Base Load Power Hub (BLPH)

OTP – Instrument Air Package

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Attachment 1 – N/A

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.

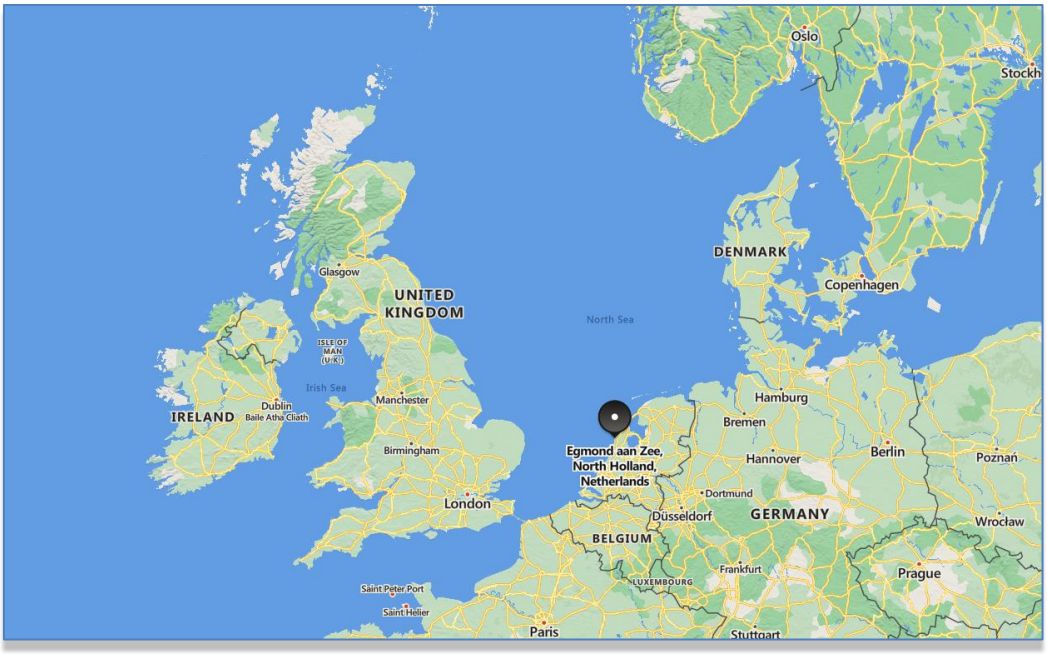


Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map

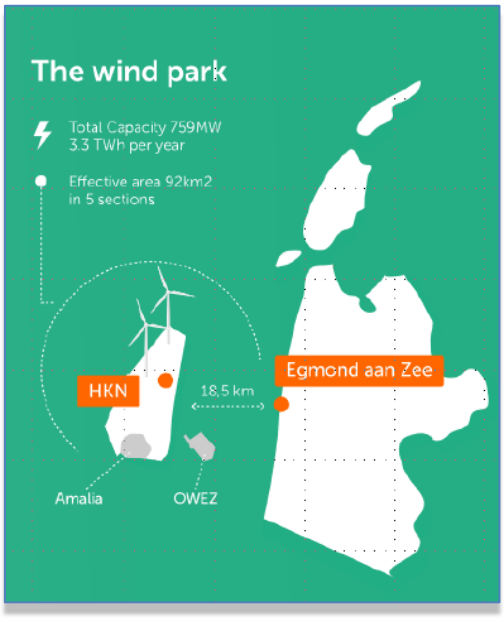


Figure 2 - Wind Park Details

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 topsides 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.

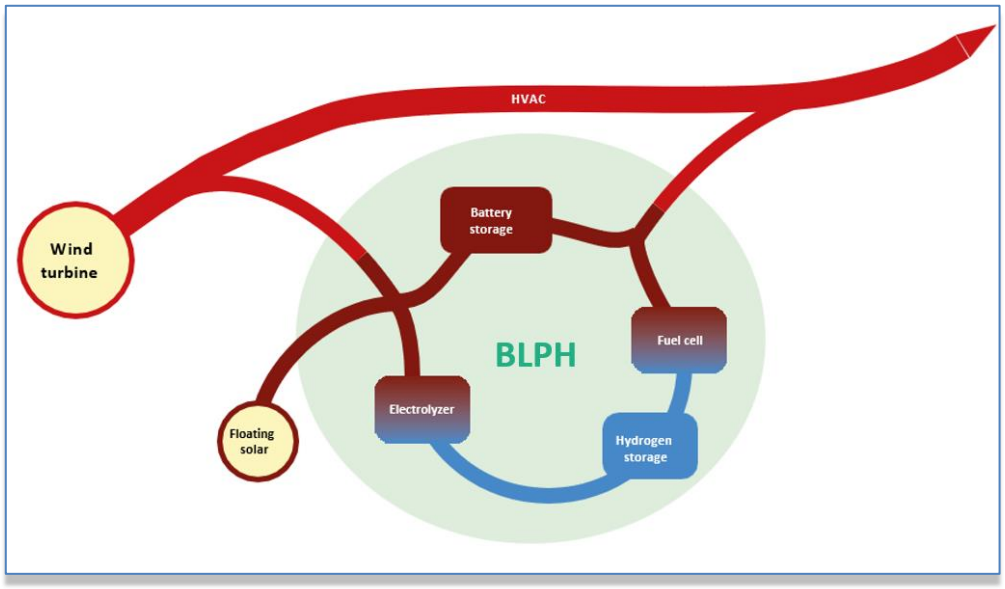


Figure 3 – BLPH Concept

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 the Instrument Air Package system is executed to ensure that the system is started up in a safe and controlled manner and to verify the correct operation according to the project requirements.

The scope of this document is to explain the principal procedure for inspection and test the Instrument Air Package.

3.2 System Boundary Limits

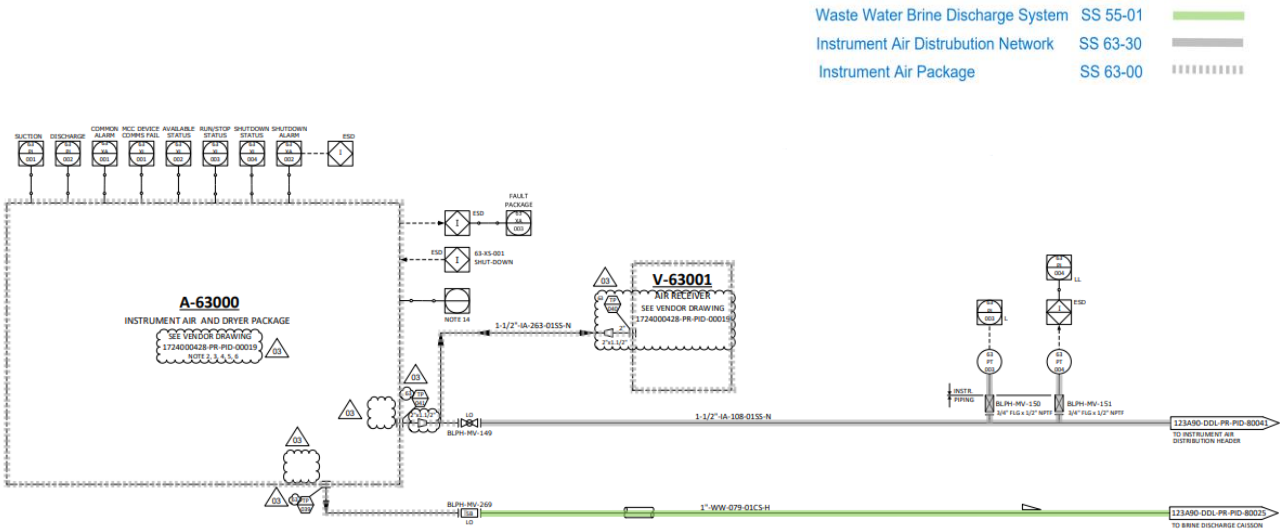


Figure 4 – System Boundary Limits

3.3 Test and System Description

This document is specifically related to the following system:

- 63-00: Instrument Air Package

All equipment must be properly installed in according with vendor document 1724000428-PR-PID-0019.
The limits of the system are defined in document 1724000428-PR-PID-0019.

These parts of the system shall be tested on worksite and on site.

The Instrument Air Package data are the following:
GENERAL CHARACTERISTICS CLIMATIC CONDITION:

Main components of the Package:

- K-63001A/B Oil Free Screw Compressor 1&2
  - 400V – 50 Hz
  - Max operating Pressure10barg.
  - Discharge Pressure 9.5barg
  - Discharge temperature 35°C
- S-63001A/B Dryer Pre-Filter
- D-63001A/B Dryer Unit 1
- D-63002A/B Dryer Unit 2
- S-63002A/B Dryer After-Filter
- V-63001 Air Receiver
- 63-LP-001 Local Control Panel

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, safety glasses, 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

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 connections.

After Power ON:
Energising the units is an essential step in verifying the correct operation of the equipment. Observing that all wiring has been done correctly and in the event of an alarm will help us detect possible errors or malfunctions.

Phase 1: Preparation and Package Operations Tests

- The instrument air package consists of two distinct parts, Air Dryers & Air Compressors.
- The Air Dryer Local Control Panel 63-LP-001 will receive a 1st power supply from AC 35kVA UPS (UP-200F3) 230V MCB Q41, Subsystem SS 84-10.
- The Air Dryer Local Control Panel 63-LP-001 will receive a 2nd power supply from Distribution Board DP-200N1 230V MCB Q29, Subsystem SS 83-20.
- The Air Compressor Units K-63001A/B will receive power supplies from LV 400V Switchboard SG-200N1, drawers A4/+08 and A5/+08.

Phase 1 will validate the following:

- Verify the CPU & additional components are energized and the instrumentation on the Air Dryers are in service.
- Loop check and C&E the Air Dryers are completed.
- Verify the Air Compressor Units K-63001A/B are powered on and there are no alarms present.
- Verify the Air Compressor Units K-63001A/B functional tests are completed.

Phase 2: Validation of Communication and I/O

- Profinet communication to Network Cabinet B-400-NET-001/Server Cabinet B400-SRV-001 and PCS System Cabinet B400-PCS-001.
- Hardwired connections to SIS System.

Phase 2 will validate the following:

- Verify the Profinet Communication from PCS to Local Control Panel 63-LP-001 is operational.
- Verify loop check from SIS to Local Control Panel 63-LP-001 with C&E test.

Performing the steps in this OTP as per engineering documents is crucial to ensure that the equipment is operating correctly and that it meets the desired design specifications. Observing the results will help identify any issues that may arise during the operation.
Overall, following these steps shall provide a comprehensive and effective way to verify the equipment installation and functionality.

4. DOCUMENTS REFERENCES AND ABBREVIATIONS

4.1 Reference Documents

4.1.1 Company Documents and Standards

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

Table 1: Company Documents and Standards

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-COM-PL-03002	Mechanical Completion & Commissioning Execution Plan
[3] 123A90-PML-COM-LIS-03011	System/Sub-Systems List
[4] 123A90-PML-COM-LIS-03012	System/Sub-System Boundary Limit Diagrams
[5] 123A90-PML-COM-PRO-03007	Commissioning Strategy
[6] 123A90-PML-COM-PRO-03038	Leak Test Procedure

Document ID	Document Title
[7] 123A90-PML-COM-SP-03032	Pre-Commissioning Functional Test Sheet Template Collection (ITR-B)
[8] 123A90-PML-COM-SP-03014	Commissioning TDS - Temporary Equipment & Facilities
[9] 123A90-PML-COM-PRO-03019	OTP – Onshore Performance & Integrated Test Procedure
[10] 123A90-PML-COM-LIS-03034	Inhibit-Override Register
[11] 123A90-PML-COM-LIS-03035	PSV Calibration Register
[12] 123A90-PML-COM-PRO-03036	OTP - Black Start Procedure
[13] 123A90-PML-COM-LIS-03024	Commissioning Spare Parts and Consumables List
[14] 123A90-PML-COM-PRO-03022	Initial offshore START-UP procedures
[15] 123A90-PML-COM-RE-03001	Commissioning Final Dossier (ITR-B)
[16] 123A90-PML-QHSE-PRO-00116	Flushing and Cleaning Procedures
[17] 123A90-PML-QHSE-SP-00118	Mechanical Completion Check Sheet Template Collection (ITR-A)
[18] 123A90-PML-QHSE-RE-00115	Mechanical Completion Final Dossier (ITR-A)
[19] 123A90-PML-QHSE-PRO-00117	Punch list Management Procedure
[20] 123A90- 123A90-PML-COM-PRO-03041	OTP - Hydrogen Storage & Venting Systems
[21] 123A90- 123A90-PML-COM-PRO-03042	OTP - Sea Water Intake & Fresh Water Treatment Systems
[22] 123A90- 123A90-PML-COM-PRO-03043	OTP - Instrument Air System
[23] 123A90- 123A90-PML-COM-PRO-03055	OTP - Nitrogen Generation System
[24] 123A90- 123A90-PML-COM-PRO-03045	OTP - HV Switchgear & 66 kV Transformer Systems
[25] 123A90- 123A90-PML-COM-PRO-03046	OTP - MV Switchgear & 6.6 kV Transformer Systems
[26] 123A90- 123A90-PML-COM-PRO-03047	OTP - LV Switch Boards & LV Distribution Board Systems
[27] 123A90- 123A90-PML-COM-PRO-03048	OTP - Lighting & Small Power Systems
[28] 123A90- 123A90-PML-COM-PRO-03049	OTP - Electrical Heat Tracing Systems
[29] 123A90- 123A90-PML-COM-PRO-03050	OTP - DC UPS System 10KVA UP-200F1
[30] 123A90- 123A90-PML-COM-PRO-03051	OTP - Data Network Systems
[31] 123A90- 123A90-PML-COM-PRO-03053	OTP - Navaid System
[32] 123A90- 123A90-PML-COM-PRO-03054	OTP - F&G and ESD C&E Logics

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Document ID	Document Title
[33] 123A90-PML-COM-SP-03057	Worksite WEF (Work Execution Flow Scheme)
[34] 123A90-PML-COM-SP-03058	Site WEF (Work Execution Flow Scheme)
[35] 123A90-PML-QHSE-PL-00001	Project HSE Plan
[36] 123A90-PML-QHSE-PRO-00120	Proverlis Management Procedure
[37] 123A90-PML-COM-PRO-03056	OTP – Document Template
[38] 123A90-PML-COM-PRO-03059	OTP - AC UPS System 35kVA UP-200F3
[39] 123A90-PML-COM-PRO-03060	OTP - AC UPS System 15kVA UP-200F4
[40] 123A90-PML-COM-PRO-03061	OTP – Electrolyser (CPI)
[41] 123A90-PML-COM-PRO-03062	OTP – Fuel Cell (CPI)
[42] 123A90-PML-COM-PRO-03063	OTP – BESS (CPI)

Table 2: Project Documents

4.1.3 Vendor Documents

Document ID	Document Title
[1] 1724000428-MD-LIS-00001	SMIR - SUPPLIER MASTER INFORMATION REGISTER
[2] 1724000428-QC-ITP-00002	INSPECTION TEST PLAN (ITP)
[3] 1724000428-MAC-SP-00003	SYSTEM/PACKAGE FUNCTIONAL DESCRIPTION
[4] 1724000428-MAC-CE-00004	PACKAGE CAUSE EFFECT MATRIX /LOGIC DIAGRAMS
[5] 1724000428-MAC-DA-00005	EQUIPMENT SECTIONAL DRAWING WITH BILL OF MATERIAL
[6] 1724000428-MAC-DD-00006	EQUIPMENT SECTIONAL DRAWING WITH BILL OF MATERIAL
[7] 1724000428-MAC-DD-00007	PACKAGE 3D MODEL DRAWING AND ELECTRONIC FILE
[8] 1724000428-MAC-DD-00008	PACKAGE PIPING SCHEMATICS AND BILL OF MATERIALS
[9] 1724000428-MAC-DG-00009	PACKAGE WIRING DIAGRAM INCLUDING LAYOUT OF PACKAGE CONTROL PANEL
[10] 1724000428-ST-RE-00010	PACKAGE STRUCTURAL CALCULATION REPORT INCLUDING FIXING POINTS and LIFTING POINTS
[11] 1724000428-MAC-DS-00011	EQUIPMENT DATA SHEETS INCLUDING MOTORS, AIR COMPRESSOR, DRYERS, ETC.
[12] 1724000428-MAC-DS-00012	PACKAGE EQUIPMENT NOISE DATA SHEETS INCLUDING AIR COMPRESSOR, DRYERS, ETC.
[13] 1724000428-MAC-DS-00013	INSTRUMENT DATA SHEETS
[14] 1724000428-MAC-DS-00014	AIR COMPRESSOR PERFORMANCE CHART
[15] 1724000428-EL-LIS-00015	ELECTRICAL LOAD LIST

Document ID	Document Title
[16] 1724000428-IN-LIS-00016	I/O LIST
[17] 1724000428-IN-LIS-00017	INSTRUMENT LIST WITH SET POINTS/CONTROL/ALARM/SHUTDOWN
[18] 1724000428-EL-LIS-00018	CABLES LIST
[19] 1724000428-PR-PID-00019	PACKAGE P&ID
[20] 1724000428-NDT-PRO-00020	NDT PROCEDURES INCLUDING PERSONNEL QUALIFICATIONS
[21] 1724000428-WEL-LIS-00021	WELDING BOOK (WPS, PQR, WELDERS QUALIFICATIONS, WELDING MAPS, ETC.)
[22] 1724000428-MAT-PRO-00022	PAINTING PROCEDURE
[23] 1724000428-QC-PRO-00023	HYDROSTATIC AND OR PNEUMATIC TEST PROCEDURE
[24] 1724000428-QC-PRO-00024	FAT (FACTORY ACCEPTANCE TEST) PROCEDURE
[25] 1724000428-QC-DB-00025	MANUFACTURERS RECORD BOOK (FINAL DOSSIER)
[26] 1724000428-QC-LIS-00026	MANUFACTURERS RECORD BOOK (FINAL DOSSIER) - INDEX
[27]1724000428-MAC-LIS-00027	ATEX REGISTER
[28]1724000428-MAC-LIS-00028	ATEX DOCUMENTATION
[29] 1724000428-COM-LIS-00029	SPARE PARTS LIST (2 YEARS AND COMMISSIONING & START-UP
[30]1724000428-MAC-MAN-00030	INSTALLATION, OPERATING AND MAINTENANCE MANUAL (INCLUDING SITE ERECTION INSTRUCTIONS AND PROCEDURES)

Table 3: Vendor Documents

4.2 Acronyms and Abbreviations

Acronyms and Abbreviations	Description
AOC	Achievement of Commissioning
BLPH	Base Load Power Hub
BESS	Battery Energy Storage System
C&E	Cause & Effects
CCR	Centra Control Room
CCS	Central Control System
CCTV	Closed Circuit Television
CMS	Completions Management System
CPI	Company Provided Item
CSU	Commissioning & Start-Up
E&I	Electrical & Instrumentation
EMCS	Electrical Monitoring & Control System

Acronyms and Abbreviations	Description
ESD	Emergency Shut Down
F&G	Fire & Gas
FAT	Factory Acceptance Test
FT	Functional Test
GALT	Gross Air Leak Test
HAZID	Hazard Identification Studies
HAZOP	Hazard and Operability Studies
HKN	Hollandse Kust Noord
HSE	Health, Safety, & Environment
HSSE	Health, Safety, Security & Environment
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning
ICSS	Integrated Control and Safety System
ITR	Inspection & Test Record
LC	Locked Closed
LO	Locked Open
LOTO	Lock-Out / Tag-Out
LV	Low Voltage
OCC	Onshore Commissioning Complete
OEM	Original Equipment Manufacturer
OICT	Onshore Utility Commissioning Complete
OMAR	Operating Modes Assurance Review
OR	Operations Readiness
ORR	Operations Readiness Review
OTP	Operational Test Procedure (Commissioning)
PACO	Process Automation, Control and Optimisation
PCS	Process Control System
PC&C	Pre-Commissioning & Commissioning
PID (P&ID)	Piping and Instrumentation Diagram
PSV	Pressure Safety Valve
PSSR	Pre Start-up Safety Review
PTW	Permit to Work
PV	PothoVoltaic
PVP	Piping and Vessels Preparation

Acronyms and Abbreviations	Description
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
SMIR	Supplier Master Information Register
SoF	Statement of Fitness
TIV	Technical Integrity verification
UPS	Uninterruptible Power Supply
VHF	Very High Frequency
VooW	Van Oord Offshore Wind
VSAT	Very Small Aperture Terminal
VSAT	Very Small Aperture Terminal
WEF	Work Execution Flow Scheme

Table 4: Acronyms and Abbreviation

5. OTP TEST REQUIREMENTS – ONSHORE WORKSITE

This chapter refers 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 from Contractor.
- 1 E&I commissioning supervisor from Contractor.
- 1 E&I commissioning technicians from Contractor.
- 1 Vendor technician.
- 1 Operator workstation field engineer (phase 2).

5.1.2 Test Duration Estimate

The test duration is forecast as follows:

- 2 days approx. PHASE 1.
- 1 day PHASE 2.

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

5.1.3 Vendor Assistance

Vendor COES SRL will provide a qualified specialist to assist with all aspects of commissioning of the Instrument Air Package.

5.1.4 Items Postponed to C&E OTP

- Not Applicable

5.1.5 Summary of Items HARDWIRED to be Tested

Signal tag:	**Signal description:**
63-AIT-051	Outlet dew point
63-FIT-051	Outlet flowrate
63-XY-051 63-XY-052 63-XY-053 63-XY-054	Pneumatic on-off valves actuation
63-XV-051 63-XV-052 63-XV-053 63-XV-054	Dryer towers change-over
63-XV-055 63-XV-056	Pre-filters change-over
63-XV-059 63-XV-060	Post-filters change-over
63-PIT-064	Instrument Air Receiver pressure
63-PDIT-051	Pre-filter pressure drop
63-PDIT-062	Post-filter pressure drop
63-TIT-051	Air dryer inlet temperature
63-TIT-052	Instrument Air Receiver temperature
63-PS-054 63-PS-056 63-PS-058 63-PS-060	Air dryer towers pressure

Table 5: *Items HARDWIRING to be Tested*

5.1.6 Summary of Items HARDWIRED and PROFINET to be Tested

Signal tag:	**Signal description:**
63-XA-003	A-63000 Instrument air PKG fault
63-XS-001	SHUT-DOWN A-63000 Instrument air PKG
PROFINET	Refer to parameter list Appendix 7.6

Table 6 *Items HARDWIRING and PROFINET to be Tested*

5.2 OTP TEST REQUIREMENTS – ONSHORE WORKSITE

5.2.1 Pre-Commissioning Achievement

Prior the commissioning operation starts, the relevant pre-commissioning ITRs should be fully signed.

5.2.2 Commissioning Achievement

The commissioning achievement will be the successful operation, functionality of Instrument Air Package, installed and put in operation during the WORKSITE phase:

- 63-00: Instrument Air Package

5.2.3 Status of Required Associated Subsystems

PHASE 1: Preparation and Package Operations Tests
Subsystems required RFC for Commissioning of Instrument Air Package:

- SS 83-00 LV 400V Switchboard SG-200N1
- SS 83-20 Distribution Board DP-200N1 230V
- SS 84-10 AC 35kVA UPS (UP-200F3) 230V
- SS 88-00 Earthing System
- SS 55-01 Wastewater Brine Discharge System

PHASE 2: Validation of Communication and I/O
Subsystems required RFC for Commissioning of Instrument Air Package:

- SS 83-00 LV 400V Switchboard SG-200N1
- SS 84-10 AC 35kVA UPS (UP-200F3) 230V
- SS 83-20 Distribution Board DP-200N1 230V
- SS 88-00 Earthing System
- SS 55-01 Wastewater Brine Discharge System
- SS 86-00 Server Cabinet
- SS 86-00 Network Cabinet
- SS 79-00 SIS (ESD)
- SS 87-10 PCS System Cabinet

5.2.4 Special Tools & Test Equipment

The following special tools and Test Equipment are required:

- Continuity tester (Multimeter)
- Toolbox

- Hart Communicator
- Portable radios (2 pcs + 1 per Technical Room)
- Dew point measuring instrument (vendor supply)

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

5.2.5 Consumable List

- Not applicable

5.2.6 Commissioning Spare Parts

- See reference doc. N. 1724000428-COM-LIS-00029

5.2.7 Temporary Facilities

- Not applicable

5.3 OTP DESCRIPTION – ONSHORE WORKSITE

5.3.1 OTP Test Preparation

Step	Description	Result	Verified by	Date
1.	System Ready for Commissioning Certificate (RFC) is issued and approved.			
2.	No Mechanical Completion or Pre-commissioning punch list 'A' items are outstanding against the system to be commissioned.			
3.	Factory Acceptance Test Procedure has been carried out successfully (refer to Doc. 1724000428-QC-PRO-00024)			
4.	All personnel involved in the implementation of this procedure are familiar with its content as well as with associated safety requirements (Toolbox Talk to be conducted before initiation of activities).			
5.	A final walkdown of the system has been completed, to ensure that the system and the area are ready for commissioning.			

6.	Check that areas are free for work and escape routes are clear of any obstructions.			
7.	All safety barriers and warning signs have been installed.			
8.	Ensure that proper communications have been established between parties involved in the implementation of the procedure.			
9.	Verify availability of test equipment as per section 5.2.4.			
10.	System(s) (de)isolations as per LOTO procedure defined within HSSE Permits to Work and Commissioning procedures duly prepared and approved			
11.	All yard personnel have been duly notified by dedicated LUN (Livening Up Notification) that the system(s) is ready for commissioning.			

5.3.2 Electrical Preparation

Step	Description	Result	Verified by	Date
1.	Check related punch list 'B' items and confirm acceptability for start of commissioning activities.			
2.	Verify that all relevant associated systems / subsystems are completed.			
3.	Verify and confirm the completion of the final connections between the LV 400V Switchboard 04/+08 & 05/+08 and the two Air Compressors units K-63001A/B.			
4.	Verify and confirm the correct circuit breaker protection settings according to latest protection study revision.			
5.	Verify and confirm the completion of the final connections between the UPS (UP-200F3) MCB Q41 and the 63-LP-001 Local Control Panel.			
6.	Verify and confirm the completion of the final connections between the Distribution Board DP-200N1MCB Q29 and the 63-LP-001 Local Control Panel.			

5.3.3 Mechanical Preparation

Step	Description	Result	Verified by	Date
1.	Check the correct flow direction of the package valves			

2.	Install flexible hose if necessary for Temporary drainage.			

5.3.4 Instrument Preparation

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

5.3.5 Piping Preparation

Step	Description	Result	Verified by	Date
1.	Verify the completion of piping in conformity with system battery limit.			

5.3.6 Additional Discipline Preparation

- Not applicable

5.4 OTP TEST STEPS - ONSHORE WORKSITE (PHASE 1 & PHASE 2)

In the following steps the functionality of the Instrument Air Package shall be tested:

- SS 63-00: Instrument Air Package

5.4.1 Test Preparation

Need to Verify:

- SS 83-00 LV 400V Switchboard SG-200N1
- SS 84-10 AC 35kVA UPS (UP-200F3) 230V
- SS 83-20 Distribution Board DP-200N1 230V
- SS 88-00 Earthing System
- SS 55-01 Wastewater Brine Discharge System
- SS 86-00 Server Cabinet
- SS 86-00 Network Cabinet
- SS 79-00 SIS (ESD)

- SS 87-10 PCS System Cabinet

All systems and subsystems involved in this procedure must be ready for commissioning and available.

5.4.2 Test Step PHASE 1: Preparation and Package Operations Tests

Step	Description	Result	Verified by	Date
Energization of Instrument Air Package				
PHASE1: Preparation and Package Operations Tests				
Verify related ITR-B for System 63-00 is completed.				
1	Check and confirm that the MCB Q41 from UPS (UP-200F3) and Distribution Board DP-200N1 MCB Q29 230V are ready for power on.			
2	Check according to reference vendor document 1724000428-MAC-DG-00009 sheets 20 and 21 the following protection devices are open. 20QF1/20FU2 and 21QF1/21FU3.			
3	Confirmed the above we can proceed with energization of the Air Dryer Local Control Panel 63-LP-001.			
4	Close the MCB Q41 from UPS(UP-200F3) and with reference to vendor doc. 1724000428-MAC-DG-00009 sheet 21 verify that power supply 230V is present on the terminal strip X2:1-2 Voltage: _____ V			
5	Close the MCB Q29 from Distribution Board DP-200N1and with reference vendor doc. 1724000428-MAC-DG-00009 sheet 20 verify that power supply 230V is present on the terminal strip X1:1-2 Voltage: _____V			
6	Confirmed the steps 4 and 5 let's proceed with energization of the CPU1, CPU2, I/O RACK, SCALANCE and PN/PN COUPLER with reference vendor doc. 1724000428-MAC-DG-00009 sheets 44 and 45.			

Step	Description	Result	Verified by	Date
7	Check that there are no alarms present and that all instrumentation on the Air Dryer are powered.			
8	With reference Vendor Doc 1724000428-MAC-DG-00009 sheet 20 verify the correct functionality: internal light, anticondensation resistor and service socket.			
9	Verify loop check and alarm setting with reference vendor doc. 172400428-IN-LIS-00016 sheet 4.			
10	Check and confirm that the A4/+08 and A5/+08 drawers on the LV 400V switchboard SG-200N1 are ready for power on.			
11	Check and confirm that the Main Switch's inside the Air Compressors K-63001A/B are open, see reference document 1724000428.MAC-MAN-00030			
12	Confirmed the above we can proceed with energization of the Air Compressors K-63001A/B			
13	Close and energize drawers A4/+08 and A5/+08 from LV 400V switchboard SG-200N1 and with reference vendor doc. 1724000428.MAC-MAN-00030 verify in the Air Compressors K-63001A/B that the control voltage, line voltage and phase rotation are all correct for starting.			
14	Before starting the compressors, ensure that no persons are in a hazardous position.			
15	With reference to the first Air Compressor K-63001A, when the display shows READY TO START, press the dedicated START button. The compressor will start in an unloaded state then automatically load depending on demand.			
16	Pressing the dedicated button UNLOAD STOP will activate the unload stop sequence. If the compressor is running loaded, it will first unload and then stop. If the compressor is running unloaded, it will stop immediately.			
17	Pressing the dedicated button UNLOAD will cause the compressor to unload and remain running and unloaded. The display will indicate that the machine is RUNNING UNLOADED with MODE UNLOAD.			

Step	Description	Result	Verified by	Date
18	Pressing the dedicated button LOAD will cause the compressor to load if the compressor is running and if the DISCHARGE PRESSURE is less than the ONLINE PRESSURE. This also returns the machine to the operating mode that is specified by the MODE OF OPERATION set point. The other buttons provide access to various operator–selectable functions and machine operating conditions. The purpose of each of these buttons is defined by the display screen and the particular function being performed at that time.			
19	With reference to the second Air Compressor K-63001B, repeat the test steps from n. 15 to n. 18.			
20	The sequence local mode Air Dryer is from Local Control Panel 63-LP-001. Before starting the sequence verify in the front LCP: • Lamp 230V SERVICE 63-XL–001 is on • Lamp 230V UPS 63-XL-002 is on • Lamp 24V 63-XL-004 is on • Lamp ALARM 63-XA-001 is off			
21	Turns the selector 63-HS-004 in local mode and start pushbutton 63-HS-001. Verify in the front LCP the running status lamp 63-XL-003 is on, (the sequence is starting). Verify the start sequence in local mode with vendor document 172400428-MAC-CE-0004.			
22	The PLC inside the LCP 63-LP-001 will manage the sequence Air Dryer and interface with Compressors K-63001A and K-63001B.			
23	The dryer consists of two pressure towers. Both towers are filled with desiccant. A tower removes moisture from compressed air. The moist air passes directly through a desiccant tower that absorbs moisture. When the tower is saturated with moisture, the valves switch and conduct air to the other spare tower. During absorption on the second tower, the first tower will respawn. This is a cyclical process. The tower containing the saturated desiccant is depressurized and the accumulated water is expelled.			

Step	Description	Result	Verified by	Date
24	During the testing verify the: Dew point analyzer 63-AIT-051 • …….. °C Fow downstream dryer 63-FIT-051 • ……. Sm³/h Air dryer intel temperature 63-TIT-051 • …….. °C. Air receiver pressure 63-PIT-064 • …….. barg. Differential pressure Pre-filter 63-PDIT-051 • …….. barg. Differential pressure After filter 63-PDIT-062 • …….. barg. For the set point alarms are in the document vendor 1724000428-IN-LIS-00017 sheet 2 and 3			
25	Test Acceptance criteria: • Outlet air dew point -40°C • Outlet air flow 350 Sm³/h • Outlet air pressure 9 barg • Outlet air temperature 35°C			
26	After Validation of the process parameters detailed above proceed to the stop sequence, press the stop pushbutton 63-HS-002.			
27	The shutdown Air Dryer is given by the: • Emergency push button 63-SBM-001 Cumulative critical alarm 63-XS-003.			

5.4.3 Test Preparation PHASE 2: Validation of Communication and I/O

Step	Description	Result	Verified by	Date
PROFINET Communication Instrument Air Package				
PHASE 2: Validation of Communication and I/O				
1.	Check and confirm all panels are involved as per section 5.4.1 are available.			
2.	Verify the interface Profinet Communication from PCS System to Control Local Control Panel 63-LP-001 is available and has no communication problem.			
3.	Verify the Profinet Signal and alarm setting from 63-LP-001 to HMI/workstation in CCR with vendor document 1724000428-MD-LIS-00016.			
4.	Verify the hardwiring signal from 63-LP-001 to SIS in HMI/workstation in CCR: • 63-XA-003: Instrument Air PKG fault. • 63-XS-001: SHUT-DOWN Instrument Air PKG.			
5.	During the step 3 to 4 verify and confirm the correct animation in the graphic page in the HMI/workstation.			
6.	Confirmed the steps 1 to 5 let's proceed with start the Instrument Air PKG in remote mode from workstation located in temporary yard CCR. Verify the start sequence with vendor document 172400428-MAC-CE-0004.			
7.	Confirmed step 6 proceed to send STOP command to the Instrument Air PKG in remote mode from workstation located in temporary yard CCR.			
8.	Start once again the Instrument Air PKG in remote mode from workstation located in temporary yard CCR and validate the trip signal from send from SIS (63-XA-001). Confirm Instrument Air Package stopped, then reset tip signal and confirm Package ready to start.			
9.	Steps 6 to 8 must be repeated for the Air Compressors K-63001A and K-63001B.			

5.4.4 OTP Worksite Tests Notes and Remark

5.4.5 OTP Worksite Tests Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature

5.4.6 OTP Worksite Test Final Signatures and Company Acceptance

Name and Surname	Company Representative	Position	Signature

5.5 POST TEST CONDITION

the previous chapters are successfully performed.

- All necessary tests are performed and accepted for that system.
- All Communication Cables are tested and completed.
- All panels are in normal operation and no alarm pending.

5.6 REINSTATEMENT AND PRESERVATION TASKS

- 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 safety condition and that they are operational.
- all preservation routines identified and required will be included in relevant Preservation ITR within the Proverlis Completions System.

6. OTP AT OFFSHORE SITE

6.1 PLANNING AND MANPOWER

6.1.1 Offshore Site Test Overview

The propose of this test is to recheck the good condition of all equipment and the commissioning of the Instrument Air Package. At the end of the test the equipment will remain in operation.

6.1.2 Planned Tasks with Estimated Manpower

Estimated manpower for the entire duration of the Test:

- 1 E&I commissioning supervisor from Contractor.
- 1 E&I commissioning technicians from Contractor.
- 1 Operator workstation field engineer.

6.1.3 Test Duration Estimate

The test duration should be as follows:

- 1 day.

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

6.1.4 Vendor Assistance

- Not applicable

6.1.5 Items Postponed to C&E OTP

- Not applicable

6.1.6 HOLDS

- Not applicable

6.2 OTP TEST REQUIREMENT – OFFSHORE SITE

6.2.1 Pre-Commissioning Achievement

- Not applicable

6.2.2 Commissioning Achievement

- Not applicable

6.2.3 Status of Required Associated Subsystem

Subsystems required for Commissioning of Instrument Air Package:

- SS 83-00 LV 400V Switchboard SG-200N1
- SS 84-10 AC 35kVA UPS (UP-200F3) 230V
- SS 83-20 Distribution Board DP-200N1 230V
- SS 88-00 Earthing System
- SS 55-01 Wastewater Brine Discharge System
- SS 86-00 Server Cabinet
- SS 86-00 Network Cabinet
- SS 79-00 SIS (ESD)
- SS 87-10 PCS System Cabinet

6.2.4 Special Tools & Test Equipment

The following special tool and Test Equipment are required:

- Continuity tester (Multimeter)
- Hart communicator
- Toolbox
- Portable radios (2 pcs + 1 per Technical Room)

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

6.2.5 Consumable List

- Not applicable

6.2.6 Commissioning Spare Parts

The commissioning spare parts are indicated in the document 1724000428-COM-LIS-00029 "Commissioning Spare Parts".

6.2.7 Temporary Facilities

- Not applicable

6.3 OTP DESCRIPTION – OFFSHORE SITE

6.3.1 OTP Test Preparation

Step	Description	Result	Verified by	Date
1.	System Ready for Operation (from WORKSITE Phase) (RFO) Certificate is issued and approved.			
2.	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).			
3.	A final walkdown of the system has been completed, to ensure that the system and the area are ready for start-up.			
4.	Verify availability of test equipment as per section 6.2.4.			
5.	All personnel have been duly notified that the system(s) is ready for start-up.			

6.3.2 Electrical Preparation

Step	Description	Result	Verified by	Date
1.	Verify that all relevant associated systems / subsystems are ready.			

6.3.3 Mechanical Preparation

Step	Description	Result	Verified by	Date
1.	Verify that all relevant associated systems / subsystems are ready.			

6.3.4 Instrument Preparation

Step	Description	Result	Verified by	Date
1.	Verify all Panels are available as per section 6.2.3			

6.3.5 Piping Preparation

- Not applicable

6.3.6 Additional Discipline Preparation

- Not applicable

6.4 OTP TEST STEPS - OFFSHORE SITE

6.4.1 Test Preparation

Need to confirm availability of the following systems
:

- SS 83-20 Distribution Board 230V (MCB Q29) is available.
- SS 84-10 UPS (UP-200F3) 230V (MCB Q41) is available.
- SS 83-00 LV 400V SG-200N1 (04/+08 & 05/+08) is available.
- SS 86-00 NETWORK CABINET is available.
- SS 86-00 SERVER CABINET is available.
- SS 79-00 SIS SYSTEM is available.
- SS 87-10 PCS SYSTEM is available.

All systems and subsystems involved in this procedure must be ready and available.

6.4.2 Test Steps

Step	Description	Result	Verified by	Date
Energization of Instrument Air Package				
System 63-00 is completed.				
1.	Check and confirm that the MCB Q41 from UPS (UP-200F3) and MCB Q29 from Distribution Board DP-200N1 230V are ready for power on.			
2.	Confirmed the above we can proceed with energization of the Air Dryer LCP63-LP-001.			
3.	Check on the Air Driver LCP 63-LP-001 that voltage is available for the control circuit and for starting.			
4.	Check and confirm that the A4/08 and A5/08 drawers on the LV 400V switchboard SG-200N1 are ready for power on.			
5.	Confirmed the above we can proceed with energization of the Air Compressors K-63001A / K-63001B.			

Step	Description	Result	Verified by	Date
6.	Check on the Air Compressors K-63001A and K-63001B that the control voltage and the line voltage is available for starting.			
7.	Before starting the compressors, make sure that the Profinet communication between PCS Panel to Air Driver LCP is available and has no communication problem.			
8.	Confirmed the steps 1 to 7, the Instrument Air Package System is ready for start-up.			
9.	Turn the selector 63-HS-004 in local mode and start pushbutton 63-HS-001. Check the correct starting sequence and: • Outlet air dew point -40°C • Outlet air flow 350 Sm^3/h • Outlet air pressure 9 barg • Outlet air temperature 35°c			
10.	The test will only give a positive result if the required parameters are reached. After Validation of the process parameters, give the stop from local 63-HS-002.			
11.	Repeat the sequence of start and stop remotely from the CCR (Central Control Room).			

6.4.3 OTP Site Tests Notes and Remarks

6.4.4 OTP Site Tests Certifying Authority Table of Attendances

Name and Surname	Certifying Authority	Position	Signature

6.4.5 OTP Site Tests Final Signatures and Company Acceptance

Name and Surname	Company Representative	Position	Signature

6.5 POST TEST CONDITIONS

- The previous chapters are successfully performed.
- All panels are in normal operation and no alarm pending.

6.6 REINSTATEMENT AND PRESERVATION TASKS

After the test are completed, the system is left in a safe condition and that it is operational.

7. APPENDICES

7.1 Vendor SAT Procedure (where applicable)

7.2 Proverlis Summary System Reports

7.3 Equipment Related Technical Queries (where applicable)

7.4 As Built Documentation (where applicable)

7.5 Management of Change – Summery Table of Tasks and Details of Affected Related Documentation (where applicable)

7.6 Profinet Signal Table

4814_COES_Dryer — PROFINET SIGNALS TABLE — Rev 1 03/07/2024

N. BYTE	N. BIT	DATA TYPE	TAG	DESCRIPTION	MEANING	SCALING	OFFSET	READ/WRITE	
1000	0	BOOL		SPARE				R	ALARMS
	1	BOOL		SPARE				R	
	2	BOOL		SPARE				R	
	3	BOOL		SPARE				R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1001	0	BOOL		SPARE				R	
	1	BOOL		SPARE				R	
	2	BOOL		SPARE				R	
	3	BOOL		SPARE				R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1002	0	BOOL	63-PS-054-H	ALARM (DRYER 1) TOWER A PRESSURE SWITCH	0=ALARM, 1=OK			R	
	1	BOOL	63-PS-056-H	ALARM (DRYER 1) TOWER B PRESSURE SWITCH	0=ALARM, 1=OK			R	
	2	BOOL	63-PS-058-H	ALARM (DRYER 2) TOWER A PRESSURE SWITCH	0=ALARM, 1=OK			R	
	3	BOOL	63-PS-060-H	ALARM (DRYER 2) TOWER B PRESSURE SWITCH	0=ALARM, 1=OK			R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1003	0	BOOL	63-CMPR-ALARM-FDBCK-001-H	COMPRESSOR 1 - GENERAL ALARM	0=ALARM, 1=OK			R	
	1	BOOL	63-CMPR-ALARM-FDBCK-002-H	COMPRESSOR 2 - GENERAL ALARM	0=ALARM, 1=OK			R	
	2	BOOL	63-20FS-12-H	SOURGE ARRESTER 230VAC_SERVICES - ALARM	0=ALARM, 1=OK			R	
	3	BOOL	63-21FS-12-H	SOURGE ARRESTER 230VAC_UPS - ALARM	0=ALARM, 1=OK			R	
	4	BOOL	63-TH-001-H	INTERNAL CABINET THERMOSTAT - ALARM	0=ALARM, 1=OK			R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1004	0	BOOL	63-XY-051-H	ALARM 5-WAY VALVE SOV (DRYER 1)	0=ALARM, 1=OK			R	
	1	BOOL	63-XY-052-H	ALARM DEPRESSURIZATION VALVE SOV (DRYER 1)	0=ALARM, 1=OK			R	
	2	BOOL		SPARE				R	
	3	BOOL		SPARE				R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1005	0	BOOL	63-XY-053-H	ALARM 5-WAY VALVE SOV (DRYER 2)	0=ALARM, 1=OK			R	
	1	BOOL	63-XY-054-H	ALARM DEPRESSURIZATION VALVE SOV (DRYER 2)	0=ALARM, 1=OK			R	
	2	BOOL		SPARE				R	
	3	BOOL		SPARE				R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1006	0	BOOL		SPARE				R	
	1	BOOL		SPARE				R	
	2	BOOL		SPARE				R	
	3	BOOL		SPARE				R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1007	0	BOOL	63-AIT-051-LL	DEW POINT TRANSMITTER - LOW LOW ALARM (LL)	0=ALARM, 1=OK			R	
	1	BOOL	63-AIT-051-L	DEW POINT TRANSMITTER - LOW ALARM (L)	0=ALARM, 1=OK			R	
	2	BOOL	63-AIT-051-H	DEW POINT TRANSMITTER - HIGH ALARM (H)	0=ALARM, 1=OK			R	
	3	BOOL	63-AIT-051-HH	DEW POINT TRANSMITTER - HIGH HIGH ALARM (HH)	0=ALARM, 1=OK			R	
	4	BOOL	63-PT-064-LL	PRESSURE TRANSMITTER INSTRUMENT AIR RECIEVER - LOW LOW ALARM (LL)	0=ALARM, 1=OK			R	
	5	BOOL	63-PT-064-L	PRESSURE TRANSMITTER INSTRUMENT AIR RECIEVER - LOW ALARM (L)	0=ALARM, 1=OK			R	
	6	BOOL	63-PT-064-H	PRESSURE TRANSMITTER INSTRUMENT AIR RECIEVER - HIGH ALARM (H)	0=ALARM, 1=OK			R	
	7	BOOL	63-PT-064-HH	PRESSURE TRANSMITTER INSTRUMENT AIR RECIEVER - HIGH HIGH ALARM (HH)	0=ALARM, 1=OK			R	
1008	0	BOOL	63-TIT-051-LL	TEMPERATURE TRANSMITTER INLET AIR - LOW LOW ALARM (LL)	0=ALARM, 1=OK			R	
	1	BOOL	63-TIT-051-L	TEMPERATURE TRANSMITTER INLET AIR - LOW ALARM (L)	0=ALARM, 1=OK			R	
	2	BOOL	63-TIT-051-H	TEMPERATURE TRANSMITTER INLET AIR - HIGH ALARM (H)	0=ALARM, 1=OK			R	
	3	BOOL	63-TIT-051-HH	TEMPERATURE TRANSMITTER INLET AIR - HIGH HIGH ALARM (HH)	0=ALARM, 1=OK			R	
	4	BOOL	63-TIT-052-LL	TEMPERATURE TRANSMITTER INSTRUMENT AIR RECIEVER - LOW LOW ALARM (LL)	0=ALARM, 1=OK			R	
	5	BOOL	63-TIT-052-L	TEMPERATURE TRANSMITTER INSTRUMENT AIR RECIEVER - LOW ALARM (L)	0=ALARM, 1=OK			R	
	6	BOOL	63-TIT-052-H	TEMPERATURE TRANSMITTER INSTRUMENT AIR RECIEVER - HIGH ALARM (H)	0=ALARM, 1=OK			R	
	7	BOOL	63-TIT-052-HH	TEMPERATURE TRANSMITTER INSTRUMENT AIR RECIEVER - HIGH HIGH ALARM (HH)	0=ALARM, 1=OK			R	
1009	0	BOOL	63-FIT-051-LL	FLOW TRANSMITTER OUTLET AIR - LOW LOW ALARM (LL)	0=ALARM, 1=OK			R	
	1	BOOL	63-FIT-051-L	FLOW TRANSMITTER OUTLET AIR - LOW ALARM (L)	0=ALARM, 1=OK			R	
	2	BOOL	63-FIT-051-H	FLOW TRANSMITTER OUTLET AIR - HIGH ALARM (H)	0=ALARM, 1=OK			R	
	3	BOOL	63-FIT-051-HH	FLOW TRANSMITTER OUTLET AIR - HIGH HIGH ALARM (HH)	0=ALARM, 1=OK			R	
	4	BOOL	63-PDIT-051-LL	DIFFERENTIAL PRESSURE TRANSMITTER INLET FILTERS - LOW LOW ALARM (LL)	0=ALARM, 1=OK			R	
	5	BOOL	63-PDIT-051-L	DIFFERENTIAL PRESSURE TRANSMITTER INLET FILTERS - LOW ALARM (L)	0=ALARM, 1=OK			R	
	6	BOOL	63-PDIT-051-H	DIFFERENTIAL PRESSURE TRANSMITTER INLET FILTERS - HIGH ALARM (H)	0=ALARM, 1=OK			R	
	7	BOOL	63-PDIT-051-HH	DIFFERENTIAL PRESSURE TRANSMITTER INLET FILTERS - HIGH HIGH ALARM (HH)	0=ALARM, 1=OK			R	
1010	0	BOOL	63-PDIT-052-LL	DIFFERENTIAL PRESSURE TRANSMITTER OUTLET FILTERS - LOW LOW ALARM (LL)	0=ALARM, 1=OK			R	
	1	BOOL	63-PDIT-052-L	DIFFERENTIAL PRESSURE TRANSMITTER OUTLET FILTERS - LOW ALARM (L)	0=ALARM, 1=OK			R	
	2	BOOL	63-PDIT-052-H	DIFFERENTIAL PRESSURE TRANSMITTER OUTLET FILTERS - HIGH ALARM (H)	0=ALARM, 1=OK			R	
	3	BOOL	63-PDIT-052-HH	DIFFERENTIAL PRESSURE TRANSMITTER OUTLET FILTERS - HIGH HIGH ALARM (HH)	0=ALARM, 1=OK			R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1011	0	BOOL	63-AIT-051-BADPV	DEW POINT TRANSMITTER - BAD PROCESS VALUE	0=ALARM, 1=OK			R	
	1	BOOL	63-PT-064-BADPV	PRESSURE TRANSMITTER INSTRUMENT AIR RECIEVER - BAD PROCESS VALUE	0=ALARM, 1=OK			R	
	2	BOOL	63-TIT-051-BADPV	TEMPERATURE TRANSMITTER INLET AIR - BAD PROCESS VALUE	0=ALARM, 1=OK			R	
	3	BOOL	63-TIT-052-BADPV	TEMPERATURE TRANSMITTER INSTRUMENT AIR RECIEVER - BAD PROCESS VALUE	0=ALARM, 1=OK			R	
	4	BOOL	63-FIT-051-BADPV	FLOW TRANSMITTER OUTLET AIR - BAD PROCESS VALUE	0=ALARM, 1=OK			R	
	5	BOOL	63-PDIT-051-BADPV	DIFFERENTIAL PRESSURE TRANSMITTER INLET FILTERS - BAD PROCESS VALUE	0=ALARM, 1=OK			R	
	6	BOOL	63-PDIT-052-BADPV	DIFFERENTIAL PRESSURE TRANSMITTER OUTLET FILTERS - BAD PROCESS VALUE	0=ALARM, 1=OK			R	
	7	BOOL		SPARE				R	PLANT STATUS
1012	0	BOOL	63-ESD-SIS-001-H	PLANT SHUTDOWN ALARM (SIS)	0=SHUTDOWN ALARM, 1=OK			R	
	1	BOOL	63-ALARM-PLANT	PLANT GENERAL ALARM	0=CUMULATIVE STANDARD ALARM, 1=OK			R	
	2	BOOL	63-PLANT-READY	PLANT READY	0=NOT READY, 1=READY TO START			R	
	3	BOOL	63-PLANT-RUNNING	PLANT RUNNING	0=STOPPED, 1=RUNNING			R	
	4	BOOL	63-PLANT-LOCA-REM	PLANT IN REMOTE MODE	0=LOCAL (PLC), 1=REMOTE (DCS)			R	
	5	BOOL	63-ALARM-DRY-001	DRYER 1 ALARM	0=ALARM, 1=OK			R	
	6	BOOL	63-ALARM-DRY-002	DRYER 2 ALARM	0=ALARM, 1=OK			R	
	7	BOOL		SPARE				R	
1013	0	BOOL	63-CMPR-START-001	COMPRESSOR 1 COMMAND	1=RUN COMMAND (ONLY FOR INFO)			R	
	1	BOOL	63-CMPR-START-002	COMPRESSOR 2 COMMAND	1=RUN COMMAND (ONLY FOR INFO)			R	
	2	BOOL		SPARE				R	
	3	BOOL		SPARE				R	
	4	BOOL	63-CMPR-RUN-FDBCK-001	COMPRESSOR 1 RUNNING	1=RUNNING STATUS RECEIVED			R	
	5	BOOL	63-CMPR-RUN-FDBCK-002	COMPRESSOR 2 RUNNING	1=RUNNING STATUS RECEIVED			R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1014	0	BOOL	63-XY-051	(DRYER 1) 5-WAY VALVE SOV OPEN COMMAND	1=OPEN COMMAND			R	
	1	BOOL	63-XY-052	(DRYER 1) DEPRESSURIZATION VALVE SOV OPEN COMMAND	1=OPEN COMMAND			R	
	2	BOOL	63-XY-053	(DRYER 2) 5-WAY VALVE SOV OPEN COMMAND	1=OPEN COMMAND			R	
	3	BOOL	63-XY-054	(DRYER 2) DEPRESSURIZATION VALVE SOV OPEN COMMAND	1=OPEN COMMAND			R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	

	7	BOOL		SPARE				R	
1015	0	BOOL		SPARE				R	
	1	BOOL		SPARE				R	
	2	BOOL		SPARE				R	
	3	BOOL		SPARE				R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1016	0	BOOL		SPARE				R	
	1	BOOL		SPARE				R	
	2	BOOL		SPARE				R	
	3	BOOL		SPARE				R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1017	0	BOOL		SPARE				R	
	1	BOOL		SPARE				R	
	2	BOOL		SPARE				R	
	3	BOOL		SPARE				R	
	4	BOOL		SPARE				R	
	5	BOOL		SPARE				R	
	6	BOOL		SPARE				R	
	7	BOOL		SPARE				R	
1018	/	REAL (IEEE 754)	63-AIT-051-PV	DEW POINT TRANSMITTER - PROCESS VALUE	range -100..20 °C			R	MEASURES
1022	/	REAL (IEEE 754)	63-PT-064-PV	PRESSURE TRANSMITTER INSTRUMENT AIR RECIEVER - PROCESS VALUE	range 0..16 barg			R	
1026	/	REAL (IEEE 754)	63-TIT-051-PV	TEMPERATURE TRANSMITTER INLET AIR - PROCESS VALUE	range 0..100 °C			R	
1030	/	REAL (IEEE 754)	63-TIT-052-PV	TEMPERATURE TRANSMITTER INSTRUMENT AIR RECIEVER - PROCESS VALUE	range 0..100 °C			R	
1034	/	REAL (IEEE 754)	63-FIT-051-PV	FLOW TRANSMITTER OUTLET AIR - PROCESS VALUE	range 0..500 Sm3/h			R	
1038	/	REAL (IEEE 754)	63-PDIT-051-PV	DIFFERENTIAL PRESSURE TRANSMITTER INLET FILTERS - PROCESS VALUE	range 0..1 bar			R	
1042	/	REAL (IEEE 754)	63-PDIT-052-PV	DIFFERENTIAL PRESSURE TRANSMITTER OUTLET FILTERS - PROCESS VALUE	range 0..1 bar			R	
1046	/	REAL (IEEE 754)		SPARE				R	
1050	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 001	To be defined according to Control Philosophy			R	PARAMETERS
1054	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 002				R	
1058	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 003				R	
1062	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 004				R	
1066	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 005				R	
1070	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 006				R	
1074	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 007				R	
1078	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 008				R	
1082	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 009				R	
1086	/	REAL (IEEE 754)		SPARE - REAL PARAMETER 010				R	
1090	/	INT		SPARE - INTEGER PARAMETER 001		/	0	R	
1092	/	INT		SPARE - INTEGER PARAMETER 002		/	0	R	
1094	/	INT		SPARE - INTEGER PARAMETER 003		/	0	R	
1096	/	INT		SPARE - INTEGER PARAMETER 004		/	0	R	
1098	/	INT		SPARE - INTEGER PARAMETER 005		/	0	R	
1100	/	INT		SPARE - INTEGER PARAMETER 006		/	0	R	
1102	/	INT		SPARE - INTEGER PARAMETER 007		/	0	R	
1104	/	INT		SPARE - INTEGER PARAMETER 008		/	0	R	
1106	/	INT		SPARE - INTEGER PARAMETER 009		/	0	R	
1108	/	INT		SPARE - INTEGER PARAMETER 010		/	0	R	
1110	/	TIME (DINT)		SPARE - TIME PARAMETER 001				R	
1114	/	TIME (DINT)		SPARE - TIME PARAMETER 002				R	
1118	/	TIME (DINT)		SPARE - TIME PARAMETER 003				R	
1122	/	TIME (DINT)		SPARE - TIME PARAMETER 004				R	
1126	/	TIME (DINT)		SPARE - TIME PARAMETER 005				R	
1130	/	TIME (DINT)		SPARE - TIME PARAMETER 006				R	
1134	/	TIME (DINT)		SPARE - TIME PARAMETER 007				R	
1138	/	TIME (DINT)		SPARE - TIME PARAMETER 008				R	
1142	/	TIME (DINT)		SPARE - TIME PARAMETER 009				R	
1146	/	TIME (DINT)		SPARE - TIME PARAMETER 010				R	

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PROFINET SIGNALS TABLE

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N. BYTE	N. BIT	DATA TYPE	TAG	DESCRIPTION	MEANING	SCALING	OFFSET	READ/WRITE	
	0	BOOL	63-START-PLANT-CMD	REMOTE START COMMAND	1 = START			W	REMOTE COMMANDS
	1	BOOL	63-STOP-PLANT-CMD	REMOTE STOP COMMAND	0 = STOP			W	
	2	BOOL		SPARE				W	
	3	BOOL	63-ACK-ALARM	REMOTE ALARMS ACKNOWLEDGE	1 = ACK (PULSE 1 sec)			W	
	4	BOOL		SPARE				W	
	5	BOOL		SPARE				W	
	6	BOOL		SPARE				W	
1150	7	BOOL		SPARE				W	
	0	BOOL		SPARE				W	
	1	BOOL		SPARE				W	
	2	BOOL		SPARE				W	
	3	BOOL		SPARE				W	
	4	BOOL		SPARE				W	
	5	BOOL		SPARE				W	
	6	BOOL		SPARE				W	
1151	7	BOOL		SPARE				W	
1152	/	REAL		SPARE - REAL PARAMETER 001	To be defined according to Control Philosophy				PARAMETERS
1156	/	REAL		SPARE - REAL PARAMETER 002				W	
1160	/	REAL		SPARE - REAL PARAMETER 003				W	
1164	/	REAL		SPARE - REAL PARAMETER 004				W	
1168	/	REAL		SPARE - REAL PARAMETER 005				W	
1172	/	REAL		SPARE - REAL PARAMETER 006				W	
1176	/	REAL		SPARE - REAL PARAMETER 007				W	
1180	/	REAL		SPARE - REAL PARAMETER 008				W	
1184	/	REAL		SPARE - REAL PARAMETER 009				W	
1188	/	REAL		SPARE - REAL PARAMETER 010				W	
1192	/	INT		SPARE - INTEGER PARAMETER 001		/	0	W	
1194	/	INT		SPARE - INTEGER PARAMETER 002		/	0	W	
1196	/	INT		SPARE - INTEGER PARAMETER 003		/	0	W	
1198	/	INT		SPARE - INTEGER PARAMETER 004		/	0	W	
1200	/	INT		SPARE - INTEGER PARAMETER 005		/	0	W	
1202	/	INT		SPARE - INTEGER PARAMETER 006		/	0	W	
1204	/	INT		SPARE - INTEGER PARAMETER 007		/	0	W	
1206	/	INT		SPARE - INTEGER PARAMETER 008		/	0	W	
1208	/	INT		SPARE - INTEGER PARAMETER 009		/	0	W	
1210	/	INT		SPARE - INTEGER PARAMETER 010		/	0	W	
1212	/	TIME (DINT)		SPARE - TIME PARAMETER 001				W	
1216	/	TIME (DINT)		SPARE - TIME PARAMETER 002				W	
1220	/	TIME (DINT)		SPARE - TIME PARAMETER 003				W	
1224	/	TIME (DINT)		SPARE - TIME PARAMETER 004				W	
1228	/	TIME (DINT)		SPARE - TIME PARAMETER 005				W	
1232	/	TIME (DINT)		SPARE - TIME PARAMETER 006				W	
1236	/	TIME (DINT)		SPARE - TIME PARAMETER 007				W	
1240	/	TIME (DINT)		SPARE - TIME PARAMETER 008				W	
1244	/	TIME (DINT)		SPARE - TIME PARAMETER 010				W	

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