.3.4 Energization UPS UP-200F1B

Step	Description	Result	Verified by	Date
	Energization UPS UP-200F1B			
1	Set the load interrupter switch Q1 to the "OFF" position			
2	In SG-200N1 closing the breaker QA1 for the aux power supply in the drawer A7/+04 (DC BATTERY SYSTEM SWTG CONTROL - FEEDER B)			

Step	Description	Result	Verified by	Date
3	Put the drawer in service position			
4	Manually close the circuit breaker QF1 for the drawer and consequently energize the power supply to UP-200F1B			
5	Set the load interrupter switch Q1 to the "ON" position			
6	Check the functionality of rectifier on the controller display A300			
7	Set the output interrupter switch Q2 to "ON" position			
8	Verify the battery bank is in charge by display			
9	The second UPS unit is now in operation			
10	The essential circuit breaker to switch on are: - Q12 (110Vdc Supply A) - Q13 (110Vdc Supply B)			

6.3.4.1 Energization NAVAIDS - NC-200F2

Step	Description	Result	Verified by	Date
Energization NAVAIDS - NC-200F2				
1	Verify that all the terminals with fuses have the fuse installed and inserted (locked)			
2	In SG-200N1, closing the breaker QA1 for the aux power supply in the drawer A7/+05 (NAVAID SYSTEM FEEDER A)			
3	Manually close the circuit breaker QF1 for energize the NC-200F2 LINE A NORMAL POWER SUPPLY			
4	In SG-200N1, closing the breaker QA1 for the aux power supply in the drawer A7/+06 (NAVAID SYSTEM FEEDER B)			
5	Manually close the circuit breaker QF1 for energize the NC-200F2 LINE B ESSENTIAL POWER SUPPLY			
6	In NC-200F2 close the circuit breaker Q2 for NORMAL POWER SUPPLY (LINE A)			
7	In NC-200F2 close the circuit breaker Q3 for ESSENTIAL POWER SUPPLY (LINE B)			
8	In NC-200F2 close the circuit breaker Q4 for powered-on the battery charger BC-200F2A			
9	In NC-200F2 close the circuit breaker Q5 for powered-on the battery charger BC-200F2B			
10	In CB-200F2 close the circuit breaker Q1 for connect the BATTERY BANK BA-200F2 to the NAVAIDS CENTRAL CONTROL PANEL (NC-200F2)			

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Step	Description	Result	Verified by	Date
11	In NC-200F2 close the circuit breaker Q1 for connect the 24Vdc battery bus bar			
12	In NC-200F2 close the circuit breaker Q6 for energize the MEDIUM INTENSITY AOL 1/2 (EOL-200-01/02)			
13	In NC-200F2 close the circuit breaker Q7 for energize the MEDIUM INTENSITY AOL 3/4 (EOL-200-03/04)			
14	In NC-200F2 close the circuit breaker Q8 for energize the MARINE YELLOW LIGHT 1 (EML-200-01)			
15	In NC-200F2 close the circuit breaker Q9 for energize the MARINE YELLOW LIGHT 2 (EML-200-02)			
16	In NC-200F2 close the circuit breaker Q10 for energize the BOAT LANDING STATUS LIGHT (ESL-200-01)			
17	In NC-200F2 close the circuit breaker Q11 for energize the VISIBILITY METER (EVM-200-01), the Control System, the astro time KA1 and the earth insulation relay KE1			
18	The local display panel installed on cover of the enclosure B of the NCCP have its own On/Off switch. The user has to verify that the mentioned switch (accessible from the internal side of the enclosure) is switched on			
19	The Inverter INV1/INV2 installed inside the NCCP have their own ON/OFF/ECO switch. The user has to verify that the mentioned switch is in ON position (I)			
20	Put the selector S1, located on the cover of the enclosure B of the NCCP, in AUTO position. In this position the Marine lights are switched on/off accordingly to the photocell detection, the visibility meter detection and the astronomical time switch detection. The Obstruction lights are always activated regardless of the above.			
21	Now the System of Navaids is in AUTO operation, confirm that we haven't alarms in the HMI			

6.3.4.2 Energization ICSS (F&G, SIS, PCS, DATA NETWORKS, EMCS)

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Step	Description	Result	Verified by	Date
Energization ICSS (F&G, SIS, PCS, DATA NETWORKS, EMCS)				
1	In UPS UP-200F4 switch on: - QF31: FGS PANEL LINE A - QF32: FGS PANEL LINE B - QF36: NETWORK CABINET LINE A - QF37: NETWORK CABINET LINE B			
2	In UPS UP-200F3 switch on: - QF37: SERVER CABINET ITER - LINE A - QF38: SERVER CABINET ITER - LINE B - QF43: SIS - CONTROLLER AND I/O CABINET - LINE A - QF44: SIS - CONTROLLER AND I/O CABINET - LINE B - QF45: PCS – CONTR. AND I/O CABINET - LINE A - QF46: PCS – CONTR. AND I/O CABINET - LINE B - QF47: EMCS – CONTR. AND I/O CABINET - LINE A - QF48: EMCS – CONTR. AND I/O CABINET - LINE B - QF49: LV SWITCHBOARD AUXILIARY - QF50: LV SWITCHBOARD 800/460V AUXILIARY			
3	Verify in the respective system cabinets if the voltage is present			
4	In NETWORK & SERVER ITER B400-NET-001 B400-SRV-001 switch on: - QF5-QF6: NETWORK CABINET - LINE A - QF8-QF9: NETWORK CABINET - LINE B - QF50: UTILITY - QF51: SOCKET - QF52: LIGHT - QF54: FAN - QF61: 24V LINE A DISTRIBUTION - QF62: 24V LINE B DISTRIBUTION			
5	In FGS B400-FGS-001 switch on: - QF6: G1 - LINE A - QF7: PW RACK1 - LINE A - QF8: PW RACK2 - LINE A - QF9: PW RACK3 - LINE A - QF10: PW RACK4 - LINE A - QF11: PW RACK5 - LINE A - QF12: PW RACK6 - LINE A - QF24: FAN PROSAFE - LINE A - QF14: G2 - LINE B - QF15: PW RACK1 - LINE B - QF16: PW RACK2 - LINE B - QF17: PW RACK3 - LINE B - QF18: PW RACK4 - LINE B - QF19: PW RACK5 - LINE B - QF20: PW RACK6 - LINE B - QF25: FAN PROSAFE - LINE B - QF1: UTILITY			

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Step	Description	Result	Verified by	Date
	- QF2: SOCKET - QF3: LIGHT - QF5: FAN - QF22: 24V LINE A DISTRIBUTION - QF23: 24V LINE B DISTRIBUTION			
6	In SIS B400-SIS-001 switch on: - QF55: G1 - LINE A - QF56: PW RACK1 - LINE A - QF57: PW RACK2 - LINE A - QF58: PW RACK3 - LINE A - QF67: FAN PROSAFE - LINE A - QF60: G2 - LINE B - QF61: PW RACK1 - LINE B - QF62: PW RACK2 - LINE B - QF63: PW RACK3 - LINE B - QF68: FAN PROSAFE - LINE B - QF50: UTILITY - QF51: SOCKET - QF52: LIGHT - QF54: FAN - QF65: 24V LINE A DISTRIBUTION - QF66: 24V LINE B DISTRIBUTION			
7	In PCS B400-PCS-001 switch on: - QF6: G1 - LINE A - QF1: PW RACK1 - LINE A - QF2: PW RACK2 - LINE A - QF3: PW RACK3 - LINE A - QF4: PW RACK4 - LINE A - QF20: G3 - LINE A - QF12: G2 - LINE B - QF13: PW RACK1 - LINE B - QF14: PW RACK2 - LINE B - QF15: PW RACK3 - LINE B - QF16: PW RACK4 - LINE B - QF21: G4 - LINE B - QF1 UTILITY - QF2: SOCKET - QF3: LIGHT - QF5: FAN - QF18: 24V LINE A DISTRIBUTION - QF19: 24V LINE B DISTRIBUTION			
8	In EMCS B400-EMCS-001 switch on: - QF6: G1 - LINE A - QF8: G2 - LINE B - QF1: UTILITY - QF2: SOCKET - QF3: LIGHT			

Step	Description	Result	Verified by	Date
	- QF5: FAN - QF10: 24V DISTRIBUTION			

6.3.4.3 Energization HVAC B100-HSB-001

Step	Description	Result	Verified by	Date
Energization HVAC B100-HSB-001				
1	In SG-200N1, closing the breakers QA1 for the aux power supply in the drawers A5/+03(HVAC PANEL UPS ROOM)			
2	Put the drawer in service position and the selector SA1 in Local position			
3	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to B300-HSB-001			
4	In UP-200F3 closing the breaker QF41 for energize the auxiliary circuit			
5	The HVAC Board B300-HSB-001 is now available to energise the respective platform consumers.			
6	Inside the panel B300-HSB-001, the user must switch on these circuit breakers: - QF400: measure MVA-1 with multimeter - QF1: MODULE LIGHT AND EMERGENCY LIGHT - QF3: INTERNAL AUX 230V - QF2: MODULE INTERNAL SOCKET - QF6: HEATING CABLE HHC-77-002 - QM1: ELECTRICAL HEATER HSS-77-007/8/9 - QM1A: PRESSURING FAN 1 - HFM-77-301 - QM2A: SUPPLY FAN HFM-77-302 - QM3A: COMPRESSOR 1A HCO-77-301 - QM4A: ELECTRICAL HEATER HSS-77-301 - QF1A: INTERNAL AUX 230V - QM5A: CONDENSER FAN 1/2 HFM-77-305/6 - QM1B: PRESSURING FAN HFM-77-303 - QM2B: SUPPLY FAN HFM-77-304 - QM3B: COMPRESSOR 1A HCO-77-302 - QM4B: ELECTRICAL HEATER HHS-77-305 - QF1B: INTERNAL AUX 230V - QM5B: CONDENSER FAN 1/2 HFM-77-307/8 - QF4: POWER ON FOR AC/DC CONVERTER 230V/24Vdc - QF5: INTERNAL AUX 24Vdc			
7	Close the panel and Switch on the QS1 to energize all the system, then close: - QFA: HHU-77005 UNIT - QFB: HHU-77006 UNIT			

8	Push the button, CELS-B300H-F1-L1-01 or CELS-B300H-F1-L1-01, near the door for switch on the light			

6.3.4.4Energization HVAC B200-HSB-001

Step	Description	Result	Verified by	Date
Energization HVAC B200-HSB-001				
1	In SG-200N1, closing the breakers QA1 for the aux power supply in the drawers A5/+02 (HVAC PANEL - LV ROOM)			
2	Put the drawer in service position and the selector SA1 in Local position			
3	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to B200-HSB-001			
4	In UP-200F3 closing the breaker QF40 for energize the auxiliary circuit			
5	The HVAC Board B200-HSB-001 is now available to energise the respective platform consumers.			
6	Inside the panel B200-HSB-001, the user must switch on these circuit breakers: - QF400: measure MVA-1 with multimeter - QF1: MODULE LIGHT AND EMERGENCY LIGHT - QF3: INTERNAL AUX 230V - QF2: MODULE INTERNAL SOCKET - QF4: HEATING CABLE HHC-77-002 - QM1: ELECTRICAL HEATER HSS-77-004/5/6 - QM1A: PRESSURING FAN 1 - HFM-77-201 - QM2A: ELECTRICAL HEATER HSS-77-201 - QF1A: INTERNAL AUX 230V - QM1B: PRESSURING FAN 2 - HFM-77-202 - QM2B: ELECTRICAL HEATER - HHS-77-202 - QF1B: INTERNAL AUX 230V - QF5: POWER ON FOR AC/DC CONVERTER 230V/24Vdc - QF6: INTERNAL AUX 24Vdc			
7	Close the panel and Switch on the QS1 for energize all the system. After close: - QSA: HHU-77003 UNIT - QSB: HHU-77004 UNIT			
8	Push the button, CELS-B200H-F1-L1-02 or CELS-B200H-F1-L1-01, near the door for switch on the light			

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6.3.4.5Energization HVAC B300-HSB-001

Step	Description	Result	Verified by	Date
Energization HVAC B300-HSB-001				
1	In SG-200N1, closing the breakers QA1 for the aux power supply in the drawers A5/+03(HVAC PANEL UPS ROOM)			
2	Put the drawer in service position and the selector SA1 in Local position			
3	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to B300-HSB-001			
4	In UP-200F3 closing the breaker QF41 for energize the auxiliary circuit			
5	The HVAC Board B300-HSB-001 is now available to energise the respective platform consumers.			
6	Inside the panel B300-HSB-001, the user must switch on these circuit breakers: - QF400: measure MVA-1 with multimeter - QF1: MODULE LIGHT AND EMERGENCY LIGHT - QF3: INTERNAL AUX 230V - QF2: MODULE INTERNAL SOCKET - QF6: HEATING CABLE HHC-77-002 - QM1: ELECTRICAL HEATER HSS-77-007/8/9 - QM1A: PRESSURING FAN 1 - HFM-77-301 - QM2A: SUPPLY FAN HFM-77-302 - QM3A: COMPRESSOR 1A HCO-77-301 - QM4A: ELECTRICAL HEATER HSS-77-301 - QF1A: INTERNAL AUX 230V - QM5A: CONDENSER FAN 1/2 HFM-77-305/6 - QM1B: PRESSURING FAN HFM-77-303 - QM2B: SUPPLY FAN HFM-77-304 - QM3B: COMPRESSOR 1A HCO-77-302 - QM4B: ELECTRICAL HEATER HHS-77-305 - QF1B: INTERNAL AUX 230V - QM5B: CONDENSER FAN 1/2 HFM-77-307/8 - QF4: POWER ON FOR AC/DC CONVERTER 230V/24Vdc - QF5: INTERNAL AUX 24Vdc			
7	Close the panel and Switch on the QS1 for energize all the system. After close: - QFA: HHU-77005 UNIT - QFB: HHU-77006 UNIT			
8	Push the button, CELS-B300H-F1-L1-01 or CELS-B300H-F1-L1-01, near the door for switch on the light			

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6.3.4.6Energization HVAC B400-HSB-001

Step	Description	Result	Verified by	Date
Energization HVAC B400-HSB-001				
1	In SG-200N1, closing the breakers QA1 for the aux power supply in the drawers A5/+04 (HVAC PANEL ITER ROOM)			
2	Put the drawer in service position and the selector SA1 in Local position			
3	Manually close the circuit breaker QF1 and press the button PM1 to close the contactor K1 and consequently energize the power supply to B400-HSB-001			
4	In UP-200F3 closing the breaker QF42 for energize the auxiliary circuit			
5	The HVAC Board B400-HSB-001 is now available to energise the respective platform consumers.			
6	Inside the panel B400-HSB-001, the user must switch on these circuit breakers: - QF400: measure MVA-1 with multimeter - QF1: MODULE LIGHT AND EMERGENCY LIGHT - QF3: INTERNAL AUX 230V - QF2: MODULE INTERNAL SOCKET - QF6: HEATING CABLE HHC-77-004 - QM1: ELECTRICAL HEATER HSS-77-010/11/12 - QM1A: PRESSURING FAN - HFM-77-401 - QM2A: SUPPLY FAN HFM-77-402 - QM3A: COMPRESSOR 1A HCO-77-401 - QM4A: ELECTRICAL HEATER HSS-77-401 - QF1A: INTERNAL AUX 230V - QM5A: CONDENSER FAN 1/2 HFM-77-405/6 - QM1B: PRESSURING FAN HFM-77-403 - QM2B: SUPPLY FAN HFM-77-404 - QM3B: COMPRESSOR 1A HCO-77-402 - QM4B: ELECTRICAL HEATER HHS-77-405 - QF1B: INTERNAL AUX 230V - QM5B: CONDENSER FAN 1/2 HFM-77-407/8 - QF4: POWER ON FOR AC/DC CONVERTER 230V/24Vdc - QF5: INTERNAL AUX 24Vdc			
7	Close the panel and Switch on the QS1 for energize all the system. After close: - QFA: HHU-77007 UNIT - QFB: HHU-77008 UNIT			
8	Push the button, CELS-B400H-F1-L1-01 or CELS-B400H-F1-L1-01, near the door for switch on the light			

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6.3.4.7Energization GIS AUXILIARY SUPPLY 6.6kV

Step	Description	Result	Verified by	Date
Energization GIS AUXILIARY SUPPLY				
1	In DP-200N1 closing the breaker Q37 for energize the auxiliary circuit of CP-100E1			
2	In CP-100E1 closing the breaker FA-AC MAIN SUPPLY for energize: - LCP LIGHTING CIRCUIT - LCP HEATING CIRCUIT - SOCKET OUTLET - CB Q0 (QA1) OPERATING MECHANISM - CB Q0 (QA1) HEATING CIRCUIT - DS QZ92_ES QZ92 OPERATING MECHANISM HEATING CIRCUIT - DS QZ91_ES QZ91 OPERATING MECHANISM HEATING CIRCUIT			
3	In UP-200F1 closing the breaker Q10 and Q11 for energize the principal auxiliary circuit of CP-100E			
4	In CP-100E1 closing the breaker FD1 - DC1 110Vdc MAIN SUPPLY and F01 - CIRCUIT BREAKER CONTROL SUPPLY CLOSING & TRIP CIRCUITS 1. Now check: - CLOSE COMMAND CIRCUIT - K86-1 of 7SJ85 PROTECTION LOCK OUT RELAY CIRCUITS - LOCK OUT RELAY SET COMMAND TR-100AD1 PROTECTION TRIP - CB Q0 (QA1) ANTI PUMPING CIRCUIT - CB Q0 (QA1) PROTECTION & TRIP COIL CIRCUITS - SAFETY SYSTEM POWER - CB Q0 (QA1) GIS PRESSURE LOW STAGES 1&2			
5	In CP-100E1 closing the breaker F02 - CIRCUIT BREAKER MOTOR SUPPLY Now check: - CB Q0 (QA1) MOTOR OPERATING CIRCUIT - CB Q0 (QA1) SPRING EXCESSIVE RUN TIME			
6	In CP-100E1 closing the breaker F03 - INDICATION CIRCUIT SUPPLY Now check: - LAMP TEST - CB Q0 (QA1) POSITION INDICATOR CLOSE & OPEN - DS QZ92 POSITION INDICATOR CLOSE & OPEN - ES QZ92 POSITION INDICATOR CLOSE & OPEN - DS QZ91 POSITION INDICATOR CLOSE & OPEN - ES QZ91 POSITION INDICATOR CLOSE & OPEN - IED FAILURE FROM 7SJ85 - IED FAILURE FROM 7UT85 - VD1 L1, L2, L3 SUPPLY - VD2 L1, L2, L3 SUPPLY			
7	In CP-100E1 closing the breaker F04 - PROTECTION RELAY: 7UT85 SUPPLY Now check: - PROTECTION RELAY 7UT85 SUPPLY			

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Step	Description	Result	Verified by	Date
	- IED FAILURE FROM 7SJ85			
8	In CP-100E1 closing the breaker F05 - RED BOX UNIT: RSG907R SUPPLY Now check: - RSG907R RED BOX UNIT			
9	In CP-100E1 closing the breakers: - FD2: DC2 110Vdc MAIN SUPPLY - F11: CIRCUIT BREAKER CONTROL SUPPLY CLOSING & TRIP CIRCUITS 2 Now check: - REMOTE TRIP-2 COMMAND - CB Q0(QA1) TRIP COIL-2 50/50N/51/51G/67/67N - CB QO(QA1) TRIP COIL-2 87 - CB QO(QA1) TRIP COIL-2 86 - CB TRIP-2 COMMAND - PROTECTION TRIP SIGNAL - CB Q0(QA1) GIS PRESSURE LOW STAGE-1 - CB Q0(QA1) GIS PRESSURE LOW STAGE-2 - SIS SAFETY SYSTEM DC 24V INPUT			
10	In CP-100E1 closing the breakers: - F12: DS & ES MOTOR & CONTROL SUPPLY Now check: - DS/ES MANUAL OPER. MODE - DS/EZ QZ92 MOTOR OPERATION - DS/EZ QZ91 MOTOR OPERATION - ES QZ92 ES OPEN COMMAND - DS QZ92 DS CLOSE COMMAND - DS/ES QZ92 SELF HOLDING - ES QZ92 ES CLOSE COMMAND - DS QZ92 DS OPEN COMMAND - MANUAL DS/ES QZ92 OPER. MODE SELECTION - ES QZ91 ES OPEN COMMAND - DS QZ91 DS CLOSE COMMAND - DS/ES QZ91 SELF HOLDING - ES QZ91 ES CLOSE COMMAND - DS QZ91 DS OPEN COMMAND - MANUAL DS/ES QZ91 OPE. MODE SELECTION			
11	In CP-100E1 closing the breaker F13 - MERGING UNIT: IM2 SUPPLY Now check: - MERGING UNIT: IM2 SUPPLY			
12	In CP-100E1 closing the breakers F14: PROTECTION RELAY: 7SJ85 Now check: - PROTECTION RELAY 7SJ85 SUPPLY - DS QZ91 OPEN/CLOSE - ES QZ91 OPEN/CLOSE - DS QZ92 OPEN/CLOSE - ES QZ92 OPEN/CLOSE - CB Q0(QA1) OPEN/CLOSE - DC CONTROL VOLTAGE FAILURE - AC CONTROL VOLTAGE FAILURE - 6.6 kV ARC PROTECTION TRIP1			

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Step	Description	Result	Verified by	Date
	- 6.6 kV SWG. CB OPEN - 6.6 kV SWG. ES OPEN - SIS OVERRIDE ENABLE - VD1 NO VOLTAGE - VD2 NO VOLTAGE - CB WARNING GAS LOW VOLTAGE STAGE-1 - CB WARNING GAS LOW VOLTAGE STAGE-2 - CB SPRING MOTOR OVERLOAD - CB SPRING MOTOR EXCESSIVE RUN TIME - CB MOTOR RUNTIME EXCEEDED & SPRING UNCHARGED - DS/ES MOTOR MCB TRIP - DS OR ES MANUAL OPER. MODE - HAND CRANK INSERTED - IED FAILURE FROM 7UT85 - LOCAL STATUS - REMOTE STATUS - TCS1 FAIL - TCS2 FAIL - SAFETY SYSTEM POWER WATCHDOG - CB Q0(QA1) MCB ALARM - DS QZ92_ES QZ92 GIS PRESSURE LOW STAGE-1 - DS QZ92_ES QZ92 GIS PRESSURE LOW STAGE-2 - DS QZ91_ES QZ91 GIS PRESSURE LOW STAGE-1 - DS QZ91_ES QZ91 GIS PRESSURE LOW STAGE-2 - PROTECTION RELAY 7SJ85 (CB202) SUPPLY			
13	Verify and confirm ESD signal 81-XS-001 from SIS on CP-100E1 is working			
14	KSIL is ON in healthy condition the NO contact is closed. Check: - KSIL2 DC 24V TRIP SAFETY SYSTEM must be on and GIS will be in healthy condition - ESD (SIS) Override selector SR1 must be disable to permit any signal of Emergency Shut Down.			

6.3.4.8 Auxiliaries' energization Transformer TR-100AD1

Step	Description	Result	Verified by	Date
Energization Auxiliary TR-100AD1				
1	Verify and confirm the power presence from DP-200D1 - Q33 on Auxiliary LCP CP-100E4			
2	Verify in CP-100E4 that no alarms are present and the power supply is ok			
3	Verify and confirm the power presence from DP-200D1 - Q32 on Auxiliary LCP CP-100E3			
4	Verify in CP-100E3 that no alarms are present and the power supply is ok			

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5	Verify and confirm the power presence from DP-200D1 - Q31 on Auxiliary LCP CP-100E2			
6	Verify in CP-100E2 that no alarms are present and the power supply is ok			

6.3.4.9Energization Auxiliary Supply SG-100D1(6.6kV)

Step	Description	Result	Verified by	Date
Energization Auxiliary Supply SG-100D1(6.6kV)				
1	In UP-200F1 switch on Q12 (110Vdc Supply A) and Q13 (110Vdc Supply B)			
2	Verify and confirm the power by UPS supply A&B 110V on column A5: - Supply A XM 1-2 - Supply B XM 3-4			
3	Close MCB QD01 and QD02 (110Vdc distribution)			
4	Verify and confirm the power supply 110V on Column A4: - Supply XC 1-3			
5	Close MCB QD1 (protection device) and QD2 (command circuits). Now the HMI panel is online			
6	Verify and confirm the power supply 110V on Column A6: - Supply XC 1-3			
7	Close MCB QD1 (protection device), QD2 (command circuits) and QD3 (spring charging motor). Now the HMI panel is online			
8	In column A5 switch on QD1 and QD2 for energize DC/DC converter GS1 and the commands			
9	Verify and confirm the power supply 24V on column A5: - measure 24Vdc on QD4 - close MCB QD4 (main breaker for 24Vdc) - close MCB QD5 (exeterm device) - close MCB QD6 (partial discharged monitoring) - close MCB QD21 (ethernet switch A) - close MCB QD22 (ethernet switch B + C)			
10	Verify the led on ethernet switches and on the exeterm are ON			
11	In column A4 switch on QD4 for energize the exeterm (24Vdc)			
12	In column A6 switch on QD4 for energize the termally monitor (24Vdc)			
13	Close QV1, QV3, QV4, QV5 (Voltametric measure for protection relay FP1) in column A5			

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6.3.4.10 Energization A5, A6 UNIT and main busbar

Step	Description	Result	Verified by	Date
Energization A5, A6 UNIT and main busbar				
1	Verify and confirm that Unit A6 is in safety status with following checks: - BGE Earthing Switch is locked in closed position. KEY-4 G3228/279 is locked on KD1 device. KEY-3 G3355 is locked on BGE Earthing Switch closed - QM Main Breaker is locked in extract position and opened. KEY-2 14466 is locked on 66kV upstream safety isolation device.			
2	Verify and confirm that Unit A5 is in safety status with following checks: - BGE Earthing Switch is locked in closed position. KEY-3 G3098/277 is locked on KD1 device - KEY-4 G3150 is unlocked and available to use in the LoTo Procedure			
3	The keys 278, 279, 280, 281, 282, 283 are interlocked on KD1. On Unit A5: - Take KEY-4 G3150 insert it on BGE and open Earthing Switch - KEY-3 G3098/277 is now available, withdraw it and insert in keys Interlock device KD1			
4	To unlock Incomer Unit A6 BGE Earthing Switch: - QM main Breaker is locked in extract position - KEY-1 G3260 is locked on LoTo procedure to keep breaker isolated in compliance with project PTW Procedure - KEY-2 14466 is locked on 66kV upstream safety isolation device - KEY-3 G3355 is used and locked on PTW procedure. Once it is available insert it on BGE Earthing Switch to allow opening switch procedure - KEY-4 G3228 has been released from KD1. Insert KEY-4 G3228 on BGE and open it - Led-7 "EARTHING SWITCH ENABLE" on protection relay REX640 will turn to green - Remove the safety isolation device, extract KEY-2 14466 and place it on rack in/out system to unlock the QM main breaker - Led-8 "RACK IN/OUT ENABLE" on protection relay REX640 will turn to green - Rack in QM Main Breaker in SERVICE position			
5	The test of the UNIT A6 in TEST POSITION and the hardwired I/O signals has been done during the OTP (Ref. Document: 123A90-PML-COM-PRO-03046)			
6	Confirm availability of the 66kV (GIS) and prepare to energize.			
7	Close the main breaker Q0(QA1) on CP-100E1			

8	Verify the voltage presence in the Switchgear SG-100D1 on the warning lights C1 in column A6			
9	Place the selector SA1, in UNIT A6, in local position			
10	All permissive interlock signals are authorizing the Circuit Breaker closing			
11	Close QM Breaker by pressing push button S1C			
12	See on FP1 Protection Relay Display if Breaker Closed is confirmed on REX640 HMI			
13	On Unit A5 the busbar voltage presence lamps C1 are ON			
14	The busbar is now energized			

6.3.4.11 Energization column A4 feeder for TR-200E1

Step	Description	Result	Verified by	Date
Energization column A4 feeder for TR-200E1				
1	Verify and confirm that Unit A4 is in safety status with following checks: - BGE Earthing Switch is locked in closed position. KEY-4 G3135/280 is on KD1 device. KEY-3 G3398, that is mechanically coupled (ringed) with KEY-2 150901 of SG-200N1 main Incomer, it is locked on BGE Earthing Switch closed - K1 Contactor is locked in extract position and opened. KEY-2 19465 is locked on the LoTo Procedure			
2	Ensure voltage reference on REX640 Protection relay: - Close MCB QV4 - Close MCB QV5 The protection relay is now available and ready to operate			
3	The KEY-4 3135/280 is in KD1 device and it is withdrawable On UNIT A4: - Take KEY-4 G3135/280 insert it on BGE and open Earthing Switch - KEY-3 G3398/277 is now unlocked and withdrawable to use it on SG-200N1 SWBD Incomer			
4	To unlock Incomer Breaker of Unit A4: - K1 main contactor is locked in extract position - KEY-2 19465 is locked on LoTo procedure to keep breaker isolated in compliance with project PTW Procedure - KEY-3 G3398/277 is unlocked with BGE opened. - Led-7 "EARTHING SWITCH ENABLE" on protection relay REX640 HMI will turn to green - the internal Interlock is unlocking Rack in/out Contactor system. The KEY-2 19465 has been freed from PTW procedure, insert it on Rack in/out system and bring			

Step	Description	Result	Verified by	Date
	contactor in SERVICE position - Led-8 "RACK IN/OUT ENABLE" on protection relay REX640 will turn to green			
5	The test of the UNIT A4 in TEST POSITION and the hardwired I/O signals has been done during the OTP (Ref. Document: 123A90-PML-COM-PRO-03046)			
6	All permissive interlock signals are authorizing the Circuit Breaker closing			
7	Rack in K1 Contactor in SERVICE position and confirm that it is available on FP1 Protection relay REX640			
8	Confirm the conditions to close the K1 contactor following: - On Unit A5 the voltage presence lamps C1 are ON - Led-2 "BREAKER READY (TCS)" on Unit A4 protection relay REX640 is green			
9	Place the selector SA1 in Local position			
10	All permissive interlock signals are authorizing the contactor closing command			
11	Close K1 Contactor by pressing push button S1C			
12	See on FP1 Protection Relay Display if Contactor Closed is confirmed on REX640 HMI			
13	On Unit A4 the downstream voltage presence lamps C1 are ON			
IMPORTANT NOTE: Before making the switch from YARD to MV verify that the batteries of UPS F1/F2/F3/F4 are fully charged				

6.3.4.12 Electrical Interlock between 6.6 KV SWBD SG-100D1 (Column A4) and LV SWBD SG-200N1

Step	Description	Result	Verified by	Date
Electrical Interlock between 6.6 KV SWBD SG-100D1 (Column A4) and LV SWBD SG-200N1 Incomer				
1	Interlock On SG-200N1 main incomer Earthing switch BGE Column A4 is open, its KEY-3 G3398 is free and its KEY-4 G3135 is blocked on earthing switch: - Key G3398 is ringed with main incomer QF1 (A1/+05) Rack-In/Out system Key 151733 (2) of SG-200N1 SWBD - Insert the key 151733 on Rack- In/Out system of Main Incomer QF1 place the breaker in test or service position and the key 151733 will be blocked on Rack-In/Out system Interlock On SG-100D1 main incomer SG-200N1 Incomer is extract position the Key 151733 is free.			

Step	Description	Result	Verified by	Date
	Insert KEY-3 G3398 on the earth switch of column A4 (BGE), if possible close it and the G3398 key will remain blocked on the BGE until the BGE is opened and the key is free again.			
2	Rack in the Main incoming breaker QF1 (SG-200N1) in SERVICE position on column A1/+05			
3	The test of the incomer QF1 in TEST POSITION and the hardwired I/O signals has been done during the OTP (Ref. Document: 123A90-PML-COM-PRO-03047)			
4	In column A2/+02: - Place the selector SA1 in local position - Verify and confirm the SA2 Selector is in normal position - Push SC1 to close main breaker - Led-3 on the REF615 must be ON - On the REF615 display the circuit breaker symbol will change to closed - Rotate selector switch SA1 to remote position			
5	Now the user can put all in remote and remove all the remaining override (if necessary) by YOKOGAWA			

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6.3.5 OTP SITE Tests Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature

6.3.6 OTP SITE - Tests Final Signatures and Company Acceptance

Name and Surname	Company Representative	Position	Signature

7 APPENDICES

7.1 Vendor SAT Procedure

7.2 Proverlis Summary System Reports

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7.3 Equipment Related Technical Queries

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7.4 As Built Documentation

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

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