Base Load Power Hub (BLPH)

SITE ACCEPTANCE TEST (SAT) PROCEDURE

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1 Introduction

1.1 General

The purpose of this document is to define the methods and documentation that will be used to carry out the Site Acceptance Test (SAT) on YOKOGAWA's PCS, SIS, FGS, EMCS and SCADA. The SAT is performed to ensure that the system is properly configured, assembled and functional in accordance with the intended design as specified in the approved documents.

The objective of SAT is to demonstrate to CROSSWIND that the system hardware and software is built in accordance to requirements as specified in the approved documents.

Crosswind and Rosetti Marino would witness to verify the test. Upon successful completion of the test, a SAT Test Certificate shall be signed for the acceptance of the test.

1.2 Scope and Objective

The Site Acceptance Test referred to as SAT applies to the PCS, SIS, FGS, EMCS and SCADA Hardware and Software supplied by Yokogawa.

The objective of the SAT is to ensure that the system is properly installed and functional in accordance to the intended design as stated in the approved documents.

The SAT is to demonstrate to CROSSWIND that the system hardware and software is built in accordance to requirements as specified in the approved documents.

The project scope of work for YOKOGAWA generally ends at the conclusion of SAT. YOKOGAWA involvement in other site activities such as loop check and commissioning considered as additional scope of work.

SAT Procedure outlines the following:

- Testing and inspection philosophy
- Steps and Activities involved in the SAT
- Criteria for checking and accepting the system

Prior to start SAT, all the PCS/SIS/FGS/SCADA/EMCS Hardware delivered shall be installed to proper location and system related cables, such as system cable, power cable, earthing, fiber optic cables, etc. shall be laid by ROSSETI MARINO.

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2 Reference Documents

2.1 Input Documents

The PCS, SIS, EMCS and F&G systems are configured using input documents such as IO Database, P&IDs, Cause & Effect Diagrams, F&G Layouts, Process Control Narratives, etc. These input documents shall be used as reference documents for SAT. These documents are listed.

2.1.1 Project Reference Documents

Doc. No.	Description
123A90-DDL-IN-DD-40019 Rev.00	Data Network Architecture Drawings
123A90-DDL-EL-DG-20041 Rev.00	Block Diagram (EMCS)
123A90-PML-PM-TQ-00050 Rev.01	Reactive power control requirement for BLPH
123A90-DDL-EL-DS-20040 Rev.00	TDS - Electrical Monitoring and Control System (EMCS)
123A90-PML-PM-TQ-00052 Rev.00	Interface with Electrolyzer
123A90-PML-PM-TQ-00053 Rev.00	Interface with BESS
123A90-PML-PM-TQ-00054 Rev.00	Interface with WINDFARM and WTG-57
123A90-PML-PM-TQ-00055 Rev.01	Interface with SOLAR FARM
123A90-PML-QHSE-PRO-00113 Rev.01	Vendor final document requirements and management
123A90-PML-PM-RE-00038 Rev.01	PROJECT CODES AND STANDARDS REPORT
123A90-DDL-TL-SP-45007 Rev.02	Telecom System Philosophy and Specifications
123A90-DDL-SAF-DL-30027 Rev.00	FandG detection Layout - lower and upper deck
123A90-DDL-SAF-DL-30028 Rev.00	FandG detection Layout - Below Lower deck
123A90-DDL-PR-UFD-80006 Rev.01	BLPH UTILITY FLOW DIAGRAM WATER TREATMENT PLANT
123A90-DDL-PR-UFD-80007 Rev.01	BLPH UTILITY FLOW DIAGRAM INSTRUMENT AIR AND NITROGEN SYSTEMS
123A90-DDL-PR-UFD-80008 Rev.01	BLPH UTILITY FLOW DIAGRAM VENT SYSTEMS
123A90-DDL-IN-SP-40018 Rev. 00	Data Network Design Specification

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Doc. No.	Description
123A90-DDL-IN-SP-40094 Rev. 00	Instrumentation for Package Unit Specification
123A90-DDL-IN-SP-40097 Rev.00	System Specification for Main Automation Contractor
123A90-DDL-IN-SP-40098 Rev.00	Control System (PCS) Specification
123A90-DDL-IN-SP-40100 Rev.00	Safety System (ESD, Fire and Gas) Specification
123A90-DDL-IN-RE-40023 Rev. 00	Cyber Security Design Philosophy
123A90-DDL-IN-RE-40093 Rev. 00	Control System Philosophy
123A90-DDL-IN-DL-40013 Rev.00	Earthing layouts drawings (Onshore CCR, Offshore ITER)
123A90-DDL-IN-DD-40096 Rev.00	Control System Architecture Detailed Drawings
123A90-DDL-IN-DD-40029 Rev.00	Automation Detailed Design and Construction Package
123A90-DDL-EL-SP-20039 Rev.00	Functional and Technical Design Specification, IDS and DDS for EMCS
123A90-DDL-PR-DG-80000 Rev.01	Process Safety Cause and Effect Block Diagram
123A90-DDL-IN-MR-40103 Rev.01	MR - Process Automation System
123A90-DDL-IN-CE-40000 Rev.03	Process Safety Cause and Effect Matrix
123A90-DDL-IN-CE-40002 Rev.02	Fire and Gas Cause and Effect Matrix
123A90-DDL-PR-PID-80009 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM GENERAL NOTES
123A90-DDL-PR-PID-80010 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM PIPING SYMBOLOGY
123A90-DDL-PR-PID-80011 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM ELECTROLYSER PACKAGE
123A90-DDL-PR-PID-80012 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM FUEL CELL PACKAGE
123A90-DDL-PR-PID-80013 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN STORAGE VESSELS HEADER (INLET)
123A90-DDL-PR-PID-80014 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN STORAGE VESSELS HEADER (OUTLET)
123A90-DDL-PR-PID-80015 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN STORAGE VESSEL A

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Doc. No.	Description
123A90-DDL-PR-PID-80016 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN STORAGE VESSEL B
123A90-DDL-PR-PID-80019 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN STORAGE VESSEL E
123A90-DDL-PR-PID-80017 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN STORAGE VESSEL C
123A90-DDL-PR-PID-80018 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN STORAGE VESSEL D
123A90-DDL-PR-PID-80020 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN STORAGE VESSEL F
123A90-DDL-PR-PID-80021 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM SEA-WATER INTAKE SYSTEM SHEET 1
123A90-DDL-PR-PID-80022 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM SEA-WATER INTAKE SYSTEM SHEET 2
123A90-DDL-PR-PID-80023 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM WATER TREATMENT PLANT SHEET 1
123A90-DDL-PR-PID-80024 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM WATER TREATMENT PLANT SHEET 2
123A90-DDL-PR-PID-80025 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM WATER DISPOSAL SHEET 1
123A90-DDL-PR-PID-80026 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM WATER DISPOSAL SHEET 2
123A90-DDL-PR-PID-80027 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM INSTRUMENT AIR PACKAGE
123A90-DDL-PR-PID-80029 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN VENT DRUM
123A90-DDL-PR-PID-80028 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN VENT HEADER
123A90-DDL-PR-PID-80041 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM Instrument air distribution header
123A90-DDL-PR-PID-80042 Rev.02	BLPH PIPING AND INSTRUMENTATION DIAGRAM instrumentation SYMBOLOGY
123A90-DDL-PR-PID-80043 Rev.00	BLPH PIPING AND INSTRUMENTATION DIAGRAM - OPEN DRAIN SYSTEM
123A90-MOM-RM-OOE-CW-002 Rev.00	Solar Package – BLPH Network Redundancy discussion
CWHKN-INN-INP-SPC-00005 Rev.01	SCADA Functional Design Specification

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Doc. No.	Description
Crosswind - System Security Requirements v1.0	SYSTEM SECURITY REQUIREMENTS
123A90-DDL-IN-LIS-40027 Rev.01	Master Alarm Database
123A90-DDL-IN-RE-40026 Rev.00	Alarm Management Workshop Report
123A90-DDL-IN-RE-40095 Rev.01	Process Control Logics Description
123A90-DDL-IN-PRO-40010 Rev.01	Override Procedures for Process Safeguarding Systems
123A90-DDL-IN-RE-40025 Rev.01	Alarm Management Workshop Terms of Reference
123A90-DDL-IN-SP-40024_Rev.00	Alarm System Requirements Specification
123A90-DDL-PR-RE-80031 Rev.02	Process Control, Operation, Start-up and Shutdown Philosophy
123A90-DDL-EL-DG-20014 Rev 01	Electrical Control, Protection and Metering Diagrams
123A90-DDL-EL-DG-20158 Rev.02	Overall-Key Single Line Diagram
123A90-DDL-EL-RE-20170 Rev.01	Electrical System Study Report - Load Flow
123A90-DDL-EL-RE-20171 REV.01	Electrical System Study Report - Short Circuit
123A90-DDL-EL-RE-20175 Rev.01	Electrical System Study Report - Power Factor Compensation
123A90-DDL-EL-RE-20176 Rev.01	Electrical System Study Report - Transient In-Rush
123A90-DDL-EL-SP-20141 Rev.01	Electrical System Description and Design Philosophy
1723001595-EL-DG-00012 Rev.02	Functional logic diagram
1723001595-EL-DG-00013 Rev.03	BASE LOAD POWER HUB (BLPH) - 66kV Switchgear (GIS) - Single line diagram
1723001595-EL-DG-00017 Rev.01	Inter-panel logic diagram
1723001697-EL-DG-00010 Rev.03	TR-100AD1 Termination and Wiring Diagram
1723002197-EL-DG-00010 Rev. 04	SG-100D1 HV SWBD 6,6kV - ELECTRICAL SINGLE LINE DIAGRAM
1723002197-EL-DG-00011 Rev.04	SG-200N1 LV SWBD 400-230V ELECTRICAL SINGLE LINE DIAGRAM

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Doc. No.	Description
1723002197-EL-DG-00012 Rev.04	SG-200D2-LV SWBD 800V-ELECTRICAL SINGLE LINE DIAGRAM
1723002197-EL-DG-00015 Rev.01	SG-100D1 MV SWBD 6,6kV - FUNCTIONAL DIAGRAM - INCOMING FEEDER
1723002197-EL-DG-00016 Rev.01	SG-100D1 MV SWBD 6,6kV - FUNCTIONAL DIAGRAM - BUS BAR METERING
1723002197-EL-DG-00017 Rev.01	SG-100D1 MV SWBD 6,6kV - FUNCTIONAL DIAGRAM BESS FEEDER A-8500
1723002197-EL-DG-00018 Rev.01	SG-100D1 MV SWBD 6,6kV - FUNCTIONAL DIAGRAM - ELECTROLYSER FEEDER A20000
1723002197-EL-DG-00019 Rev.03	SG-100D1 HV SWBD 6,6kV- FUNCTIONAL DIAGRAM - FUEL CELL FEEDER A-80000
1723002197-EL-DG-00020 Rev.03	SG-100D1 HV SWBD 6,6kV - FUNCTIONAL DIAGRAM - TRANSFORMER FEEDER TR200ED1
1723002197-EL-DG-00021 Rev.01	SG-100D1 MV SWBD 6,6kV - FUNCTIONAL DIAGRAM - TRANSFORMER FEEDER TR200DE1
1723002197-EL-DG-00022 Rev.01	SG-100D1 MV SWBD 6,6kV INTERCONNECTING
1723002197-EL-DG-00023 Rev.01	SG-100D1 MV SWBD 6,6kV-LOGIC DIAGRAM-INCOMING FEEDER TR-100AD1
1723002197-EL-DG-00025 Rev.01	SG-100D1 MV SWBD 6,6kV - LOGIC DIAGRAM - BESS FEEDER A-85000
1723002197-EL-DG-00026 Rev.01	SG-100D1 MV SWBD 6,6kV - LOGIC DIAGRAM - ELECTROLYSER FEEDER A20000
1723002197-EL-DG-00027 Rev.03	SG-100D1 HV SWBD 6,6kV - LOGIC DIAGRAM -FUEL CELL FEEDER A-80000
1723002197-EL-DG-00028 Rev.03	SG-100D1 HV SWBD 6,6kV - LOGIC DIAGRAM - TRANSFORMER FEEDER TR200ED1
1723002197-EL-DG-00029 Rev.03	SG-100D1 HV SWBD 6,6kV - LOGIC DIAGRAM - TRANSFORMER FEEDER TR200DE1
1723002197-EL-DG-00030 Rev.02	SG-200N1 LV SWBD 400-230V FUNCTIONAL DIAGRAMS - INCOMINGS AND INTERCONNECTING AND AUX DISTRIBUTION
1723002197-EL-DG-00031 Rev.02	SG-200N1 LV SWBD 400-230V - FUNCTIONAL DIAGRAMS - TYPICAL FEEDERS
1723002197-EL-DG-00032 Rev.01	SG-200D2 LV SWBD - ELECTRICAL FUNCTIONAL DIAGRAM
1724000428-IN-LIS-00016 Rev.03	IO LIST - INSTRUMENT AIR PACKAGE

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Doc. No.	Description
1724000437-IN-LIS-00015 Rev.03	IO LIST - NITROGEN GENERATION PACKAGE U-64000
1724000372-EL-LIS-00014 Rev.02	IO LIST
1723002197-EL-LIS-00041 Rev.02	SG-100D1 IO LIST- Hv Switchgear
1723002197-EL-LIS-00042 Rev.02	SG-200N1 IO LIST - Lv Switchgear
1723002197-EL-LIS-00043 Rev.01	SG-200D2 IO LIST (HARDWARE -SOFTWARE)
1723001595-EL-LIS-00011 Rev.02	Switchgear IO list
1724000448-IN-LIS-00019 Rev.01	INPUT-OUTPUT LIST
123A90-DDL-EL-DG-20185 Rev.01	Electrical Single Line Diagram HV Systems
1724000372-EL-DG-00006 Rev.02	DC UPS - SINGLE LINE DIAGRAM and INTERCONNECTING DIAGRAM
1724000372-EL-DG-00007 Rev.02	AC UPS - SINGLE LINE DIAGRAM and INTERCONNECTING DIAGRAM
123A90-DDL-IN-LIS-40089 Rev.03	Instrument I-O List
123A90-DDL-EL-DL-20100 Rev 01	Base Load Power Hub - Electrical Equipment Layout - Top Deck
123A90-DDL-EL-DL-20101 Rev 01	BASE LOAD POWER HUB (BLPH) - Electrical Equipment Layout - Lower Deck
123A90-DDL-EL-DL-20104 Rev.02	Base Load Power Hub (BLPH) - Electrical Equipment Layout - HV Switch room
123A90-DDL-EL-DL-20105 Rev.02	Electrical Equipment Layout - LV Switch room
123A90-DDL-EL-DL-20106 Rev.01	Base Load Power Hub (BLPH) - Electrical Equipment Layout - UPSs & Batteries Switch room
123A90-DDL-IN-DL-40012_Rev.03	BASE LOAD POWER HUB - OFFSHORE ITER - EQUIPMENT LAYOUT
1724000049-HV-PID-00039.Rev.00	B-100 PID - E&I SHELTERS
1724000049-HV-PID-00040.Rev.00	B-200 PID - E&I SHELTERS
1724000049-HV-PID-00041.Rev.00	B-300 PID - E&I SHELTERS
1724000049-HV-PID-00042.Rev.00	B-400 PID - E&I SHELTERS

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Doc. No.	Description
1724000428-PR-PID-00019 Rev.02	PACKAGE PID - INSTRUMENT AIR PACKAGE
1724000437-PR-PID-00018 Rev.02	PACKAGE PID - NITROGEN GENERATION PACKAGE
1724000448-PR-PID-00013_Rev.01	WATER TREATMENT PACKAGE-PID DIAGRAM
HKN1-04-DWG-312 RevD	HKN1-04-DWG-312 Power Export System Single Line Diagram
C63-PID-001_Rev.07	ELOGEN BLPH Project - Process and Instrumentation Diagrams
123A90-DDL-IN-CE-40000 Rev.03	Process Safety Cause and Effect Matrix
123A90-DDL-IN-CE-40002 Rev.02	Fire and Gas Cause and Effect Matrix

2.1.2 Yokogawa Project Document

Doc. No.	Description
1724000594-IN-RE-00041 Rev00	Cybersecurity Workshop Preparation
1724000594-QC-ITP-00002 Rev01	INSPECTION AND TEST PLAN
1724000594-QC-PRO-00031 Rev00	SW FACTORY ACCEPTANCE TEST (FAT) PROCEDURE
1724000594-IN-SP-00018 Rev02	PCS and SAFETY SYSTEMS Software Functional Design Specification (FDS-SW)
1724000594-QC-DB-00033 Rev00	MANUFACTURERS RECORD BOOK (FINAL DOSSIER)
1724000594-IN-LIS-00040 Rev00	VENDOR ASSET AND TAG REGISTER
1724000594-IN-DG-00023 Rev01	NETWORK AND SERVER CABINETS IN OER ROOM WIRING DIAGRAMS AND TERMINAL STRIPS
1724000594-MD-LIS-00001 Rev03	SUPPLIER MASTER INDEX REGISTER (SMIR)

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1724000594-IN-MAN-00038 Rev00	Instructions for Operation and Maintenance for ProSafe-RS
1724000594-IN-DA-00009 Rev01	PCS CABINETS GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT
1724000594-QC-PRO-00030 Rev01	HW FACTORY ACCEPTANCE TEST (FAT) PROCEDURE
1724000594-IN-RE-00008 Rev01	Safety Controller loading estimation
1724000594-IN-DD-00028 Rev01	HMI screens print out
1724000594-COM-LIS-00039 Rev01	SPARE PART INDEX REGISTER (COMMISSIONING AND 2-YEARs OPERATION)
1724000594-IN-PL-00029 Rev00	Safety Validation Plan (SVP)
1724000594-IN-CA-00006 Rev01	Power Consumption and Heat Dissipation
1724000594-IN-LIS-00005 Rev00	EMCS IO List (HW and SW)
1724000594-IN-RE-00035 Rev01	Cyber Security Risk Assessment REPORT
1724000594-IN-RE-00043 Rev00	CYBER SECURITY SETTINGS
1724000594-IN-DG-00021 Rev01	SAFETY SYSTEMS CABINETS (SIS AND FGS) WIRING DIAGRAMS AND TERMINAL STRIPS
1724000594-IN-DA-00010 Rev01	SAFETY SYSTEMS CABINETS (SIS AND FGS) GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT
1724000594-IN-LIS-00036 Rev01	ATEX REGISTER
1724000594-IN-DA-00011 Rev02	NETWORK AND SERVER CABINETS IN ITER ROOM GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT
1724000594-IN-SP-00019 Rev02	EMCS Software Functional Design Specification (FDS-SW)
1724000594-QC-LIS-00034 Rev00	MANUFACTURERS RECORD BOOK (FINAL DOSSIER) - INDEX
1724000594-IN-DA-00012 Rev01	NETWORK AND SERVER CABINETS IN OER ROOM GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT

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1724000594-QC-PRO-00042 Rev00	THIRD PARTY COMMUNICATION TEST PROCEDURE
1724000594-IN-DD-00015 Rev03	System Architecture
1724000594-IN-LIS-00004 Rev03	PCS and Safety System IO List (HW and SW)
1724000594-IN-DG-00022 Rev01	NETWORK AND SERVER CABINETS IN ITER ROOM WIRING DIAGRAMS AND TERMINAL STRIPS
1724000594-IN-DG-00016 Rev01	Network Connection Diagram
1724000594-IN-LIS-00007 Rev01	Systems Cables List
1724000594-IN-SP-00017 Rev01	PAS Hardware Functional Design Specification (FDS-HW)
1724000594-IN-DG-00024 Rev01	EMCS CABINETS WIRING DIAGRAMS AND TERMINAL STRIPS
1724000594-IN-DA-00013 Rev01	EMCS CABINETS GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT

2.2 Codes, Standards and References

[1] IEC 60529: Specification for Degrees of protection provided by enclosures (IP Code)

[2] IEC 61000: Electromagnetic Compatibility of Industrial - Process Measurement and Control Equipment

[3] IEEE 802.3: Information Processing Systems – Local Area Networks

[4] IEC 61508 Functional Safety of Electrical/Electronic/Programmable Electronic Safety – Related Systems

[5] IEC 61511 Functional Safety- Safety instrumented systems for the process industry sector

2.3 Approved Document List (Detail Design Specification)

The Detail Design Specification used for construction shall be listed in this approved document list, and shall be used as reference in the SAT. In principle, the Detail Design Specification documents

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as included in this list shall form the basis for checking the PCS, SIS, FGS and SCADA system. The approved Detail Design Specification document list used for construction is listed in 2.1.2.

3 Definitions and Abbreviations

PROJECT:	HOLLANDSE KUST NOORD WIND PARK PROJECT
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
COMPANY or Client (CPY):	CROSSWIND
VENDOR	YOKOGAWA ITALIA S.R.L.

Doc. No.	Description
ALARP	As Low as Reasonably Possible
AMS	Alarm Management System
ATEX	Appareils destinés à être utilisés en ATmosphères Explosibles (Equipment intended for use in explosive atmospheres)
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
CAP	Critical Action Panel
CAPEX	Capital Expenditure
CAT	Category
CCN	Central Control Network
CCR	Central Control Room
CCS	Central Control System
CCTV	Closed Circuit Television
COMPANY	Crosswind
CONTRACTOR (CTR)	ROSETTI MARINO S.p.A.
CTV	Crew Transfer Vessel
DEM	Design Engineering Manual
DEP	Design and Engineering Practice
DMZ	Demilitarised-Zone
DOCUMENT NAME	Document Title

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ELM	Earth Leakage Monitor
EMC	Electromagnetic Compatibility
EMCS	Electrical Monitoring and Control System
EN	Engineering Notice
EPC	Engineering Procurement Construction
EPIRB	Emergency Position Indicating Radio Beacon
EWS	Engineering Workstation
Ex	Explosion Proof
FC	Fuel Cell
FCS	Field Control Station
FEED	Front End Engineering Design
FEED CONTRACTOR	Organisation contracted directly by COMPANY to provide engineering, design, or other services.
FGS	Fire & Gas System
FIO	Field Input/Output
FNU	Field Node Unit
FO	Fibre Optic
FOPP	Fibre Optic Patch Panel
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positional Satellite
HART	Highway Addressable Remote Transducer
HAZOP	Hazardous Operability Study
HKN	Hollandse Kust Noord
HMI	Human Machine Interface
HV	High Voltage
HVAC	Heating, Ventilation and Air Conditioning
HV-SCADA	The given name for the COMPANY's control system of the wind farm infrastructure. BLPH's control system shall operate autonomously but will interface with HV-SCADA.
IACS	Industrial Automation and Control Systems
IAMS	Instrument Asset Management System
ICSS	Integrated Control and Safety System

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IDCS	Intrusion Detection Control System
IEC	International Electrotechnical Commission
IP	Ingress Protection
IP	Internet Protocol
IS	Intrinsically Safe
ISO	International Organization for Standardization
ITER	Instrument & Telecoms Equipment Room
LACS	Local Access Control System
LAN	Local Area Network
LOPA	Layers of Protection Analysis
LHVS	Low and High Voltage Station
LV	Low Voltage
MAC	Main Automation Contractor
MCC	Motor Control Centre
MDF	Marshalling Cabinet (Distribution to Field)
NAMUR	Interessengemeinschaft Automatisierungstechnik der Prozessindustrie (User Association of Automation Technology in Process Industries)
NIS	Non-Intrinsically Safe
NU	Node Unit
OHVS	Offshore High Voltage Station
OPC	Open Platform Communications
OWS	Operator Workstation
PAGA	Public Address and General Alarm
P&ID	Piping and Instrument Diagram
PACO	Process, Automation, Control and Optimisation (PACO) is the term used to describe all functionality required for the monitoring and controlling of all process, safety and fire and gas systems selected for the project.
PCN	Process Control Network
PROJECT	HOLLANDSE KUST NOORD WIND PARK Project
PV	Photo Voltaic

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PURCHASER	The organisation placed a purchase order for the supply of equipment or services for the Project. The Purchaser could be the Company or the Contractor or some other party appointed by the COMPANY or Contractor.
RVO	Rijksdienst voor ondernemend Nederland – The Netherlands Enterprise Agency
SART	Search and Rescue Transponder
SCADA	Supervisory Control and Data Acquisition
SCS	Safety Control Station
SGSI	Shell Global Solutions International
SHALL	An absolute requirement.
SHOULD	This word indicates a recommendation that whilst preferred may not be implemented provided some equivalent is proposed and agreed by COMPANY. The full implications must be understood and carefully weighed before choosing a different course.
SIF	Safety Instrumented Function
SIL	Safety Instrumented Level
SIS	Safety Instrumented System
SNU	Safety Node Unit
SOLAS	Safety of Life at Sea
TB	Terminal Board
TETRA	Terrestrial Trunked Radio
TSO	Transmission System Operator
TQ	Technical Query
UCP	Unit Control Panel
UHF	Ultra-High Frequency
UPS	Uninterruptible Power Supply
VENDOR	Manufacturer/Supplier of equipment and services to perform the duties specified by the Purchaser.
VHF	Very High Frequency
VLAN	Virtual Local Area Network
VNET	Virtual Network
WAN	Wide Area Network

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WTG	Wind Turbine Generator

Table 1 – Definitions and Abbreviations

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4 Responsibility

Responsibilities for each party involved in the SAT are defined here-under to ensure that the SAT is carried out in accordance with the agreed procedure. It also ensures that there shall be authorized personnel(s) from Rosetti Marino, CROSSWIND and YOKOGAWA to facilitate any decisions and schedule changes that have resulted from the SAT.

4.1 CUSTOMER

The participation of CROSSWIND in the SAT is essential. CROSSWIND shall appoint an inspector to witness and participate in the SAT and observe the results on a daily basis.

4.2 CONTRACTOR

Rosetti Marino shall appoint a SAT Manager for the SAT. Rosetti Marino SAT manager shall co-ordinate with CROSSWIND and YOKOGAWA SAT Managers to facilitate the smooth execution of the SAT activities and schedule. The role of the SAT Manager is also to resolve SAT issues on a regular basis.

Rosetti Marino shall appoint a Project Engineer who is responsible for the Electrical & Instrumentation part of the construction work that is required for execution of SAT.

4.3 MAC

YOKOGAWA as MAC shall appoint a Test Conductor to organize and manage all aspects of SAT. YOKOGAWA shall be responsible for carrying out the testing and recording the test results on a daily basis together with Rosetti Marino representative and CROSSWIND Inspector.

The Site Manager representing YOKOGAWA shall be the SAT Manager and co-ordinate with Rosetti Marino SAT Manager and adjusts the test schedule whenever necessary to ensure the smooth running of the SAT. The SAT Manager shall also ensure that all tests are conducted in accordance with the SAT documents. If changes / modifications are required, the SAT Managers from YOKOGAWA and Rosetti Marino shall discuss and determine the action plan.

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5 General Administration

5.1 SAT Venue

All the SIS equipment will be installed by Site Construction Contractor selected by Rosetti Marino. The tests shall be conducted on-site.

5.2 SAT Organization Chart

A detailed Organization Chart shall be issued for SAT, with all positions and names filled in. In addition, a SAT roster of the participants shall be issued, with following details for each person: full name, company, responsibility, samples of the signature and initials, actual start and finish date of participation in the SAT. Rosetti Marino shall be responsible for maintaining the roster and keeping it updated.

Refer to Appendix-19.1 for SAT organization chart and SAT roster.

5.3 Kick-off Meeting

An initial kick-off Meeting will be held prior to starting the SAT to brief the participants, confirm the organization and responsibilities, and review the SAT schedule refer Appendix-19.2. At the same time, HSE briefing for all participants will be provided by Rosetti Marino/CROSSWIND. YOKOGAWA SAT Manager will prepare the presentation and explain the organization and work practices.

All SAT documentation prepared by Rosetti Marino/YOKOGAWA prior to SAT will be inspected for completeness.

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5.4 Daily Working Schedule

The SAT will be conducted in Project Site premises from Monday to Friday (working days).The following timing is recommended for the testing:

0900 to 1200 hrs	Inspection and test
1200 to 1300 hrs	Lunch
1300 to 1700 hrs	Inspection and test
1700 to 1730 hrs	Daily review meeting including next day's schedule planning

Table 2 – Daily Working Time

RM commission team shall communicate the SAT schedule based on packages ready for SAT.

5.5 Integrated Test

Upon completion of Hardware SAT, if any 3rd party package communication is not tested during FAT/SAT testing moves to the next stage, the Integrated Factory Acceptance Test that will be part of Software SAT. At this stage, integrity of infrastructures or interfaces that are shared by multiple systems, components and/or applications within the scope of Yokogawa will be demonstrated. Rosetti Marino shall facilitate the 3rd party sub-systems I/O mapping check with 3rd party Systems based on Software system/Tools capabilities or Field for HMI and control functions testing.

5.6 SAT Wrap-up Meeting

At the completion of the SAT, a final wrap-up meeting will be held. The overall status of the SAT shall be reported. Upon all parties' agreement that the SAT is completed satisfactorily, Rosetti Marino/CROSSWIND shall sign off SAT Completion Certificate and System Acceptance Certificate.

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6 Inspection / Testing

6.1 Overview

This section provides a brief overview of the various testing and inspection activities performed on the SIS system. Pre-FAT at YOKOGAWA (Internal Test)

- Factory Acceptance Test (FAT)
- Integrated Factory Acceptance Test (IFAT) i.e. integration test with Vendor package part of SAT.
- Site Acceptance Test (SAT) – Refer to this document.

Commissioning Support such as loop check, Site Integration Test will follow the SAT.

6.2 System Boundary for Testing

For the SAT, the testing boundaries have been classified as below:

The boundaries of the PCS/SIS/FGS/EMCS under test are classified as the hardware boundary and the software boundary. The hardware boundary of the SIS under test shall be from the MDF to the system cabinets including Network/Server cabinets. The fiber optic links which connect the networks across various buildings are considered as tested and accepted by Rosetti Marino before they are made available to YOKOGAWA for the interconnectivity as required by the PCS/SIS/FGS/EMCS System Architecture.

The third-party sub-systems which are supplied by others shall be verified and accepted by Rosetti Marino and CROSSWIND before commencement of SAT. The non-YOKOGAWA supplied items mounted on the consoles have to be tested by others.

The software boundary of the PCS/SIS/FGS/EMCS under test includes the PCS/SIS/FGS/EMCS application program. The full I/O test is not part of SAT, since 100% I/O check was performed during Factory Hardware Test/Pre-FAT. Only random I/O checks will be performed during SAT. PCS/SIS/FGS/EMCS Application software and Hardware integrated test(random) shall be done during SAT.

7 SAT Overview

The SIS/FGS SAT shall be a subset of the SAT. PCS/EMCS/SCADA/Cyber security solutions are part of SAT. This SAT procedure describes the activities and the requirements that are necessary to confirm that the PCS/SIS/FGS/EMCS installed on-site meets the project standards and functions as per the approved design engineering / construction drawings. The main objectives of performing the SAT are to facilitate Rosetti Marino/CROSSWIND to check and verify the following.

There are no physical (visible) damages (during shipping and installation) to the system that was inspected during FAT and IFAT.

All manufacturing and assembly that were inspected during the FAT and IFAT remain so and are not affected during the shipment.

The DCS/SIS/EMCS/Network and its components that were inspected during FAT and IFAT do function properly and are not affected during the shipment.

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To ensure that all carried over punch items identified as per FAT and IFAT report are addressed.

The Software with proper revisions has been loaded on the respective systems.

All equipment and system cables that have been disconnected for shipment are properly reconnected and is working as expected.

The Site Acceptance Test (SAT) shall be conducted in accordance with the test procedures detailed in this document. The test results shall be recorded in the Check sheet. Each Check sheet shall be given a unique reference number.

7.1 SAT Documentation

YOKOGAWA shall prepare all SAT documentation prior to the start of SAT of a particular plant or area. All forms, Check-sheets, sign off sheets, drawings, etc. as listed in this procedure shall be organized in indexed binders. A master index for the area will be provided and maintained by the individual site team(s).

The documentation for hardware checks shall include all relevant documents for each individual cabinet in a separate indexed binder or a binder section.

All SAT reference documents (latest issue) as listed in this procedure originated by other parties, which were issued formally to YOKOGAWA, will form a part of the SAT documentation and shall be printed out, and organized in indexed binders by YOKOGAWA.

All SAT reference documents as mentioned above shall be stamped "SAT MASTER" on every page/sheet (or printed with a watermark). Any additional documents as may be necessary and generated later during SAT shall also be stamped, and indexes amended accordingly.

7.2 Method of Testing

Detailed test procedure for each test item is described in this document. Check-sheet shall be provided, listing the equipment to be tested. All test results shall be recorded in the Check-sheets. The following color codes shall be used in the testing:

a) Yellow marker – Items that were checked and cleared

b) Pink marker – Items that were having issues

c) Green marker – Items that were checked after completion of recovery/resolution of issue

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7.3 SAT Topics

The topics covered in SAT shall be a subset of those covered under FAT. The reference documents to be used for the SAT are also shown in Par.2.

Table 3 – SAT topics

Title	Description	Reference Document
Document Review	Review of the respective plant FAT to ensure that all outstanding punch items are resolved and closed out	FAT Test Report
Physical Inspection	- Installation Condition Check - Dew Condensation Check - Visual inspection of Network Architecture	- Control room layout drawings - Installation condition check sheet - Dew condensation check sheet - System Architecture drawings
Pre power-up Inspection	- SIS/FGS/PCS/EMCS Safety and Instrument reference grounding - Site UPS power - Site Normal power - Inspection of Power Cables - Inspection of System Cables (FIO) - Cabinet Alarm wiring (inter-panel connections)	- SIS/FGS/PCS/EMCS Cabinet Drawings - ICSS Earthing Scheme - Control Room Grounding Plan - Power Block Diagram UPS Power Panel Schedule - Normal Power Panel Schedule - SIS/FGS/PCS/EMCS System Cable Schedule - SIS/FGS/PCS/EMCS Cabinets Alarm Wiring Cable schedule
Power-up Inspection	- Inspection of System Cabinets - Inspection of MDF Cabinets (AIO, DIO, Prox./I.S.) - Inspection of Server Cabinets - Inspection of Network Cabinets	- PDP Cabinet Drawings - System Cabinet Drawings - MDF Cabinet Drawings - Server/Network Cabinet Drawings - System Architecture Drawings
Application revision check	- Inspection and record of Safety controller application revision	- SIS FAT /IFAT Test Report
SIS/FGS Standard System	- Inspection of SCS0110/SCS0120 Power Supply Redundancy - Inspection of SCS0110/SCS0120 Processor Redundancy	This test is not required to be performed for SAT.

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Title	Description	Reference Document
Function Inspection	- Random Inspection Vnet/IP bus Redundancy	If random inspection is required, then use FAT Reports
	- Random Inspection of ESB bus Redundancy	
	- Random Inspection of Node Unit Power Supply Redundancy	
SIS/FGS Performance	- Inspection of SCS0110/SCS0120 Resource Capacity	- FAT Reports
	- Inspection of SCS0110/SCS0120 CPU Loading	
	- Inspection of SCS0110/SCS0120 Online / Offline Loading Test	
	- Inspection of Back-up / Restore Function Test	
PCS Standard System Function Inspection	- Inspection of FCS0101 Power Supply Redundancy	This test is not required to be performed for SAT. If random inspection is required, then use FAT Reports
	- Inspection of FCS0101 Processor Redundancy	
	- Random Inspection Vnet/IP bus Redundancy	
	- Random Inspection of ESB bus Redundancy	
	- Random Inspection of Node Unit Power Supply Redundancy	
PCS Performance	- Inspection of FCS0101 Resource Capacity	FAT Reports
	- Inspection of FCS0101 CPU Loading	
	- Inspection of FCS0101 Online / Offline Loading Test	
	- Inspection of Back-up / Restore Function Test	
System Integration	- CI Server	Refer to FAT reports for CI Server & Time Synchronization test records Refer to Appendix-19.10 for subsystem communication check sheet
	IAMS	
	- Time Synchronization	
	- Sub-System Communication (if applicable, including redundancy)	

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Title	Description	Reference Document
EMCS	Standard System Function Inspection and Performance Check	Refer to Sl. No.16
SAT Completion Inspection	- Final inspection of the SIS to remove any temporary labels, tags, etc. added for SAT purpose.	

Note: The topics are listed as per the expected sequence of testing.

7.4 Sequence of Testing in SAT

Sl No	Description
1	SIS Hardware Certificates Review
2	Appearance & construction
3	System Configuration
4	Node / I/O Module loading
5	Wiring Check
6	Grounding Check
7	Startup System Cabinets.
8	Startup Marshalling Cabinets.
9	SIS/FGS/PCS/SCADA/EMCS Software Loading & License review
10	Loop Checking
11	Cabinet Alarm Check
12	Spare Check
13	Online / Offline loading of Application
14	Application inspection for Safety control station
15	Scan Time Check
16	CPU Load check

7.5 Random Selection philosophy

The following shall dictate the philosophy of random selection

- If necessary, for functional inspection of Node Unit Power Supply Modules, one set of dual redundant Power Supply Modules per SCS/FCS shall be selected for inspection.
- Connectivity inspection of AI /AO Modules of FIO shall be performed with the signal of 50% of full scale. One AI /AO point shall be selected per IOM / terminal panel for testing. For FTA, that has connection from two different I/O modules, one point per module shall be tested. If no failures are found, the test is considered acceptable. If any failures are found, the AI / AO module

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is replaced and another point shall be selected and tested. For I/O modules that are in redundant configuration, test for redundancy function shall be performed by selecting random redundant pair, preferably one pair per SCS/FCS.

- For functional inspection of DI and DO Modules of FIO, one point shall be selected per I/O module / interface board for testing. If no failures are found, the test is considered acceptable. If any failures are found, the DI or DO module is replaced and another point shall be selected and tested.
- For EMCS test details refer to Sl No. 20 EMCS SAT

7.6 SAT Plan

The SAT shall be conducted in the following sequence.

1. Document Review
2. Physical Inspection
3. Pre Power-up Inspection
4. Power-up Inspection
5. IOM Functional Inspection
6. SIS/FGS/PCS/EMCS Standard System Function Inspection (if necessary)
7. SIS/FGS/PCS/EMCS Performance
8. System Integration
9. SAT Completion Inspection

7.7 Punch Record

Any deficiency found during the test shall be noted in the SAT Punch Record (Attached as Appendix-19.9A, 19.9C). Each punch Record shall cover one punch item/fault. A Punch Record Ledger (Attached as Appendix-19.9B, 19.9D) shall be used to summarize all the punch records. Punch record items shall be classified as follows:

M = Modification, item is to be modified, deleted, added due to design input changes.

C = Correction, item is to be corrected by YOKOGAWA.

If the recovery work involves change/modification, it is to be recorded on the punch record and the recovery shall be carried out after the agreement of both the SAT managers. YOKOGAWA shall clear all correction items (Code C) as per the identified resolutions. For recovery work that involves modification (Code M), the item will be jointly reviewed by all parties on a daily basis and determined whether to be implemented during SAT or later, depending on complexity and potential schedule and/or cost impact. After verification, all concerned parties in the punch record will sign off the same.

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Each Punch Record Shall include the expected completion Date within which the punch shall be implemented and ready for re-testing.

-Each "Code-M" punch requiring a minor or negligible effort to be cleared and shall be considered as included in lump-sum.

-Each" Code-M" punch deemed not included in lump-sum Yokogawa scope shall be subject to preliminary agreement between the parties before proceeding for implementation.

-Such Classification of "Code-M" punches shall be reflected either in SAT punch record sheets or in SAT punch ledger/SIS Punch Record Summary.

7.8 SAT Completion Certificate & System Acceptance Certificate

Upon completion of the SAT, a SAT Completion Certificate and System Acceptance Certificate will be signed by CROSSWIND, Rosetti Marino and YOKOGAWA. The purpose of these two documents is to certify that the SAT has been completed and accepted by Rosetti Marino /CROSSWIND. Both Rosetti Marino/CROSSWIND and YOKOGAWA agree that the system is in order and can be released for the next stage of site activities. However, if the tested system is to be accepted in partial for whatever reasons, Rosetti Marino/CROSSWIND shall advise and issue the SAT documents accordingly. A Sample of the SAT Completion Certificate is attached in Appendix-19.12 and System Acceptance Certificate in Appendix-19.11.

7.9 Safety at work

CROSSWIND site safety procedures shall form the basis for YOKOGAWA to conduct the SAT. Rosetti Marino/CROSSWIND shall provide necessary safety orientation to YOKOGAWA site team so that YOKOGAWA site engineers can follow the safety rules while working on-site.

RM shall give indication about the safety equipment (PPE) to be used at site; Yokogawa will be responsible of procuring such equipment to its personnel.

7.10 Test Equipment

Rosetti Marino/CROSSWIND will provide all test equipment (e.g. Digital Multimeter, Calibrator, Signal Generators, etc.) for the SAT. The details of the test equipment for SAT with certification shall be provided using format attached in Appendix-19.4.

8 Punch List Document Review

This section outlines the steps for ensuring that all problems identified during FAT or IFAT are resolved and closed out.

Steps

1. Review the respective plant FAT and IFAT report.

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2. Check that all problems indicated in the Punch List Logs that were identified as "to be corrected" before shipment to site have been resolved and implemented prior to shipment of the SIS/FGS/PCS/SCADA/EMCS.
3. Check the items that are to "be completed before SAT" have been implemented.

Acceptance Criteria

1. All problems indicated in the Punch Registry that was to be implemented before shipment have been resolved / implemented prior to shipment of the SIS/FGS/PCS/SCADA/EMCS.
2. The respective Punch Lists and Punch Registers have been updated.

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9 Physical Inspection

9.1 Installation Condition Check (Pre-Power up)

Outline	The SIS/FGS/PCS cabinets are installed as per the layout shown in the approved control room layout drawings. Installation conditions of the SIS/FGS/PCS equipment shall be checked and verified prior to powering up the cabinets. For External panels/JBs, installation condition, location shall be checked and verified as per installation guide and plot plan.
Objective	To verify that the installation conditions of all installed SIS/FGS/PCS equipment are as per Yokogawa Installation guidance and approved control room layout drawings and /or plot plan (for external equipment)
Reference	- Functional Specifications like; - 1724000594-IN-SP-00018- PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-LIS-00004- PCS and Safety System IO List (HW and SW) - ProSafe-RS Installation Guidance - CentumVP Installation Guide - CI Server Installation Guide - IAMS Installation guide - Control Room Layout Drawings - Plot Plan (for external equipment)
Procedure	Visually check that the SIS/FGS/PCS cabinets/panels/JBs are installed as per the approved control room layout drawings and/or plot plan. Check items as follows: 1. Perform random inspection of the installation conditions as per the Installation guidance document to observe any non-conformance. 2. Check and complete the installation check sheet for the particular area / installation environment under test.
Criteria	1. The authorized installation inspection teams should complete the installation checks and sign the installation condition check sheet. 2. Also random inspection of the installation condition should meet the installation specification requirements.
Test Record Reference	- Appendix-19.5

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

Note: Prerequisite construction conditions for installation are listed below. These condition must be checked by construction contractor before system installation.

- Cutoff of air outside (Seal on control room doors/windows)
- No piping of water/steam on the ceiling
- No direct Sun light (For External Equipment)
- Air quality in control room
- HVAC condition
- HVAC Air ducts - Ensure no direct air flow on the cabinet installation area
- Vibration
- Lighting
- Impacts from other construction
- Sealing at the cable duct entrance (For External Equipment)

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9.2 Dew Condensation Check

Outline	The dew condensation can be formed in the SIS/FGS/PCS equipment due to combination of air saturation inside the cabinet and drop in temperature.
Objective	To verify that all the installed SIS/FGS/PCS equipment are free from any dew condensation
Reference	- Functional Specifications like; - 1724000594-IN-SP-00018- PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-LIS-00004- PCS and Safety System IO List (HW and SW) - ProSafe-RS Installation Guidance - CentumVP Installation Guide
Procedure	Visually check that the Installation Conditions are as per the project requirements. Check items as follows: 1. Check and complete the dew condensation check sheet for the particular area / installation environment under test. 2. Perform random inspection of the SIS/FGS/PCS equipment to confirm that there is no condensation on the SIS/FGS/PCS equipment. 3. The body of cabinets at random shall be checked for dew, dew trace, color change and rust, and verified by filling each item on the check sheet. 4. The installed cards at random shall be checked for dew, dew trace, color change and rust, and verified by filling each item on the attached check sheet. 5. If the dew, dew trace, color change or rust has been recognized, the conditions must be record by taking picture and a non-conformity report shall be created.
Criteria	The authorized installation inspection teams should complete the dew condensation checks and sign off the dew condensation check sheet.
Test Record Reference	- Appendix-19.5 Dew Condition

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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9.3 System Architecture and BOM Check

Outline	The SIS/FGS/PCS system is configured as per SIS/FGS/PCS system architecture Drawing. The BOM for SIS/FGS/SIS equipment are verified during the FAT. During SAT, only the major components like SIS/FGS/PCS cabinets, console stations, network cables and system cables (between cabinets) are verified.
Objective	Verify major SIS/FGS/PCS equipment installed for SAT is per the System Architecture Drawing.
Reference	- Functional Specifications like; - 1724000594-IN-DD-00015- System Architecture Drawing - 1724000594-IN-SP-00018- PCS and SAFETY SYSTEMS Software FDS-SW - CENTUMVP system view - 123A90-DDL-IN-SP-40097 Rev.00 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Rev.00 Control System (PCS) Specification - 123A90-DDL-IN-RE-40093 Rev. 00 Control System Philosophy - 123A90-DDL-IN-DD-40096 Rev.00 Control System Architecture Detailed Drawings - K559-2254-IC-SPE-001 Rev.00 SYSTEM SPECIFICATION FOR MAIN AUTOMATION CONTRACTOR - K559-2254-PR-BLD-001 Rev.01 BLOCK FLOW DIAGRAM SYSTEM OVERVIEW - K559-2254-EL-LST-001 Rev.00 CONTROL ALARM AND MONITORING TABLE - 123A90-DDL-IN-SP-40024_Rev.00 Alarm System Requirements Specification - 123A90-DDL-IN-DD-40019 Rev.00 Data Network Architecture Drawings - System Architecture Drawing - BOM
Procedure	Visually check that all SIS/FGS/PCS cabinets and consoles are staged as per the System Architecture. Also verify that the network communication cables (both of copper cables and fiber optic cables) are connected per the corresponding cable schedule. Verify the BOM for SIS/FGS/PCS equipment both of Hardware and Software. Check items as follows:

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	1. Verify Hardware BOM related to System cabinets - Run reports on an engineering workstation to extract hardware configuration, domain/station settings etc. 2. Verify Software BOM and correct station, Domain numbers setting.
Criteria	The quantity of SIS/FGS/PCS cabinets, consoles, and network cables should match the system architecture.
Test Record Reference	- Marked system architecture drawing 1724000594-IN-DD-00015 and BOM 1724000594-IN-LIS-00003

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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10 Pre Power-up Inspection

10.1 Grounding Check

Outline	All the SIS/FGS/PCS associated cabinets and active components powered by AC power inside the cabinets are connected to protective earth. The system components and the signal shield bars are connected to functional earth (insulated Bar).
Objective	To verify that the SIS/FGS/PCS equipment are connected to the respective ground bars as shown in the cabinet drawings and grounding plan block diagram.
Reference	- Earthing layouts drawings (Onshore CCR, Offshore ITER) 123A90-DDL-IN-DL-40013 - Grounding Plan - SIS/FGS/PCS Cabinet Grounding Scheme
Procedure	1. Visually check that all the SIS/FGS/PCS associated cabinets have been connected to the proper grounding system as per the grounding drawings Perform random checks on the SIS associated cabinets *Note: The Installation Check Sheets for Earthing Connection should be verified and signed by the Installation teams prior to SAT*
Criteria	1. All of the SIS/FGS/PCS associated cabinets safety and instrument reference grounding are connected properly with correct wire size and according to the grounding plan/drawings. 2. All punch items from the Installation check sheets should be resolved
Test Record Reference	- Appendix-19.5 Earth Connection

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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10.2 System Cables Check (FIO System)

Outline	When the SIS/FGS/PCS system nodes and terminal boards (FTAs) are installed in different cabinets, the system cables have to be laid between cabinets and terminated at site after cabinet installation. These system cables have to be checked and verified for proper interconnections.
Objective	To verify that all the system cables are connected properly as per the SIS/FGS/PCS system cable schedule. The system cables are routed per the cable routing plan
Reference	- 123A90-DDL-EL-DL-20100 Base Load Power Hub - Electrical Equipment Layout - Top Deck - 123A90-DDL-EL-DL-20101 BASE LOAD POWER HUB (BLPH) - Electrical Equipment Layout - Lower Deck - 1724000594-IN-LIS-00007 Systems Cables List - 1724000594-IN-DG-00016 Network Connection Diagram
Procedure	1. Cable laying and connection should have been completed by the construction contractor under supervision of Rosetti Marino. 2. Randomly, verify that system cables have been properly terminated and the cables have correct cable labels.
Criteria	1. All system cables should be terminated per the system cable schedule. 2. All system cables should have proper cable labels for easy identification. 3. All system cables should be laid per the system cable routing plan
Test Record Reference	- Marked System Cable List 1724000594-IN-LIS-00007 The Cable model, length and markers shall be as per the System Cable Schedule.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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10.3 Power Cables Check

Outline	Power feed to SIS/FGS/PCS cabinets/panels/JBs are from Power Distribution Panels for which the source is UPS and Normal power distribution panel. All the SIS Power cables are installed and connected per the power cable schedules
Objective	- Verify that all the SIS SIS/FGS/PCS system power cables are connected properly as per the approved UPS and Normal Power cable schedules. - Verify that all power cables are correctly labeled and that the label is clearly visible.
Reference	- 123A90-DDL-EL-DL-20100 Base Load Power Hub - Electrical Equipment Layout - Top Deck - 123A90-DDL-EL-DL-20101 BASE LOAD POWER HUB (BLPH) - Electrical Equipment Layout - Lower Deck - Power Cable Schedule - Cable laying check sheet by Rosetti Marino
Procedure	1. Cable laying and connection should have been completed by the construction contractor under supervision of Rosetti Marino. 2. Randomly, verify that power cables have been properly laid per the cable schedule, terminated and the cables have correct cable labels.
Criteria	1. All Power cables should be terminated per the power cable schedule. 2. All Power cables should have proper cable labels for easy identification. 3. All Power cables should be laid per the power cable routing plan.
Test Record Reference	- Marked Power Cable schedule(By RM) The Cable model, length and markers shall be as per the Power Cable Schedule.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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11 Power-up Inspection

11.1 System Start-up Test (FCS and EWS/OWS)

Outline	Field Control Stations (FCS) and Operator Work Stations (OWS) go to the operating state automatically upon powering up, provided that all application software and image are properly loaded in the system.
Objective	- Verify that the above components automatically boot up when going from 'stop' state to 'operating' state.
Reference	- Functional Specifications like; - 1724000594-IN-SP-00017 PAS Hardware Functional Design Specification (FDS-HW) - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) - 1724000594-IN-DD-00015 System Architecture Drawing - IM 33J01C10-01EN CENTUM VP Instruction Manual
Procedure	1. Power down components individually or for the whole system. 2. Power up each component individually and observe its boot up sequence. 3. Check station status from EWS0164 System Maintenance panel when each station boots up. Note: For each FCS, verify the random IO state and tuning data prior to power down. After power up, verify that the FCS initializes the application program as desired and retains the tuning data.
Criteria	1. Each component must boot up automatically. 2. Station status indication on HIS(EWS0164) System Maintenance panel should change from red to green.
Test Record Reference	- Refer Appendix 19.5 – SAT Check sheet

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The above checks are conducted on random basis for selected FCS/HIS(EWS0164) and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

ROSETTI MARINO Representative : _____ Date: _____

CROSSWIND Representative : _____ Date: _____

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11.2 Inspection of Safety Control Station (System) Cabinets

Outline	The Safety Control Station (SCS) is powered up using primary and secondary power feeders from PDP. The primary feeder feeds power to one of the system power supplies and the secondary power feeder feeds power to other system power supply. All the Safety Control Station cabinets are to be checked and verified after power-up.
Objective	To verify that all the Safety Control Station cabinets power-up normally without any hardware failures Note: Once Powered Up "LIVE" tag shall be placed on the cabinet.
Reference	- Functional Specifications like; - 1724000594-IN-SP-00017 PAS Hardware Functional Design Specification (FDS-HW) - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) - 1724000594-IN-DA-00010 SAFETY SYSTEMS CABINETS (SIS AND FGS) GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT - 1724000594-IN-DG-00021 SAFETY SYSTEMS CABINETS (SIS AND FGS) WIRING DIAGRAMS AND TERMINAL STRIPS
Procedure	A. Physical Check 1. Visually check that all the Safety Control Station cabinets are as per the GA/IA drawings. 2. Confirm that the Installation teams have completed the Installation Check Sheets as per Appendix-19.5 and Appendix-19.7 SCS. B. Power-up 1. Ensure that all the isolating switches, circuit breakers and fuse terminals are switched "off" to isolate all devices inside the cabinet from any incoming power. 2. Switch on the relevant circuit breaker (primary power source) in the PDP powering the SIS cabinet under test. 3. Verify the supply voltage at the main circuit breaker/isolating switch in that SCS cabinet. 4. Apply power to the one of the SCS Power Supply Unit (s) by switching ON the respective isolating switch. 5. Verify that the SCS Power Supply modules power up. Green LED display lights up on the respective SCS PSU(s).

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	6. Switch "OFF" the Circuit Breaker/Isolating Switch providing the Primary Source of Power. 7. Repeat the Test for secondary source powering the SCS. 8. Repeat the test by powering up both the primary and secondary power sources. 9. Confirm that all the fans in the cabinet are running. 10. Repeat the test for all SCS cabinets. 11. Complete the test measurements as per the attached check sheet in Appendix-19.5 and Appendix-19.7 SCS. 12. Record the observations and sign off the related acceptance form in the SAT Test Records. 13. Cabinet Alarm Check 14. Bulk Power Supply Redundancy check
Criteria	1. The quantity, type and location of the panel components inside each of the SCS cabinets should match the GA/IA documents. 2. SCS power supply units should function normally on power up.
Test Record Reference	- Appendix-19.5 and Appendix-19.7 SCS

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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11.3 Inspection of PCS Control Station (System) Cabinets

Outline	The Process Control Station (PCS) is powered up using primary and secondary power feeders from PDP. The primary feeder feeds power to one of the system power supplies and the secondary power feeder feeds power to other system power supply. All the Process Control Station cabinets are to be checked and verified after power-up.
Objective	To verify that all the Process Control Station cabinets power-up normally without any hardware failures Note: Once Powered Up "LIVE" tag shall be placed on the cabinet.
Reference	- Functional Specifications like; - 1724000594-IN-SP-00019 EMCS Software Functional Design Specification (FDS-SW) - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) - 1724000594-IN-DA-00009 PCS CABINETS GENERAL ARRANGEMENT DRAWINGS AND INTERNAL LAYOUT
Procedure	A. Physical Check 1. Visually check that all the PCS Control Station cabinets are as per the GA/IA drawings. 2. Confirm that the Installation teams have completed the Installation Check Sheets as per Appendix-19.5 and Appendix-19.7 PCS. B. Power-up 1. Ensure that all the isolating switches, circuit breakers and fuse terminals are switched "off" to isolate all devices inside the cabinet from any incoming power. 2. Switch on the relevant circuit breaker (primary power source) in the PDP powering the PCS cabinet under test. 3. Verify the supply voltage at the main circuit breaker/isolating switch in that PCS cabinet. 4. Apply power to the one of the PCS Power Supply Unit (s) by switching ON the respective isolating switch. 5. Verify that the PCS Power Supply modules power up. Green LED display lights up on the respective PCS PSU(s). 6. Switch "OFF" the Circuit Breaker/Isolating Switch providing the Primary Source of Power.

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	7. Repeat the Test for secondary source powering the PCS. 8. Repeat the test by powering up both the primary and secondary power sources. 9. Confirm that all the fans in the cabinet are running. 10. Repeat the test for all PCS cabinets. 11. Complete the test measurements as per the attached check sheet in Appendix-19.5 and Appendix-19.7 PCS 12. Record the observations and sign off the related acceptance form in the SAT Test Records. 13. Cabinet Alarm Check 14. Bulk Power Supply Redundancy check
Criteria	1. The quantity, type and location of the panel components inside each of the PCS cabinets should match the GA/IA documents. 2. PCS power supply units should function normally on power up.
Test Record Reference	- Appendix-19.5 and Appendix-19.7 PCS

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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11.4 MDF Function Check

11.4.1 MDF for Analog Input / Output

Outline	MDF for Analog Input / Output provides interface between the SIS/FGS/PCS and the field devices. Note: Once Powered Up "LIVE" tag shall be placed on the cabinet.
Objective	To verify that the installation conditions of all installed SIS/FGS/PCS AIO MDF cabinets are as per Yokogawa Installation guidance and approved control room layout drawings.
Reference	- Functional Specifications like; - 1724000594-IN-SP-00017 PAS Hardware Functional Design Specification (FDS-HW) - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) - 1724000594-IN-DA-00010 MDF GA/IA Drawing 1724000594-IN-DA-00009
Procedure	Physical Check 1. Visually check that all the SIS/FGS/PCS AIO MDF cabinets are as per the GA/IA drawings. 2. Confirm that the Installation teams have completed the Installation Check Sheets as per Appendix-19.5 and Appendix-19.7 MDF Analog. 3. Perform following random checks on the Installation. • Cable handling – routing, trays/duct, clamp rails and termination. • System cable – KS1 • Field cables from junction boxes (if completed) 4. Repeat the test for all AIO MDF cabinets. 5. Check that all field knife edge terminals are in open position. Note: There are no power supply units / fans mounted inside the AI/AO MDF's.
Criteria	1. AIO MDF cabinets should be installed per the Control room layout drawings. 2. The quantity, type and labels of the system cables should be as per the system cable schedule.
Test Record Reference	- GA / IA Drawings & System cable schedule - Appendix-19.5 and Appendix-19.7 SCS

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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11.4.2 MDF for Digital Input / Output

Outline	MDF for DI/DO provides SIS/FGS/PCS interface to the digital devices in the field.
Objective	1. To verify that all the installed SIS/FGS/PCS DI/DO MDF cabinets are installed per the installation guidance and control room layout drawings. 2. To verify that the components inside the SIS/FGS/PCS DI/DO MDF cabinets function normally on power up. 3. To verify functionality of cabinet high temperature and power supply unit fail alarms. 4. To verify proper functioning of the redundant power supply units. This test ensures that there will be no disruption in power to field devices whenever one of the power supply unit fails. Note: Once Powered Up "LIVE" tag shall be placed on the cabinet.
Reference	- Functional Specifications like; - 1724000594-IN-SP-00017 PAS Hardware Functional Design Specification (FDS-HW) - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) - 1724000594-IN-DA-00009, 1724000594-IN-DA-00010 MDF GA/IA Drawing - 1724000594-IN-LIS-00007 Systems Cables List
Procedure	A. Physical Check 1. Visually check that all the SIS/FGS/PCS DIO MDF are as per the GA/IA drawings. 2. Confirm that the Installation teams have completed the Installation Check Sheets as per Appendix-19.5 an Appendix-19.7 MDF DIO. 3. Perform following random checks on the Installation. • Cable handling – routing, trays/duct, clamp rails and termination. • System cable – AKB System Cables • Field cables from junction boxes (if completed) 4. Confirm that the wiring for cabinet temperature, power supply unit fail alarms and FTA board failure wherever applicable is completed and is as per the Cabinet alarm wiring schedule. 5. Ensure that the Field Power supply to field is isolated by removing the fuses on the DIO FTA boards. 6. Check that all field knife edge terminals are in open position.

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Note: Preferred practice is to remove the individual channel fuses on the DIO FTA boards after FAT (before shipping)

B. Power Up

1. Ensure that all the isolating switches, circuit breakers and fuse terminals are switched "off" to isolate power to all devices inside the cabinet.
2. Switch on the relevant circuit breaker (primary power source) in the PDP powering the MDF cabinet under test.
3. Verify the supply voltage at the main isolating switch/circuit breaker of each MDF.
4. Apply power to the one of the Power Supply Unit (PSU-01) by switching on the respective isolating switch/fuse powering it.
5. Verify that the Power Supply Unit power up by checking the Green LED on the PSU. Measure the DC voltage at the terminals.
6. Measure the voltage at the power terminals of DIO FTA boards.
7. Switch "off" the Primary source of power to the Power Supply Unit (PSU-01).
8. Perform the test for the Redundant Power Supply Unit (PSU-02) connected to the Secondary source of Power and repeat steps 5 & 6.
9. Repeat steps 5 & 6 by Powering up both PSU-01 & PSU-02.
10. Turn ON the fuse to run the fans in the cabinet.

C. Cabinet Temperature Alarm

1. Note Thermostat setting in the cabinet. Check that the contact at the terminal is closed circuit.
2. Set the Temperature setting of thermostat to a lower setting (e.g. 18°C).
3. Check that the contact is now open. Verify alarm in SCADA HMI.
4. Recover the alarm by setting the temperature setting back to above room temperature.
5. Check that the contact is now closed. Verify alarm recovery in SCADA HMI.

D. Field Power Supply Alarm

1. Simulate field PSU fail by removing incoming power to PSU-01.
2. Measure contact at alarm terminal, contact should be open. Verify alarm in SIS/SCADA HMI.
3. Apply power to PSU-01. Contact status should return to closed. Verify alarm recovery in SCADA HMI.
4. Repeat the test for PSU-02.

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	5. Complete the test measurements as per the attached check sheet in Appendix-19.5 and Appendix-19.7 MDF DIO. 6. Repeat the test for all SIS/FGS/PCS DIO MDF cabinets.
Criteria	1. SIS/FGS/PCS DIO MDF cabinets should be installed per installation guidance and control room layout. 2. The quantity, type and labels of the system cables should be as per the system cable schedule. 3. The components inside SIS/FGS/PCS DIO MDF cabinets should function normally on power up. 4. Wiring of SIS/FGS/PCS DIO MDF PSU fail and Cabinet temperature high alarms should be according to the cabinet alarm wiring schedule and the alarm in SIS/FGS/PCS should function as desired.
Test Record Reference	- Appendix-19.5 and Appendix-19.7 MDF DIO

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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11.5 Other Cabinet

11.5.1 Server Cabinet

Outline	The server cabinet houses rack mounted rack server computers.
Objective	1. To verify that all the installed server cabinets are installed per the installation guidance and control room layout drawings. 2. To verify that the server PCs, and other components inside the cabinet function normally on power-up. 3. To verify that selection of Server PC to the monitor can be done using the KVM console. 4. To verify functionality of cabinet high temperature alarm. Note: Once Powered Up "LIVE" tag shall be placed on the cabinet.
Reference	- Functional Specifications like; - 1724000594-IN-DD-00015 System Architecture Drawing - 1724000594-IN-SP-00017 PAS Hardware Functional Design Specification (FDS-HW) - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-RE-40093 Control System Philosophy - 123A90-DDL-IN-DD-40096 Control System Architecture Detailed Drawings - K559-2254-IC-SPE-001 SYSTEM SPECIFICATION FOR MAIN AUTOMATION CONTRACTOR - 1724000594-IN-DA-00011, 1724000594-IN-DA-00012Server Cabinet GA/IA Drawing- Cabinet Alarm wiring - 1724000594-IN-LIS-00004 Instrument IO List
Procedure	A. Physical Check 1. Visually check that the server cabinets are as per the GA/IA drawings. 2. Confirm that the Installation teams have completed the Installation Check Sheets as per Appendix-19.5 Server Cabinet. 3. Perform following random checks on the Installation. • Cable handling – routing, trays/duct, clamp rails and termination.

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	• Network cables 4. Confirm that the wiring for cabinet temperature alarms is completed and is as per the cabinet alarm wiring schedule. B. Power-up 1. Ensure that all the isolating switches, circuit breakers and fuse terminals are switched "off" to isolate all devices inside the cabinet from any incoming power. 2. Switch ON the relevant circuit breaker (primary power source) in the PDP powering the server cabinet under test. 3. Verify the supply voltage at the main circuit breaker/isolating switch in that server cabinet. 4. Apply power to the primary power feed of the server cabinet by switching ON the primary feed Circuit Breaker/isolating switch. Turn ON the Power to Server PC one by one from the server front panel. 5. Verify that primary PSU of Server PCs is powered ON. Confirm that the Server PCs start-up properly without any errors. 6. Switch ON the secondary power source for server cabinet in the PDP. 7. Verify that secondary PSU of Server PCs are powered ON. Confirm that the Server PCs start-up properly without any errors. 8. Verify other components like KVM switch and monitor power up and function normally. Confirm the operation of KVM switch/keyboard by changing the Server PC selection. 9. Confirm that the fans in the cabinet are running. C. Cabinet Temperature Alarm 1. Note Thermostat setting in the cabinet. Check that the contact at the terminal is closed circuit. 2. Set the Temperature setting of thermostat to a lower setting (e.g. 18°C). 3. Check that the contact is now open. Verify alarm in SCADA alarm list. 4. Recover the alarm by setting the temperature setting back to above room temperature. 5. Check that the contact is now closed. Verify alarm recovery in SCADA alarm list.
Criteria	1. Server cabinets should be installed per installation guidance and control room layout drawings. 2. The quantity, type and labels of the network cables should be as per the network cable schedule.

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	3. The components inside server cabinets should function normally on power up. 4. Wiring of server cabinet temperature high alarms should be correct and the alarm in SIS/FGS/PCS should function as desired.
Test Record Reference	- Appendix-19.5 Server Cabinet

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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11.5.2 Network Cabinet

Outline	The network cabinet houses rack mounted network switches and fiber optic patch panels
Objective	1. To verify that all the installed network cabinets are installed per the installation guidance and control room layout drawings. 2. To verify that the network switches and other components inside the cabinet function normally on power-up. 3. To verify functionality of cabinet high temperature alarm. Note: Once Powered Up "LIVE" tag shall be placed on the cabinet.
Reference	- Functional Specifications like; - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-RE-40093 Control System Philosophy - 123A90-DDL-IN-DD-40096 Control System Architecture Detailed Drawings - K559-2254-IC-SPE-001 SYSTEM SPECIFICATION FOR MAIN AUTOMATION CONTRACTOR - 1724000594-IN-DD-00015 System Architecture Drawing - 1724000594-IN-SP-00017 PAS Hardware Functional Design Specification (FDS-HW) - 1724000594-IN-DA-00011, 1724000594-IN-DA-00012 Server Cabinet GA/IA Drawing - Cabinet Alarm wiring in Instrument IO List 1724000594-IN-LIS-00004
Procedure	A. Physical Check 1. Visually check that the network cabinets are as per the GA/IA drawings. 2. Confirm that the Installation teams have completed the Installation Check Sheets as per Appendix-19.5 Network Cabinet. 3. Perform following random checks on the Installation. • Cable handling – routing, trays/duct, clamp rails and termination. • Network cables 4. Confirm that the wiring for cabinet temperature alarms is completed and is as per the cabinet alarm wiring schedule. B. Power-up

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	1. Ensure that all the isolating switches, circuit breakers and fuse terminals are switched "off" to isolate all devices inside the cabinet from any incoming power. 2. Switch ON the relevant circuit breaker (primary power source) in the PDP powering the Server/Network cabinet under test 3. Verify the supply voltage at the main circuit breaker/isolating switch in that network cabinet. 4. Apply power to the primary power feed of the network cabinet by switching ON the primary feed Circuit Breaker/isolating switch. Turn ON the Power to network switches one by one. 5. Verify that primary PSU of Vnet/IP Bus 1 L2SW/L3SW (and if applicable Ethernet switch) is powered ON. Confirm that the Vnet/IP Bus1 L2SW/L3SW (and if applicable Ethernet switch) start-up properly without any errors. Verify Vnet/IP Bus 1 recovery on HIS. 6. Switch ON the secondary power source for server cabinet in the PDP. 7. Verify that secondary PSU of Vnet/IP Bus 2 L2SW/L3SW (and if applicable Ethernet switch) is powered ON. Confirm that the Vnet/IP Bus2 L2SW/L3SW (and if applicable Ethernet switch) start-up properly without any errors. Verify Vnet/IP Bus 2 recovery on HIS. 8. If applicable, verify fiber optic link on the L2SW/L3SW by checking network communication using fiber network. 9. Confirm that the fans in the cabinet are running. C. Cabinet Temperature Alarm 1. Note Thermostat setting in the cabinet. Check that the contact at the terminal is closed circuit. 2. Set the Temperature setting of thermostat to a lower setting (e.g. 18°C). 3. Check that the contact is now open. Verify alarm in SCADA alarm list. 4. Recover the alarm by setting the temperature setting back to above room temperature. 5. Check that the contact is now closed. Verify alarm recovery in SCADA alarm list.
Criteria	1. Network cabinets should be installed per installation guidance and control room layout drawings. 2. The quantity, type and labels of the network cables should be as per the network cable schedule. 3. The components inside Server/Network cabinets should function normally on power up.

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	4. Wiring of network cabinet temperature high alarms should be correct and the alarm in SIS should function as desired.
Test Record Reference	- Appendix-19.5 Network Cabinet

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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11.6 SENG / SOE (EWS0164)

Outline	The SENG/SOE (EWS0164) Servers shall be checked and verified for the proper functioning on power-up.
Objective	To verify that all the installed SENG/SOE Server boot up and applications started up automatically on power-up Note: Once Powered Up "LIVE" tag shall be placed on the stations.
Reference	- Functional Specifications like; - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40100 Safety System (ESD, Fire and Gas) Specification - 123A90-DDL-IN-DD-40096 Control System Architecture Detailed Drawings - K559-2254-IC-SPE-001 SYSTEM SPECIFICATION FOR MAIN AUTOMATION CONTRACTOR - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-DD-40019 Data Network Architecture Drawings - 1724000594-IN-SP-00018- PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-SP-00017 PAS Hardware Functional Design Specification (FDS-HW) - 1724000594-IN-DD-00015 System Architecture Drawing
Procedure	**A.** Physical Check 1. Visually check that all the SENG (EWS0164) is installed as per the design layout/console arrangement drawing **B.** Functional Check 1. Ensure that all the isolating switches, circuit breakers and fuse terminals are switched "off" to isolate power to all the devices inside the console. Following steps are applicable if the console is equipped with Redundant Power Supply Switch/units 2. Switch on the relevant circuit breaker (primary power source) in the PDP powering the console under test. 3. Verify that the Redundant Power Switch (RPS) Unit power up and measure the AC voltage at the terminals. Green LED display lights up.

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	4. Power-up the respective machine. The PC should boot up properly and the application program should start up automatically. 5. Switch "off" the Primary source of power (within the MDF) to the Redundant Power Supply Switch (RPS). 6. Perform the test by powering "on" the secondary source of power and repeat the test to ensure the similar results. 7. Power "off" both sources of power. Repeat the test by powering up both Power feeds to RPS. 8. If the machine has built-in redundant power supplies, i.e., connected through a direct feeds (and not through RPS) using the isolating switch, then, isolate the power feeds one at a time and perform the test.
Criteria	SENG/SOE Servers & monitor should power-up normally and the SIS application program should start up.
Test Record Reference	- Appendix-19.7 Power Up

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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12 Application Check

12.1 Application Revision Check

Outline	Check the revision of the safety application.
Objective	To ensure the correct application revision is loaded to each safety controller.
Reference	- Functional Specifications like; - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW - 123A90-DDL-IN-LIS-40089 Instrument I/O List - P&IDs - FAT Test Report
Procedure	1. In the workbench open the revision control sheet of the controller. 2. Check the revision record against the FAT Test Report. 3. Record the application revision in Appendix-19.13 Revision Record.
Criteria	Revision should be equal to FAT version in case of SIS/FGS OR Revision should be higher than FAT version and list of post-FAT implemented punch items present in case of SIS/FGS. In case PCS this test is not applicable.
Test Record Reference	- Appendix-19.13 Revision Record for SIS/FGS

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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12.2 Project Overall Function

12.2.1 Project Common Setting Check

Outline	Application inspection of project overall function include verifying project common configuration like plant hierarchy, alarm table, operation mark, and FCS properties/constants.
Objective	Verify that the project overall function of CENTUM VP project is defined according to the FDS requirements.
Reference	Functional Specifications like; - 1724000594-IN-DD-00015 System Architecture Drawing - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW - CENTUMVP system view - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-RE-40093 Control System Philosophy - 123A90-DDL-IN-DD-40096 Control System Architecture Detailed Drawings - K559-2254-IC-SPE-001 SYSTEM SPECIFICATION FOR MAIN AUTOMATION CONTRACTOR - K559-2254-PR-BLD-001 BLOCK FLOW DIAGRAM SYSTEM OVERVIEW - K559-2254-EL-LST-001 CONTROL ALARM AND MONITORING TABLE - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-DD-40019 Data Network Architecture Drawings
Procedure	Verify following CENTUM VP configuration files as a part of paper check during pre-SAT; Plant hierarchy Alarm table Operation mark FCS properties/constants

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Criteria	Plant hierarchy, alarm table, operation mark, and FCS properties/constants are configured according to the FDS.

The above checks are conducted and witnessed by following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ **Date:** _____

RM Representative : _____ **Date:** _____

Crosswind Representative : _____ **Date:** _____

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12.3 FCS Function

12.3.1 Application Software Test for Complex Loops

Outline	PCS application test involves functionality check for all complex loops that is described in the functional specification, control narratives and P&IDs.
Objective	Verify that the complex control configuration functions as defined in the approved functional specifications.
Reference	Functional Specifications like; - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) Refer to Documents - 123A90-DDL-IN-LIS-40089 Instrument IO List - P&IDs of Process and third-party communication packages (WTP, HVAC, LV SWGR, UPS) - 123A90-DDL-IN-RE-40095 Process Control Logic Description - 123A90-DDL-IN-CE-40000 ESD/PSD Cause and Effect Diagram - 123A90-DDL-IN-LIS-40027 Master Alarm Database
Procedure	simulate process input signals to check control loop functions. Check following applicable control functions for each complex loop. Control Action Bumpless transfer Tracking functions Ratio/Calculations Annunciator message output Data quality Propagation ESD/PSD Interlock Shutdown Controller action Operational Interlock Controller action Initial functional status of loops on FCS startup Operator Graphical Interface Alarm & Trip settings

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	Other specific functional requirements according to complex loop description
Criteria	Complex loops in control drawing should be configured in accordance to the functional specifications, control narrative, P&IDs, C&E and PCS I/O Database.

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA

Representative : _____ Date: _____

Rosetti Marino

Representative : _____ Date: _____

Crosswind

Representative : _____ Date: _____

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12.3.2 Application Software Test for Sequence and Logic

Outline	FCS sequence control functions include sequence table, logic chart or SEBOL (Sequence and Batch Oriented Language) configuration. These are configured in accordance with plant logic requirements as described in the FDS, control narrative and any sequence/logic diagrams. Sequence control functions are checked by simulating field inputs and confirming the corresponding expected outputs.
Objective	Verify that the specified functions perform control as defined in the approved functional specifications.
Reference	Functional Specifications like; - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) Refer to Documents Refer to Documents - 123A90-DDL-IN-LIS-40089Instrument IO List - P&IDs of Process and third-party communication packages (WTP, HVAC, LV SWGR, UPS) - 123A90-DDL-IN-RE-40095 Process Control Logic Description - 123A90-DDL-IN-CE-40000 ESD/PSD Cause and Effect Diagram
Procedure	- simulate process input signals to check logic/sequence configuration. - Check that the sequence/logic performs correctly, and the correct digital outputs are set. - Check valves open/shut, pumps start/stop, appropriate alarm message display etc. - Check the initial functional status of sequence logics on FCS start-up. - For each sequence/logic, check operator interface Graphic functions. - Detail checklists are described on the Check sheet.
Criteria	Sequence and logic should be configured in accordance to the functional specifications, Control/Logic narrative, P&IDs, SLDs, C&E and PCS I/O Database and any sequence or logic diagram.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA

Representative : _____ Date: _____

Rosetti Marino

Representative : _____ Date: _____

Crosswind

Representative : _____ Date: _____

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12.3.3 Alarm and Trip Set points

Outline	This application inspection includes non-typical loops such as control loops, etc. that are generated.
Objective	Verify that alarm and set points are as per Alarm/Trip Set points.
Reference	Functional Specifications like; - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) - K559-2254-EL-LST-001 Control Alarm and Monitoring Table Refer to Documents - 123A90-DDL-IN-LIS-40089 Instrument IO List - P&IDs of Process and third-party communication packages (WTP, HVAC, LV SWGR, UPS) - 123A90-DDL-IN-RE-40095 Process Control Logic Description
Procedure	Identify each Alarm/trip for each required Tag. Simulate the value to create alarm Verify the alarm/trip set points on the check sheet. Detail checklists are described on the check sheet.
Criteria	Each loop in control drawing should be configured in accordance to the functional specifications, control narrative, P&IDs, and PCS I/O Database.

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA

Representative : _____ Date: _____

Rosetti Marino

Representative : _____ Date: _____

Crosswind

Representative : _____ Date: _____

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12.4 Hart I/O Module (CENTUM VP/Prosafe RS) Communication Test

Outline	The Instrument Asset Management System i.e. Plant Resource Manager (PRM) Server System is used to configure and maintain the database of various HART instruments via HART I/O module (Centum VP / Prosafe RS). This test will be conducted for Centum VP / Prosafe RS Hart I/O modules.
Objective	The purpose of this test is to verify that all the HART I/O module (Centum VP / Prosafe RS) and PRM supplied are properly configured.
Reference	- Functional Specifications like; - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-SP-40100 Safety System (ESD, Fire and Gas) Specification - 1724000594-IN-LIS-00004 PCS I/O Database - for Device files 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW
Procedure	- Configuring Device Path: From the device path configuration tool confirm the device path is configured by providing the communication type, domain no., station no., IOM type, Slot No., Preamble and Polling address.

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA

Representative : _____ Date: _____

Rosetti Marino

Representative : _____ Date: _____

Crosswind

Representative : _____ Date: _____

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12.5 Subsystems ALE111/A2LP131 MODULE Communication check

Outline	The subsystem communication in DCS provide interface to various subsystem using appropriate communication driver software from the vendor system (FCS0101). Based on Package Vendor communication protocol and redundancy available Redundant ALE111/A2LP131 Modules in the DCS system are provided. In case of Redundant ALE111 module during operation, one of them will be active while the other will remain as a standby. The standby I/O Modules is constantly updated.
Objective	The purpose of this test is to verify IO mapping in DCS for each subsystem interface by visually checking communication points from end to end on the actual system for all packages
Reference	Functional Specifications like; - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-LIS-00004 PCS I/O Database - 1724000428-IN-LIS-00016 INSTRUMENT AIR PACKAGE - 1724000428-IN-LIS-00015 NITROGEN GENERATION PACKAGE U-64000 - 1723002197-EL-LIS-00042 SG-200N1 I/O LIST - 1724000372-EL-LIS-00014 I/O LIST - B-100 HVAC I/O LIST - E&I SHELTERS - B-200 HVAC I/O LIST - E&I SHELTERS - B-300 HVAC I/O LIST - E&I SHELTERS - B-400 HVAC I/O LIST - E&I SHELTERS
Procedure	Analog input point check Call up an analog input serial communication tag on the DCS HIS and confirm the tag comment, Scale High and Scale Low is correct as per the reference document.

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	Simulate following input signals at the subsystem end and confirm the readings on DCS serial tag matches the simulated input signal. Signal 1 = 0% of the range Signal 2 = 50% of the range Signal 3 = 100% of the range Record the result and repeat the tests for all analog input points. Analog output point check Call up an analog output serial communication tag on the DCS HIS and confirm the tag comment, Scale High and Scale Low is correct as per the reference document. Pull up the communication register at the subsystem end to observe the analog valve from the DCS HIS. Simulate following output signals at the DCS HIS and confirm the readings on the subsystem register matches the simulated signals: Signal 1 = 0% of the range Signal 2 = 50% of the range Signal 3 = 100% of the range Record the result and repeat the tests for all analog output points. Digital input point check Call up a Digital input serial communication tag on the DCS HIS and confirm the tag comment, and switch position level is correct as per the reference document. Simulate following input signals at the subsystem end and confirm the status on DCS serial tag matches the simulated input signal. Signal 1 = 0 or open contact input signal Signal 1 = 1 or close contact input signal Record the result and repeat the tests for all digital input points. Digital output point check

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	Call up a Digital output serial communication tag on the DCS HIS and confirm the tag comment, and switch position level is correct as per the reference document. Pull up the communication register at the subsystem end to observe the digital status from the DCS HIS Simulate following input signals at the DCS HIS and confirm the status on the subsystem register matches the simulated signal. Signal 1 = 0 or open contact input signal Signal 1 = 1 or close contact input signal Record the result and repeat the tests for all digital Output points.
Criteria	To ensure that IO mapping List is verified for each subsystem interface by visually checking communication points from end to end on the actual system.
Test Record Reference	1724000594-IN-LIS-00004 PCS I/O Database Printouts

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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13 IOM Functional Inspection

13.1 PCS I/O Module Inspection (FIO System with CPU)

Outline	All I/O modules installed in System Cabinets are certified functional by YOKOGAWA and were subjected to inspection by Rosetti Marino/Crosswind during FAT. Random I/O check is performed to verify system cables installation between panels (for FIO System) and to verify that the I/O Modules correctly function.
Objective	To verify that the system cables between the I/O modules and the FTA boards have been installed and terminated properly. (for FIO System) To verify I/O module functionality by simulating signals for random I/O points.
Reference	Functional Specifications like; - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 1724000594-IN-SP-00017 PAS Hardware Functional Design Specification (FDS-HW) - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) - 1724000594-IN-LIS-00004 I/O Assignment Documents - System Cable List 1724000594-IN-LIS-00007
Procedure	- Selected input signals to be simulated from terminals at MDF cabinet. - Selected output measurements to be taken from terminals at MDF cabinet. - Refer to the section 7.5 and the procedure below.
Criteria	- System cables should be properly terminated to the respective I/O modules and should be as per the system cable schedule. (for FIO System) - The simulated signals on random I/O points should function and display properly in CI View OWS.
Test Record Reference	- SAT Test Records – I/O Check Sheets (Analog & Digital) - IOM Check sheet Appendix-19.6 FIO

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➢ Analog input:

Simulate appropriate analog input signals to the PCS using the portable calibrator and record corresponding PCS reading displayed in the SENG(EWS0164) IO lock window or corresponding faceplate at the CI View OWS.

For Analog Input points, input signals shall be simulated:

- Signal 1 = 4.00mA, corresponding to 0% at SENG IO lock window.
- Signal 2 = 12.00mA, corresponding to 50% at SENG IO lock window.
- Signal 3 = 20.00mA, corresponding to100% at SENG IO lock window.
- Out of range IOP+
- Out of range IOP-

The result to be recorded in IOM Check sheet Appendix-19.6.

➢ Analog output:

From the corresponding application logics at the SENG or faceplate at the HIS, force the output (MV) of the tag and measure the corresponding signal output at the output terminals using an ammeter. For Analog Output points, following output signals shall be set:

- Signal 1 = 0.1%, corresponding to 4mA at output terminals.
- Signal 2 = 50%, corresponding to 12mA at output terminals.
- Signal 3 = 99.9%, corresponding to 20mA at output terminals.

The result to be recorded in IOM Check sheet Appendix-19.6.

➢ Digital input:

Open or close the input point at the input terminals and record the status indication in the SENG (EWS0164) IO lock window or the corresponding tag faceplate at the HIS. For Digital Input points, 2 input states shall be simulated:

- Signal 1 = 0 or open contact input signal.
- Signal 2 = 1 or close contact input signal.
- Signal Fault : Wire break and / or short circuit as applicable for line monitored inputs

The result to be recorded in IOM Check sheet Appendix-19.6.

➢ Digital output:

Force the SIS output point through the SENG (EWS0164) IO lock window or corresponding faceplate at the HIS and see the status of the output point on the I/O Module if it is with status indication. For Digital Output points, 2 output states shall be set:

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- Signal 1 = 0 or open contact output signal.
- Signal 2 = 1 or close contact output signal.
- Signal Fault: Wire break / short circuit in the case of line monitored outputs, are to be tested.

The result to be recorded in IOM Check sheet Appendix-19.6.

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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13.2 SIS/FGS I/O Module Inspection (FIO System with CPU)

Outline	All I/O modules installed in System Cabinets are certified functional by YOKOGAWA and were subjected to inspection by Rosetti Marino/Crosswind during FAT. Random I/O check is performed to verify system cables installation between panels (for FIO System) and to verify that the I/O Modules correctly function.
Objective	To verify that the system cables between the I/O modules and the FTA boards have been installed and terminated properly. (for FIO System) To verify I/O module functionality by simulating signals for random I/O points.
Reference	- Functional Specifications like; - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 1724000594-IN-SP-00017 PAS Hardware Functional Design Specification (FDS-HW) - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) - 1724000594-IN-LIS-00004 I/O Assignment Documents - 1724000594-IN-LIS-00007 System Cable List
Procedure	- Selected input signals to be simulated from terminals at MDF cabinet. - Selected output measurements to be taken from terminals at MDF cabinet. - Refer to the section 7.5 and the procedure below.
Criteria	- System cables should be properly terminated to the respective I/O modules and should be as per the SIS system cable schedule. (for FIO System) - The simulated signals on random I/O points should function and display properly in HIS.
Test Record Reference	- FAT Test Records – I/O Check Sheets (Analog & Digital) - IOM Check sheet Appendix-19.7 FIO

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➢ Analog input:

Simulate appropriate analog input signals to the SIS using the portable calibrator and record corresponding SIS reading displayed in the SENG(EWS0164) IO lock window or corresponding faceplate at the HIS.

For Analog Input points, input signals shall be simulated:

- Signal 1 = 4.00mA, corresponding to 0% at SENG IO lock window.
- Signal 2 = 12.00mA, corresponding to 50% at SENG IO lock window.
- Signal 3 = 20.00mA, corresponding to100% at SENG IO lock window.
- Out of range IOP+
- Out of range IOP-

The result to be recorded in IOM Check sheet Appendix-19.7.

➢ Analog output:

From the corresponding application logics at the SENG or faceplate at the HIS, force the output (MV) of the tag and measure the corresponding signal output at the output terminals using an ammeter. For Analog Output points, following output signals shall be set:

- Signal 1 = 0.1%, corresponding to 4mA at output terminals.
- Signal 2 = 50%, corresponding to 12mA at output terminals.
- Signal 3 = 99.9%, corresponding to 20mA at output terminals.

The result to be recorded in IOM Check sheet Appendix-19.7.

➢ Digital input:

Open or close the input point at the input terminals and record the status indication in the SENG (EWS0164) IO lock window or the corresponding tag faceplate at the HIS. For Digital Input points, 2 input states shall be simulated:

- Signal 1 = 0 or open contact input signal.
- Signal 2 = 1 or close contact input signal.
- Signal Fault : Wire break and / or short circuit as applicable for line monitored inputs

The result to be recorded in IOM Check sheet Appendix-19.7.

➢ Digital output:

Force the SIS output point through the SENG (EWS0164) IO lock window or corresponding faceplate at the HIS and see the status of the output point on the I/O Module if it is with status indication. For Digital Output points, 2 output states shall be set:

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- Signal 1 = 0 or open contact output signal.
- Signal 2 = 1 or close contact output signal.
- Signal Fault: Wire break / short circuit in the case of line monitored outputs, are to be tested.

The result to be recorded in IOM Check sheet Appendix-19.7.

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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14 Inter-SCS and between SCS and FCS Communication

Outline	For some applications, the Safety Instrumented Function may include I/Os from different SCS and the logic may extend from one SCS to another SCS. In such cases, safety data need to be exchanged between different SCSs while maintaining the SIL as part of the Safety Loop. Such safety communication is TÜV certified up to SIL3. For other applications, non-safety related data may be required to be exchanged between SCS and FCS. In this case, the SCS Global Switch Communication can be used.
Objective	To verify that both the Inter-SCS Safety Communication function properly and the associated logic is executed as desired.
Reference	- Functional Specifications like; - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software FDS-SW - 1724000594-IN-LIS-00004 PCS and Safety System IO List (HW and SW) - ProSafe-RS Instruction Manual (Safety Manual, Safety Control Station and Engineering Reference) - 123A90-DDL-IN-CE-40000 Process Safety Cause and Effect Matrix - 123A90-DDL-IN-CE-40002 Fire and Gas Cause and Effect Matrix - 1724000594-IN-DG-00026 ProSafe-RS system print out
Procedure	1. Monitor the logic status between the sending and receiving controller of the Safety on the SENG / HIS. Set signal on the producer to 'NORMAL' state either through direct IO injection or forcing. 2. Trigger the logic / value changes on the Sender to simulate a 'Trip' condition. 3. Monitor the logic status in the Receiver controller of the Safety / Interference-Free Communication on the SENG / HIS while in 'TRIP' state. 4. Introduce a fail to both of the Redundant Vnet/IP Buses and test the Safety Communication Timeout/Delay and Failsafe Value settings to examine safe state is achieved.
Criteria	The Inter-SCS Safety Communication functions are configured per application requirement and executed as desired
Test Record Reference	

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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15 SIS/FGS/PCS Performance Test

SIS/FGS/PCS Standard System function tests are not required to be performed at SAT, since these tests are done and verified during FAT.

15.1 SCS/FCS Resource Capacity Check

SCS/FCS Resource Capacity check is not required to be performed at SAT, since the tests have been carried out during FAT. If required by a project, the SCS/FCS resource printouts that were taken during FAT can be used as reference during SAT to re-verify the available SCS/FCS resource. If the resource data is different from the data recorded during FAT, then new print out of SCS/FCS resource data shall be taken and filed in SAT binder.

15.2 SCS/FCS CPU Loading Check

It is necessary to perform SCS/FCS CPU load check when all the systems are integrated. Hence the SCS/FCS Load check should be performed again at SAT, even though it was carried out during FAT. The SCS/FCS load check procedure and recorded data during the FAT shall be re-used to verify the SCS/FCS load at SAT. The new CPU load data shall be recorded by printing out the status display (that shows CPU idle time and Communication load) of all SCSs/FCSs. The print outs shall be filed in the SAT binder.

Note: SCS/FCS CPU Loading check and Vnet/IP network loading check shall be performed again after completion of commissioning activities to ensure that the system operational is stable and enough CPU and network resource is available for online maintenance and if applicable, for future expansion.

15.3 SCS/FCS Online/Offline Loading Test

SCS/FCS Online/Offline Loading tests are not required to be performed at SAT, since these tests are done and verified during FAT. If a project requires these tests to be performed again at SAT, then the FAT procedure and related check sheets can be used as reference for re-testing during SAT.

15.4 Backup/Restore Function Test

Backup/Restore Function tests are not required to be performed at SAT, since these tests are done and verified during FAT. If a project requires these tests to be performed again at SAT, then the FAT procedure and related check sheets can be used as reference for re-testing during SAT.

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16 EMCS

16.1 System Start Up

Outline	Test the startup and initialization of the EMCS controller.
Objective	Verify that after the system starts up, the EMCS logic will move the system in mode8.
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - 1723001595-EL-LIS-00011 (GIS) - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Start the EMCS Controller computer and wait for the completion of boot procedure.
Criteria	Through the SCADA CI, or the EMCS controller debug interface, verify that the EMCS is stable in Research Mode.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.2 Test for MODE 0 = IDLE (Power Import Only)

Outline	The configuration test of the MODE 0 = IDLE (Power Import Only)
Objective	- Verify the configuration test of the MODE 0 = IDLE, BLPH shall enter in the IDLE MODE if: • It is Grid Tied • Supply Guarantee is Active • HNA5_Fault = True
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) – EMCS FDS - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906

Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
	The variables to change are the ones related to the preconditions of the Mode:
	• It is Grid Tied
	• Supply Guarantee is Active
	• HNA5_Fault = True
	If all the conditions above are satisfied than the EMCS move to IDLE mode.
	The Variables inside del logic are defines as follows:
	`EMCS_Internal.GridTied :=`
	`(HNA6_QA1CB_Status = dbpos_on) AND`

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	(SG100D1_A6_TR_100AD1_Closed AND NOT G100D1_A6_TR_100AD1_Open); **EMCS_Internal.PlatformSupplyGuarantee** := (EMCS_INTERNAL.OperatorSupplyGuarantee = EMCS_SUPPLY_GUARANTEE.AUTOMATIC AND (HNA5_SupplyGuarantee AND HV_SCADA_Connected)) OR EMCS_INTERNAL.OperatorSupplyGuarantee = EMCS_SUPPLY_GUARANTEE.MANUAL_ACTIVE; **EMCS_Internal.HNA5_Fault** := HNA5_StatusCode = HNA5_STATUS_CODE_ENUM.Stopped_GridError OR HNA5_StatusCode = HNA5_STATUS_CODE_ENUM.Stopped_ErrorWithAutoReset OR HNA5_StatusCode = HNA5_STATUS_CODE_ENUM.Stopped_ManualAlarmResetRequired OR HNA5_StatusCode = HNA5_STATUS_CODE_ENUM.SafetyStop OR HNA5_StatusCode = HNA5_STATUS_CODE_ENUM.RemoteStop OR HNA5_QA1CB_Status = CB_STATUS_ENUM.Opened;
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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16.3 Test for MODE 1 = IMPORT

Outline	The configuration test of the BLPH MODE 1 = IMPORT
Objective	- Verify the configuration test of the MODE 1 = IMPORT, BLPH shall enter in the IMPORT MODE if: • It is Grid Tied • Supply Guarantee is Active • HNA5 produces more than 1 MW for one minute • Check the BESS is NOT fully charged or NOT PCS:ProcessFullyCharge (H2 vessels not full)
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.4 Test for MODE 1A = IMPORT (Charging)

Outline	The configuration test of MODE 1A = IMPORT (Charging)
Objective	- Verify the configuration test of MODE 1A = IMPORT (Charging), BLPH shall enter in the IMPORT MODE 1A if: - HNA5.P > 2 MW for one minute (Power Surplus)

Reference	Functional Specifications:
	  - 1724000594-IN-SP-00019_R03 (Revision 3)
	  - 1724000594-IN-LIS-00005_R02- EMCS_IO_List
	  - 123A90-DDL-IN-RE-40095 Process Control Logics Description
	  - 1724000594-IN-DD-00028 HMI screen print out
	  - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear
	  - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3
	  - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear
	  - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear
	  - 1724000372-EL-LIS-00014 - I/O LIST
	  - C63-AUT-002_03_Communication table
	  - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark
	  - BAL_8249889_001_00_1_EN
	  - EMCS-HNA5-SignalList-20240906

Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.5 Test for MODE 1B = IMPORT (Not Able to Charge)

Outline	The configuration test of MODE 1B = IMPORT (Not Able to Charge)
Objective	- Verify the configuration test of the MODE 1B = IMPORT (Not Able to Charge), BLPH shall enter in the IMPORT MODE 1B if: - HNA5.P <= 2 MW for one minute (Power Deficit).

Reference	Functional Specifications:
	  - 1724000594-IN-SP-00019_R03 (Revision 3)
	  - 1724000594-IN-LIS-00005_R02- EMCS_IO_List
	  - 123A90-DDL-IN-RE-40095 Process Control Logics Description
	  - 1724000594-IN-DD-00028 HMI screen print out
	  - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear
	  - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3
	  - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear
	  - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear
	  - 1724000372-EL-LIS-00014 - I/O LIST
	  - C63-AUT-002_03_Communication table
	  - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark
	  - BAL_8249889_001_00_1_EN
	  - EMCS-HNA5-SignalList-20240906

Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.6 Test for MODE 2 = HOT STANDBY (Ready to Export)

Outline	The configuration test of the MODE 2 = HOT STANDBY (Ready to Export)
Objective	- Verify the configuration test of the MODE 2 = HOT STANDBY (Ready to Export), BLPH shall enter in the HOT STANDBY MODE if: • It is Grid Tied • Supply Guarantee is Active • HNA5 produces more than 1 MW for one minute • Check the BESS is full charged AND PCS:ProcessFullyCharge (H2 storages full)
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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16.7 Test for MODE 3 = EXPORT MODE (Discharging)

Outline	The configuration test of the MODE 3 = Export Mode (Discharging)
Objective	- Verify the configuration test of the MODE 3 = EXPORT, BLPH shall enter in the EXPORT MODE if: • It is Grid Tied • Supply Guarantee is Active • HNA5 is produce less than 1 MW. • BESS is Healthy
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.8 Test for MODE 4 = COLD STANDBY (Not Able to Export)

Outline	The configuration test of the MODE 4 = COLD STANDBY (Not Able to Export)
Objective	- Verify the configuration test of the MODE 4 = COLD STANDBY, BLPH shall enter in the COLD STANDBY MODE if: • It is Grid Tied • Supply Guarantee is Active • HNA5 is produce less than 1 MW. • BLPH is NOT able to operate in Export (BESS Fault)
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

The above checks are conducted and witnessed by the following representatives.

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TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.9 Test for MODE 4A = EMERGENCY (ISLAND)

Outline	The configuration test of the MODE 4A = EMERGENCY (ISLAND)
Objective	- Verify the configuration test of the MODE 4A = EMERGENCY, BLPH shall enter in the EMERGENCY MODE if: - It is Islanded (off-gid) OR Supply Guarantee = INACTIVE - BESS is Healthy (NO Fault) - The BESS charge level is above the BESS-MINIMUM-OPERATING-RESERVE threshold.
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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16.10 Test for MODE 5 = POWER OUT (Black Out)

Outline	The configuration test of the BLPH MODE 5 = POWER OUT (Black Out)

Objective	- Verify the configuration test of the MODE 5 = POWER OUT, BLPH shall enter in the POWER OUT MODE if:
	  - It is Islanded (Off grid) **OR** Supply Guarantee = INACTIVE **OR** EMCS is informed of ESD-1D activation (reference doc. "Process Safety Cause & Effect Matrix")
	  - BESS is NOT Healthy **OR** BESS charge level is below the BESS-MINIMUM-OPERATING-RESERVE threshold (BESS FAULT) **OR** the SG-100D1 voltage measure on the BLPH 6.6kV distribution bus is absent.

Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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TEST RESULT: PASS / FAIL

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Crosswind Representative : _____ Date: _____

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16.11 Test for MODE 6 = MAINTENANCE

Outline	The configuration test of the MODE 6 = MAINTENANCE
Objective	- Verify the configuration test of the MODE 6 = MAINTENANCE, BLPH shall enter and remain in this MODE if receives the request to enter from CCS SCADA. The BLPH shall exit from the MAINTENANCE MODE if, and only if, the EMCS receives the request to return in automatic identification of the MODE from the data interface of the CCS SCADA through a software exit button. In MAINTENANCE MODE the EMCS shall not dispatch any command required by any automatic logic in the EMCS, including any open/close command, load shedding command, change in power setpoint. - Transition Conditions: Entrance on a command to get in the MANTENANCE MODE, Exit on a command to return in automation identification of the MODE - Verify and test that in Maintenance Mode the SCADA can send all the commands and signals through OPC-UA interface as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-020' - Verify the configuration test that at entrance in the Maintenance Mode a following procedure shall be followed: • EMCS shall stop and hold stop (prevent start command) the Electrolyzer. • EMCS shall stop and hold stop (prevent start command) the Fuel Cell. • EMCS shall stop the BESS. • EMCS – PCS coordination shall remain in place for package permissions. • EMCS sent to the PCS the command PCS.EnterMode(Manual)
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear

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	- 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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16.12 Test for MODE 7 = RESEARCH

Outline	The configuration test of the MODE 7 = RESEARCH
Objective	- Verify the configuration test of the MODE 7 = RESEARCH, BLPH shall enter and remain in the RESEARCH MODE, if the EMCS receives the request to enter in this MODE from the data interface of the CCS SCADA (protected under password). BLPH will ignore the power output of the HNA5 wind turbine. - Verify and test BLPH shall exit from the RESEARCH MODE if, and only if, the EMCS receives the request to return in automatic identification of the MODE from the data interface of the CCS SCADA through an exit button. - Verify and test that in Research Mode the SCADA can send all the commands and signals through OPC-UA interface as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-020'
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.13 Test for OPC-UA Communication Loss Between HV-SCADA & EMCS

Outline	The configuration test for the loss of OPC-UA communication between HV-SCADA & EMCS
Objective	- Verify the configuration test of the EMCS, in case of OPC-UA communication between the HV-SCADA and EMCS is lost, the EMCS does not take any automatic action on 66kV GIS. In conjunction with this communication loss, the EMCS will immediately command the platform in IDLE MODE without waiting for any permissive from PCS. The EMCS notifies the PCS the mode change.
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS or directly interrupting an OPC-UA client communication, change the parameters of the EMCS. The parameter change directly affects the control logic and transit to IDLE.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.14 Test for Configuration of 66kV GIS

Outline	The configuration test for the status of signals & electrical sequence to manage the closing of GIS on BLPH
Objective	- Verify the configuration test of the EMCS, to manage the open and closing of GIS on BLPH.
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1724000372-EL-LIS-00014 - I/O LIST - 1723001595-EL-LIS-00011 (GIS)
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface. Test the following sequence: - Q0(QA1) "CB Open" command - Wait Q0(QA1) "Ready to close" permissive from HV-SCADA - Q0(QA1) "CB Close" command
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.15 Test for Configuration of Transformer OLTV/AVR

Outline	The configuration test for the AVR the set-point voltage reference for the secondary winding (the 6.6 kV side)
Objective	- Verify the configuration test as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-033', If EMCS is in Automatic or Maintenance, the AVR Controller logic will be forced in automatic mode and follows the set point requested by the Operator from the SCADA (password protected). There are two set points: • One is used in Automatic and Maintenance (password protected) • The other is used by the Operator in Research mode
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.16 Configuration Test for Coordination Between PCS & EMCS

Outline	The configuration to test the Coordination between PCS & EMCS as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-048'.

Objective	- Verify the configuration test of the EMCS, as follows:
	  - PCS communicates with EMCS through serial internal communication and the necessary signals (commands, statuses and permissive) will be exchanged between two systems
	  - EMCS requires PCS to enter in IMPORT MODE with "PCS.EnterMode(IMPORT)".
	  - EMCS requires PCS to enter in HOT STANDBY MODE with "PCS.EnterMode(HOT STANDBY)".
	  - EMCS requires PCS to enter in EXPORT MODE with "PCS.EnterMode(EXPORT)".
	  - EMCS requires PCS to enter in COLD STANDBY MODE with "PCS.EnterMode(STANDBY)".
	  - EMCS requires PCS to enter in EMERGENCY MODE with "PCS.EnterMode(EMERGENCY)".
	  - EMCS requires PCS to enter in RESEARCH MODE with "PCS.EnterMode(RESEARCH)".
	  - The EMCS shall not run (i.e. not starting and stop if running) the BESS without a positive permissive signal from the PCS.
	  - EMCS informs PCS for "Start Request" for Electrolyzer Package with "PermToStartEL"
	  - EMCS requires PCS the "Permissive to start" for Fuel Cell Package with "PermToStartFC"
	  - EMCS sends to PCS the "Command to Load shedding 1" – "Cmd.To.LoadShed"
	
	All the above control signals (status & commands) will be exchanged with BLPH control system (PCS) through a Modbus TCP communication

Reference	Functional Specifications:
	  - 1724000594-IN-SP-00019_R03 (Revision 3)
	  - 1724000594-IN-LIS-00005_R02- EMCS_IO_List
	  - 123A90-DDL-IN-RE-40095 Process Control Logics Description
	  - 1724000594-IN-DD-00028 HMI screen print out

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	- 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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16.17 Test for Communication with Fuel Cell Package

Outline	The communication test of Fuel Cell Package.
Objective	- Verify the communication test of Fuel Cell Package, identifying that State Machine is configured as per transitions of the Fuel Cell control policy without constraints to rising the set point using steps, also the Fuel Cell interval power regulator overshoot as per the SW- FAT Punch list record 'BPLH-EMCS-SW-038'. - Verify and test Conversion Efficiency of Fuel Cell: 33.33 kWh/kg as per the SW- FAT Punch list record 'BPLH-EMCS-SW-016'.
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.18 Test for Communication with Electrolyzer Package

Outline	The communication test of Electrolyzer Package.
Objective	- Verify the configuration test of the Electrolyzer Package identifying that State Machine is configured as per transitions between these states based on conditions like running duration and PCS permission.(For Example: the system will transition to Stop state if PCS permission is revoked (i.e., Tanks are full). Furthermore, verify and test the availability of the signal MIN_RUNNING_TIME as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-043'. - Verify the signal ActivePowerConsumption of the Electrolyzer is mapped to the SG-100D1_A1_ELECTROLYZER_RealPower as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-053'. - Verify that the Electrolyzer requires the set point when it is run, as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-054'.
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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16.19 Test for Communication with BESS Package

Outline	The communication test of BESS Package.
Objective	- Verify the configuration test of the BESS Package, identifying that State Machine is configured as per transitions between these States include Charging, Discharging, and Idle, influenced by the State of Charge (SoC) and PCS permissions via EMCS. - Verify and test the Healthy status formula of the BESS as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-059'.
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.20 Test for Communication with Solar Farm Package

Outline	The communication test of Solar Farm Package.
Objective	- Verify the configuration test of the Solar Farm Package, identifying that State Machine is configured as per transitions between these States include transitions between "Started" and "Stopped" states within the broader context of "Operating." - Verify and test the mapping of the signal related to the healthy of the Solar Farm as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-058'.
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

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16.21 Test for Operator Control on Supply Guarantee

Outline	The test for the operator control on Supply Guarantee
Objective	- Verify and test the configuration test of the Operator Control on the Supply Guarantee, If Automatic, the supply guarantee coming from the HV-SCADA is used, If Manual it could be Active or Inactive (Password Protected) as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-043'
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	: _____	Date:	_____
Rosetti Marino Representative	: _____	Date:	_____
Crosswind Representative	: _____	Date:	_____

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16.22 Test All Signals From HV-SCADA

Outline	The test for all signals from HV-SCADA
Objective	- Verify and test all the signals coming from HV-SCADA (Wind Turbine Power) and relative logic as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-039'
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

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Crosswind Representative : _____ Date: _____

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16.23 Test for Configuration on the Energy Management Policy

Outline	The test for the configuration on the Energy Management Policy

Objective	- Verify the exposure of EMCS to CCS SCADA the following parameters:
	  - WINDFARM_SURPLUS_MIN_POWER
	  - WINDFARM_SURPLUS_MIN_POWER_ABLE_TO_CHARGE
	  - WINDFARM_SURPLUS_MIN_TIME_ENTRANCE_INERTIA.
	- Validate the user input in changing the parameters regarding power and time energy surplus as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-049'

Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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16.24 Test for Power Distribution Management

Outline	The test for Power Distribution Management
Objective	- Verify logic to detect discrepancy between the CB status (open) and the automatic logic of EMCS for close command and generate alarm. For example if the open command is sent to the SG-100D1-TR_200ED1 CB and the feedback remain to close status, after a timeout (1 sec), generate a discrepancy alarm (it could be implemented using a flag for each CB and a timer) as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-050'.
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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16.25 Test for Electrical Distribution Equipment

Outline	The test for the configuration on the Electrical Distribution Equipment
Objective	- Verify EMCS will supervise and command the equipment of the electrical distribution of the BLPH, including switchgears on the 6.6kV and 800V SG-200D2 directly, as per the SW- FAT Punchlist record 'BPLH-EMCS-SW-047'
Reference	Functional Specifications: - 1724000594-IN-SP-00019_R03 (Revision 3) - 1724000594-IN-LIS-00005_R02- EMCS_IO_List - 123A90-DDL-IN-RE-40095 Process Control Logics Description - 1724000594-IN-DD-00028 HMI screen print out - 1723002197-EL-LIS-00043 - SG-200D2 I/O List Lv Switchgear - 23A2007_240628_PROFINET_Register BESS_V1_0_0_3 - 1723002197-EL-LIS-00041 - SG-100D1 I/O LIST HV Switchgear - 1723002197-EL-LIS-00042 - SG-200N1 I/O LIST Lv Switchgear - 1724000372-EL-LIS-00014 - I/O LIST - C63-AUT-002_03_Communication table - Crosswind Modbus Table - Main PLC - External Cut v3_comTest_Denmark - BAL_8249889_001_00_1_EN - EMCS-HNA5-SignalList-20240906
Procedure	Change the input variables of the EMCS, acting on the physical devices signals or simulating the variables value through the EMCS controller debug interface.
Criteria	Verify that the changed input signals will affect the control logic according to the EMCS FDS reference.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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17 CI Server Configuration

17.1 Audit trail

Outline	The generated events are recorded and can be traced
Objective	To verify the event generated by the operator can be traced
Reference	Functional Specifications: - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design Specification (FDS-SW) Section 14.8, 28.5.7 Input documents - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-LIS-40027 Master Alarm Database
Procedure	Generate some events which have to be recorded in the audit trail window in the operator interface. Random check of events generated and recorded shall be verified.
Criteria	The generated events are logged in the respective display.
Test Record Reference	Audit Trail Window printout

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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17.2 Historization

Outline	History data is acquired for applications like reporting, alarm pages and trending and therefore the correct configuration is very important to trace significant events in the past.
Objective	To verify the history configuration meets the customer requirements.
Reference	Functional Specifications: - 1724000594-IN-SP-00018 of Reference PCS and SAFETY SYSTEMS Software Functional Design Section 28.5.1 - History Storage calculation sheet Input documents - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-LIS-40027 Master Alarm Database
Procedure	- Verify the history storage path - Check the lifetime for the following history groups: - Item storage groups: SCAN/ITEM EVENT/EVENT EVENT/ITEM Generate randomly events for items in each storage groups to verify the timestamp of the generated events.
Criteria	The storage drive has enough space to match the size of the total history lifetime. This could be verified by using a history calculation sheet. The lifetime of the history groups is correctly implemented. Generated events could be observed using reports or trend displays.
Test Record Reference	Trend Display printout and generated csv report file

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

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Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

17.3 Authorization

Outline	The level of authorization for the typical is verified in typical FAT prior to the FAT. E.g., the operator can modify a setpoint but is not able to set the tag in calibration mode. In this test case the general CI Server configuration part will be tested which is the framework for the application typical. Random check shall be done during SAT.
Objective	Random check to verify if all authorization groups and users are configured according to the design documentation
Reference	Functional Specifications: - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design Section 28.8 Input documents - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-LIS-40027 Master Alarm Database
Procedure	Random check - Authorization groups are configured correctly. - All the required users are added in CI Server with the proper authorization groups. - Users are authorized to modify items within their process area (e.g., acknowledge, value) - Users are authorized to open displays within their process area
Criteria	All Authorization levels are configured properly. All required users are configured properly. Users have (only) access to their process area
Test Record Reference	NA

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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17.4 General layout and navigation

Outline	CI Server graphics are used as the Human-Machine Interface for operating the plant. The live status of the plant can be observed on the graphics and these data are obtained from the Centum VP and SIS controller.
Objective	The purpose of this test is to confirm that the frames of the general layout are configured according to the design specification.
Reference	Functional Specifications: - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design Section 30 Input documents - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-LIS-40027 Master Alarm Database
Procedure	Verify the general layout of the display area: - Windows heading - Menu area - Toolbar area - Display area - Display Navigation Random check to Verify the display navigation is in accordance with the design document.
Criteria	Graphics layout, display navigation are according to what was approved and correctly displayed as specified in the reference document.
Test Record Reference	Graphic printouts.

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

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Representative : _____ Date: _____

Crosswind
Representative : _____ Date: _____

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17.5 PROCESS DISPLAYS

Outline	CI Server graphics are used as the Human-Machine Interface for operating the plant. The live status of the plant can be observed on the graphics and these data are obtained from the CENTUM VP and SIS controller. All dynamic process data and alarms shall be simulated from the marshaling cabinet.
Objective	The purpose of this test is to confirm that: - Correct process flow is shown on the process displays and popups. - Correct process data is shown on the process displays and popups.
Reference	Functional Specifications: - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design Section Appendix-5 - Reference Instrument IO List 1724000594-IN-LIS-00004_R02 - Reference HMI screens print out 1724000594-QC-PRO-00032 Input documents - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-LIS-40027 Master Alarm Database - P&IDs & SLDs.
Procedure	The test environment shall include online FCS and SCS with project configuration to provide data to the tags on one of the applicable displays for sample data points. Check the following for the process display: - Correct representation of the process flow - Correct representation of the process data points. - Dynamic data and element modifiers by simulating process data.
Criteria	All process displays and popups are according to what was approved and correctly implemented as specified in the reference document(s).
Test Record Reference	Graphic printouts.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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17.6 Alarms pages

Outline	CI Server graphics are used as the Human-Machine Interface for operating the plant. The related graphics shall show the generated alarm, time-stamp, Alarm text and Priority upon forcing the values from test panels.
Objective	The purpose of this test is to confirm that: - The layout and function of the alarm pages is according to specifications.
Reference	Functional Specifications: - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design. Section 28.6 - 1724000594-IN-LIS-00004 Reference Instrument IO List Input documents - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-LIS-40027 Master Alarm Database - P&IDs & PFS.
Procedure	Check the following for the process display: - Layout - Colours and priorities - Alarm sorting - Available columns - Column width - Alarm time format - Available filters (fixed or changeable) - Alarm line layout (for different state transitions) - Alarm Description
Criteria	The alarm overview displays are according to what was approved and correctly implemented as specified in the reference document(s).
Test Record Reference	Graphic printouts.

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

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Representative : _____ Date: _____

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Representative : _____ Date: _____

Crosswind
Representative : _____ Date: _____

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17.7 Alarm Function

Outline	All the alarm functions within CI Server and the related project specific configuration are implemented.
Objective	To verify all the alarm requirements are functional in OWS post power up at site.
Reference	Functional Specifications: - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design. Section 28.6 Input documents - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-LIS-40027 Master Alarm Database - P&IDs & PFS.
Procedure	Verify the following is functional in OWS: - Acknowledgement types - Alarm collection behaviour - First-out group behaviour - Alarm group behaviour - Alarm Selection area - Areas of interest - Alarm priority - Alarm destinations e.g., audible alarm annunciation, alarm notification SMTP, alarm pages, alarm printers, … - Historical alarm lifetime
Criteria	The alarm portion within CI Server is configured in accordance with the reference document
Test Record Reference	Graphic printouts.

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

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Representative : _____ Date: _____

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Representative : _____ Date: _____

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17.8 Trend Function

Outline	All the trend functions within CI Server and the related project specific configuration are functional in OWS.
Objective	To verify all the Trend Group requirements are correctly implemented. - Group - Label - Description - Sampling Time - Duration - Pen assignment
Reference	Functional Specifications: - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design. Section 30.2.5 - 1724000594-IN-LIS-00004 Reference Instrument IO List Input documents - 123A90-DDL-IN-SP-40097 System Specification for Main Automation Contractor - 123A90-DDL-IN-SP-40098 Control System (PCS) Specification - 123A90-DDL-IN-SP-40024 Alarm System Requirements Specification - 123A90-DDL-IN-LIS-40027 Master Alarm Database -
Procedure	Verify the following is functional in OWS as per the "Trend Group" in latest Project database Tag List Reference Document. The trend group displays - Trend generation for over a period by selecting the date and time range.
Criteria	The trend groups within CI Server are functional in OWS post power up at site.
Test Record Reference	Graphic Printout

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

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Representative : _____ Date: _____

Crosswind
Representative : _____ Date: _____

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18 CI Server Functionality Check

18.1 Licenses and Key codes

Outline	Each component in the system has a set of licenses installed on them. This includes CI Server licenses and third-party licenses.
Objective	Confirm that the required licenses are installed on each component, and each are at the correct version level.
Reference	Bill of Material
Procedure	The following categories of licenses are installed on the system and are to be checked. • Yokogawa CI Server: With reference to section 9.3 confirm the types and quantities of licenses are correct for each station. Print out the station report (which includes revision level of the station) and attach it to this report. • Microsoft Windows Server: - Windows licenses are full product licenses - Confirm Windows has been activated with Microsoft • Microsoft Office - Confirm Microsoft Office Standard (Excel only) is installed on CI-Portal and-Core • Anti-virus application - Confirm the File Server has Trellix Endpoint Protection software installed.
Expected Results	All licenses are loaded and are at the correct revision level as listed in the software licenses list.
Record	NA

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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18.2 Server Switchover: SERVER - SERVER

Outline	Redundant CI Servers are monitored by a watchdog mechanism to switch over to the standby Server in case of failure of the active Server. Further a mirroring process is active to update the standby Server with the latest updates
Objective	To verify the switch over mechanism is working in accordance with the design documentation and mirroring process is synchronizing the standby Server.
Reference	Functional Specifications: - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design. Section 28.1.3
Procedure	The following circumstances should be verified for all Servers within the redundancy configuration: Manual switchover Automatic switchover in case of: - Process failure - Island situation - DUR queue overload (optional) - High CPU consumption (optional) - Non-responsive processes (optional) The standby Server will be synchronized with the most important updates from the active Server. Repeat this test for all Servers which are part of the redundancy configuration. Test the live data on HMI, trending, historian, alarm list during switch over.
Criteria	A switchover is initiated automatically in case of a failure. Manual switchover is possible. Active Server is synchronizing the standby Server
Test Record Reference	NA

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

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YOKOGAWA
Representative : _____ Date: _____

Rosetti Marino
Representative : _____ Date: _____

Crosswind
Representative : _____ Date: _____

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18.3 Server Switchover: SERVER – NODE

Outline	CI Server is handling the path selection when multiple network paths are available, and the active path fails to operate. This test case is not applicable for zero deployment clients.
Objective	To verify the redundant path mechanism is configured correctly.
Reference	Functional Specifications: 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design
Procedure	Open the performance monitor. Observe the amount of available communication paths and which one is the active path to the node. This can be verified using Performance monitor->Nodes. Disconnect the active path to the Node by disabling the network connection. Repeat the test for all available communication paths
Criteria	The standby path will take over the communication in case the active path is disturbed.
Test Record Reference	NA

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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18.4 CI Server Capacity Check

Outline	CI Server resources refer to the number of consumed tags. This project requires that there is at least 10% spare capacity.
Objective	To verify that there are available licensed CI Server tags in accordance with project spare capacity requirements.
Reference	None
Procedure	- Verify the number of consumed tags by using the CI Server "Performance Monitor"
Criteria	The available number of tags is within the project space capacity requirements (Maximum 90% of licensed). Licensed tags are 32768.
Test Record Reference	Printout of the Performance Monitor

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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18.5 Backup management

Outline	Backup of the critical machines are made on a frequent basis and can be restored.
Objective	To verify that creation of backups will not affect the system performance, and all scheduled backups are stored on the local and network paths.
Reference	Functional Specifications: - 1724000594-IN-SP-00018 PCS and SAFETY SYSTEMS Software Functional Design Section 28.10
Procedure	Verify the backup software is installed on Yokogawa machines according to design document. Observe the schedule backups for each Yokogawa machine and verify it with design. Document and observe the local and remote path for the backups. File Backup and restore: - Create for each type of Yokogawa machine (Server, Client workstation) a manually triggered backup of the tls directory. - After creation is completed, add some dummy tags. - Stop CI Server - Restore the backup. Image Backup and restore: - Create for each type of Yokogawa machine (Server, Client workstation) a manually triggered image. - After creation is completed, add some dummy tags. - Restore the image. - Reboot the Yokogawa machine to verify the Operating system is functioning properly with the new image
Criteria	- Backup software is installed on proper Yokogawa machines. - Backup schedule is in accordance with the design document. - During File and image backup the system was functioning properly. This can be verified by using the CI Server "Message-Log" and "Performance monitor". - Backup for files and images is stored on local and remote location. - The file and image backup can be successfully restored.
Test Record Reference	NA

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The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative	:	_____	Date:	_____
Rosetti Marino Representative	:	_____	Date:	_____
Crosswind Representative	:	_____	Date:	_____

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18.6 CI Server Node (Core) Time Synchronization

Outline	CI server is time synchronized with the (S)NTP time server
Objective	To verify the proper time synchronization of the CI servers
Reference	Functional Specifications: - 1724000594-IN-RE-00043 Section 3.4.7 of Cyber Security Settings
Procedure	Adjust the time on CI server ((S)NTP client)
Criteria	Time is synchronized and the steps of adjustment are in accordance with design documentation. Note: adjusting the time backwards in a big step could result in corrupted history
Test Record Reference	NA

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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18.7 CI Server Node (Portal) Time Synchronization

Outline	CI clients are time synchronized using one of the following options: ▪ Internal "DURUTL" process. In this case the CI Server time is updating the client. Note that DURUTL cannot be used for zero deployment clients.
Objective	To verify the proper time synchronization of the CI Portal clients
Reference	Functional Specifications: - 1724000594-IN-RE-00043 Section 3.4.7 of Cyber Security Settings
Procedure	Adjust the time on CI server (SNTP client)
Criteria	Time is synchronized and the steps of adjustment are in accordance with design documentation.
Test Record Reference	NA

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

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18.8 Time Synchronization Tests for Other Systems/Applications

This test applies to those systems/applications that do not have proprietary time synchronization function within the system but perform time synchronization to the external time source (e.g., NTP server, domain controller(s) etc.) with the help of Windows time service.

Outline	The system clocks of various applications are synchronized to the designated time source as specified in the respective design document.
Objective	The purpose of this test is to visually check and verify functionality of the time synchronization of other applications in the non-PIN network. Time Zone setting including the daylight saving on these systems is set depending on the plant location.
Reference	Functional Specifications: - Section 3.4.7 of Cyber Security Settings 1724000594-IN-RE-00043
Procedure	Open the Windows Date and Time Properties on a selected system/application and confirm the system clock of the application matches that of the time source specified in the reference document. Manually change the system clock of the application and confirm that within 5 minutes the clock is synchronized with the time source. If applicable, repeat the above test for other systems/applications
Criteria	Time on other systems/applications match the time on the GPS receiver or NTP server and Vnet/IP time
Test Record Reference	

The above checks are conducted and witnessed by the following representatives.

TEST RESULT: PASS / FAIL

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YOKOGAWA Representative : _____ Date: _____

Rosetti Marino Representative : _____ Date: _____

Crosswind Representative : _____ Date: _____

19 Appendices

19.1 SAT Organization Chart

19.2 SAT Schedule

19.3 SAT Signature Identification Sheet

19.4 SAT Test Equipment Records

19.5 SAT Check sheet for Hardware

19.6 FCS I/O Loop Check sheet

19.7 SAT Check sheet for SIS & FGS Hardware

19.8 SCS I/O Loop Check sheet

19.9 SAT Punch Record Ledger & Punch Record Form

19.10 Sub-System Communication Check Sheets

19.11 System Acceptance Certificate

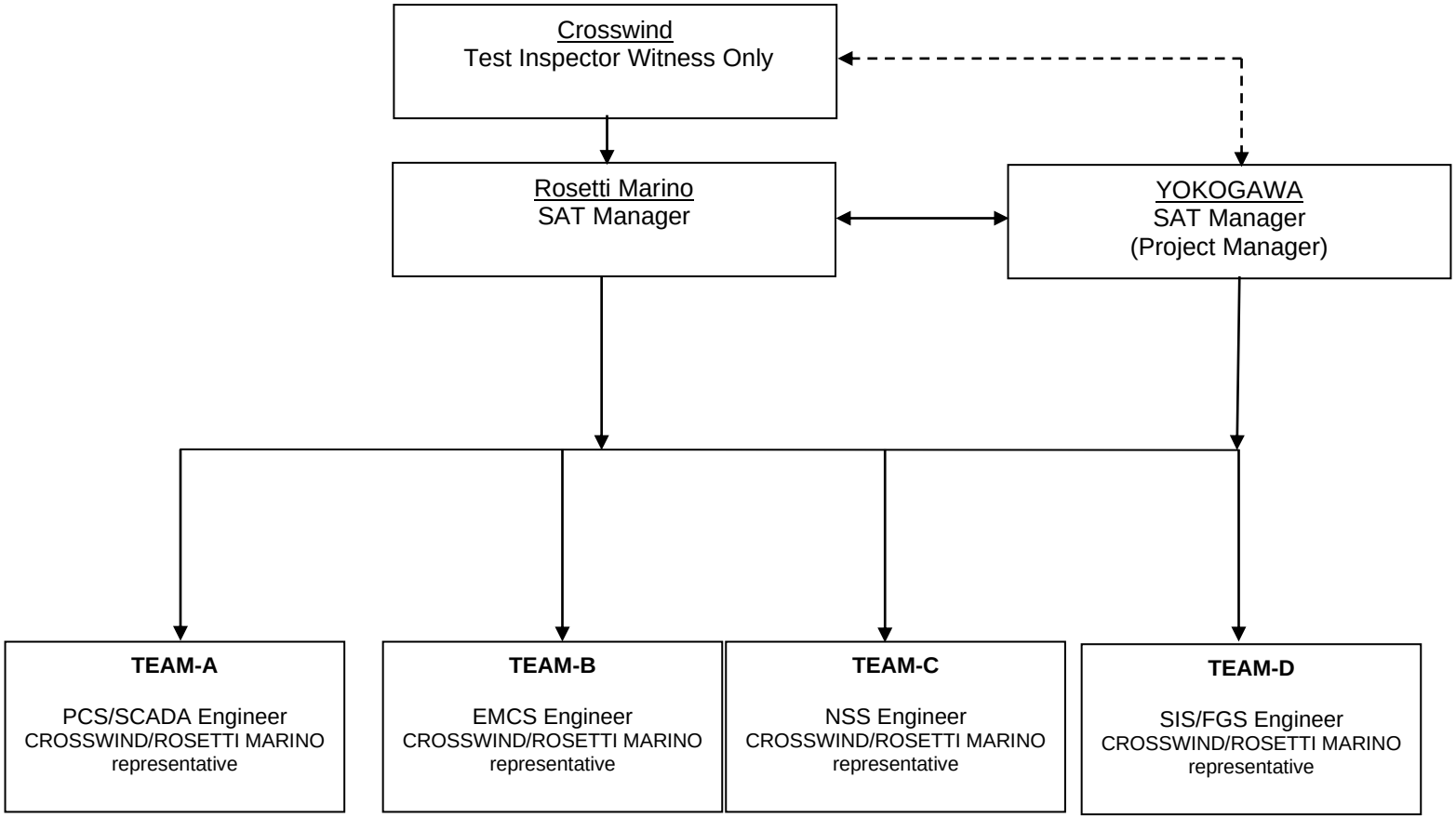
19.12 SAT Completion Certificate

19.13 Application Revision Record

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SAT ORGANIZATION



Note: Team A,B,C and D shall conduct SAT

PSC, SIS/FGS and EMCS FAT Schedule

Task Name	Duration	Start	Finish
SAT HW	Note-1	Note-1	Note-1
INTEGRATED FAT for PACKAGES	Note-1	Note-1	Note-1
SAT SW	Note-1	Note-1	Note-1

Note-1: According Site comissioning and package availability for testing

APPENDIX- 19.3 SAT SIGNATURE IDENTIFICATION SHEET

The signature identification sheets needs to be signed by all parties involved in SAT. This sheet will be used to identify the personnel who demonstrated / witnessed the test.

Sl No	Name	Company	Signatures	Initial
1				
2				
3				

Test Equipment Record

No	Test Equipment Description	Manufacturer And Model	Serial No.	Test Cert. No.	Expiry Date
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

COMMENTS:

Verified By: _____ Date: _____
Crosswind / Rosetti Marino

Reference No: _____

Installation Condition Check

Cabinet Number :

	Description	NA	Checked		Remarks / Punch No.
			Pass	Fail	
1	Quantity and specification of delivered products				
2	Installation position of delivered products				
3	No scratches, color change and dirt on the delivered products				
4	Components are tightly secured				
5	Cabinets secured tightly to the floor				
6	Cabinets secured tightly to each other				
7	Service area				
8	Completion of construction (Power Supply and grounding)				
9	Cable routing separation between power supply cable and system cables				
10	Completion of sealing at the cable duct entrance				
11	Cables are secured				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: ____________________

Dew Condition Check

Cabinet Number :

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
1 Cabinet				
1.1 Dew trace on exterior & interior of cabinets				
1.2 Color change and rust on exterior/interior of cabinets				
1.3 Dust inside/outside of cabinets and consoles				
1.4 Dew trace at the terminals inside the cabinets				
1.5 Dew trace on paints				
2 Modules				
2.1 Dew trace on modules				
2.2 Color change and rust on modules				
2.3 Dust on surface of modules				
2.4 Dew trace on paints				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: _____

Earth Connection Check

Cabinet Number :

	Description	NA	Checked		Remarks / Punch No.
			Pass	Fail	
1	Single Grounding Point				
2	Independent Grounding				
3	Grounding Junction Box				
4	Earth Electrode				
5	Ground wire size				
6	Termination contact				
7	Ground cable routing				
8	PE: Protective Earth (Safety Earth)				
9	FE: Functional Earth				
10	PE and FE Isolation (megger check)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: ____________________

SCS Hardware/Performance Check

Cabinet Number :

Description	NA	Checked		Remarks / Punch No.
		Front	Rear	
1 Hardware Installation Inspection Items				
1.1 Location is as per the drawings				
1.2 Mounting hardware is tight & per the Installation drawing				
1.3 Square, level and clean inluding air filters				
1.4 Adequate clearnace for door opening				
1.5 No water/moisture intrusion in or on the cabinet				
1.6 System cables entry position is properly sealed				
1.7 Grounding bar is tight and per the installtion drawing				
1.8 Cabinet is grounded per the drawings and specifications				
1.9 System cables are terminated properly according to the system cable schedule and Instruction manual				
2 Performance Check				
2.1 SCS Resource Capacity				
2.2 SCS CPU Loading				
2.3 Vnet/IP Network Loading				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Safety Control Station

Cabinet Number :

Description				NA	Checked		Remarks / Punch No.
					Front	Rear	
6 SCS Power Supply Module Redundancy Test							
6.1 SCU Power Supply							
- PW302 Left							
- PW302 Right							
6.2 Node Power Supply							
- Node 1							
- Node 2							
- Node 3							
- Node 4							
- Node 5							
- Node 6							
7 V-net / Vnet/IP Bus Redundancy Test							
V-net / Vnet/IP Bus1							
V-net / Vnet/IP Bus2							
8 SCS Resource Capacity Test							
SCS Front	Capacity :		%				
SCS Rear	Capacity :		%				
9 SCS CPU Loading Tests							
SCS Front	Capacity :		%				
SCS Rear	Capacity :		%				
10 V-net / Vnet/IP Loading Test							
V-net / Vnet/IP Bus1	Loading :		%				
V-net / Vnet/IP Bus2	Loading :		%				
11 Online / Offline Loading Test							

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: _____

FCS Hardware/Performance Check

Cabinet Number :

Description	NA	Checked		Remarks / Punch No.
		Front	Rear	
1 Hardware Installation Inspection Items				
1.1 Location is as per the drawings				
1.2 Mounting hardware is tight & per the Installation drawing				
1.3 Square, level and clean inluding air filters				
1.4 Adequate clearnace for door opening				
1.5 No water/moisture intrusion in or on the cabinet				
1.6 System cables entry position is properly sealed				
1.7 Grounding bar is tight and per the installtion drawing				
1.8 Cabinet is grounded per the drawings and specifications				
1.9 System cables are terminated properly according to the				
system cable schedule and Instruction manual				
2 Performance Check				
2.1 FCS Resource Capacity				
2.2 FCS CPU Loading				
2.3 Vnet/IP Network Loading				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Safety Control Station

Cabinet Number :

Description			NA	Checked		Remarks / Punch No.
				Front	Rear	
6 FCS Power Supply Module Redundancy Test						
6.1 FCU Power Supply						
- Left						
- Right						
6.2 Node Power Supply						
- Node 1						
- Node 2						
- Node 3						
- Node 4						
- Node 5						
- Node 6						
7 V-net / Vnet/IP Bus Redundancy Test						
V-net / Vnet/IP Bus1						
V-net / Vnet/IP Bus2						
8 SCS Resource Capacity Test						
FCS Front	Capacity :	%				
FCS Rear	Capacity :	%				
9 SCS CPU Loading Tests						
FCS Front	Capacity :	%				
FCS Rear	Capacity :	%				
10 V-net / Vnet/IP Loading Test						
V-net / Vnet/IP Bus1	Loading :	%				
V-net / Vnet/IP Bus2	Loading :	%				
11 Online / Offline Loading Test						

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: ____________________

HIS/EWS/PC/Server Power-up Check Sheet

Component Number :

Description		NA	Checked		Remarks / Punch No.
			Pass	Fail	
1	**Physical check**				
	Visual check for any physical damage				
	Multiple Monitor connection				
	Labels				
2	**Functional check**				
	Monitor Power-up / Power down				
	PC Power-up / Power down				
	RPS Functioning (if applicable)				
	Installed Software revisions				
	IP addressing				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: _____

MDF for Analog Input / Output

Cabinet Number :

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
1 Hardware Installation Inspection Items				
1.1 Location is as per the drawings				
1.2 Mounting hardware is tight & per the Installation drawing				
1.3 Square, level and clean inluding air filters				
1.4 Adequate clearnace for door opening				
1.5 No water/moisture intrusion in or on the cabinet				
1.6 System cables entry position is properly sealed				
1.7 Grounding bar is tight and per the installtion drawing				
1.8 Cabinet is grounded per the drawings and specifications				
1.9 System cables are terminated properly according to the				
system cable schedule and Instruction manual				
1.10 Wires and cables are labeled per drawings and specifications				
1.11 Cable terminations are tight and terminated per wiring drawings				
2 Cabinet Temperature				
- Thermostat setting				
- Alarm Contact				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: _____

MDF for Digital Input / Output

Cabinet Number :

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
1 Hardware Installation Inspection Items				
1.1 Location is as per the drawings				
1.2 Mounting hardware is tight & per the Installation drawing				
1.3 Square, level and clean inluding air filters				
1.4 Adequate clearnace for door opening				
1.5 No water/moisture intrusion in or on the cabinet				
1.6 System cables entry position is properly sealed				
1.7 Grounding bar is tight and per the installtion drawing				
1.8 Cabinet is grounded per the drawings and specifications				
1.9 System cables are terminated properly according to the				
system cable schedule and Instruction manual				
1.10 Wires and cables are labeled per drawings and specifications				
1.11 Cable terminations are tight and terminated per wiring drawings				
2 Cabinet Temperature				
- Thermostat setting				
- Alarm Contact				
3 Field Power Supply & ELM				
- PSU 1 Alarm Contact				
- PSU 2 Alarm Contact				
- ELM check (if applicable)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: _____

Server Cabinet

Cabinet Number :

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
1 Hardware Installation Inspection Items				
1.1 Location is as per the drawings				
1.2 Mounting hardware is tight & per the Installation drawing				
1.3 Square, level and clean inluding air filters				
1.4 Adequate clearnace for door opening				
1.5 No water/moisture intrusion in or on the cabinet				
1.6 Network cables entry position is properly sealed				
1.7 Grounding bar is tight and per the installtion drawing				
1.8 Cabinet is grounded per the drawings and specifications				
1.9 Network cables are terminated properly to the correct server				
NICs according to the communication cable schedule				
2 Cabinet Temperature				
- Thermostat setting				
- Alarm Contact				
3 Functional check				
3.1 KVM test				
- Selection of PC / Server from Keyboard				
3.2 Power Supply				
Server Power Supply Redundancy Check				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

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Reference No: _____

Network Cabinet

Cabinet Number :

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
1 Hardware Installation Inspection Items				
1.1 Location is as per the drawings				
1.2 Mounting hardware is tight & per the Installation drawing				
1.3 Square, level and clean inluding air filters				
1.4 Adequate clearnace for door opening				
1.5 No water/moisture intrusion in or on the cabinet				
1.6 Network cables entry position is properly sealed				
1.7 Grounding bar is tight and per the installtion drawing				
1.8 Cabinet is grounded per the drawings and specifications				
1.9 Network cables are terminated properly to the correct switch				
ports according to the Communication cable schedule				
1.10 Fiber cables are terminated properly to the correct FOPP				
ports according to the fiber cable schedule				
2 Cabinet Temperature				
- Thermostat setting				
- Alarm Contact				
3 Functional check				
3.1 Power Supply				
Vnet/IP Bus 1 Switch Check				
Vnet/IP Bus 2 Switch Check				
Ethernet (PIN) Switch Check				
4 Fiber Communication Check				
Vnet/IP Bus 1 fiber				
Vnet/IP Bus 2 fiber				
Ethernet fiber				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Ref. No.	Inst Tag	FCS Tag	Sig	FCS Tag	FCS Range Max	FCS Range Units	IS	Marshalling Cabinet No.	Marshalling Cabinet			Field Control Station							0%			50%			100%			Engineering Unit	Tested	Tested By	Witnessed by	Date Tested
									Terminal Block No.	TB A or (+)	TB B or (-)	FCS Cabinet	Card Type	Redundant	Domain	Station	Node	Slot	Channel	Expected Value		Actual Value	Expected Value		Actual Value	Expected Value		Actual Value					
																				Lower Limit	Upper Limit		Lower Limit	Upper Limit		Lower Limit	Upper Limit						
1																													Pass / Fail			
2																													Pass / Fail			
3																													Pass / Fail			
4																													Pass / Fail			
5																													Pass / Fail			
6																													Pass / Fail			
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42																													Pass / Fail			
43																													Pass / Fail			
44																													Pass / Fail			
45																													Pass / Fail			

Responsible Parties	Representative	Date	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Ref. No.	Inst Tag	FCS Tag	Sig	IS	Marshalling Cabinet	Marshalling Cabinet			Field Control Station							Expected Result				Actual Result		Tested	Tested by	Witnessed by	Tested Date
					Marshalling Cabinet No.	Terminal Block No.	TB A or (+)	TB B or (-)	FCS Cabinet	Card Type	Domain	Station	Node	Slot	Channel	Indication (DI)		Button (DO)							
																Close Contact	Open Contact	Activate	De-Activate						
1																						Pass / Fail			
2																						Pass / Fail			
3																						Pass / Fail			
4																						Pass / Fail			
5																						Pass / Fail			
6																						Pass / Fail			
7																						Pass / Fail			
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44																						Pass / Fail			
45																						Pass / Fail			

Responsible Parties	Representative	Date	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: _____

System Cabinet Check

Cabinet Number :

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
1 SCS Appearance and Construction Check				
1.1 General Construction				
- Lifting Construction, Plinth, Bakelite				
- Color				
- Side Panel				
1.2 Internal Layout				
- SCU Mounting and termination				
- ESB Bus Node Unit - IO module quantity				
- PSU				
- I/O Modules, Barriers				
- Components specification / quantity as per BOM				
- Components mounting and termination as per GA/IA				
1.3 Doors				
- Handle and document pocket				
1.4 Labeling				
- Cabinet				
- Devices & interface boards				
- Terminals, Earth bars etc.				Refer to System cable List
- Safety Covers and Safety Stickers				
- Cable markers				
1.5 Earthing				
- Bolt type & locations				
- Wire types				
- connection to doors and devices				
- Cabinet Isolation Test (Verify isolation test has been completed				
in the Panel Quality Check List)				
1.6 Cable Routing				
- Vnet/IP Bus				
- ESB Bus, Optical ESB Bus				
- System Cable (e.g., KS1 and AKB331)				
-Internal I/O Wiring				
-Cable size and specification				
- Cable Color Coding as per Supply type (AC/DC)				
- Power Cables				
				Refer to IO Assigment
1.7 Signal terminations				
- Terminal and wiring types, spare				
1.8 Power Distribution				
- Isolators and Circuit Breakers				
- Fuse terminal and rating				
- Terminal block type/size				
1.9 Others				
- Fan and thermostat				
2 SCS Nest Loading Check				
- SCS Station No. : _____				
- SCS Station No. (exten): _____				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

System Cabinet Check

Cabinet Number :

Description	NA	Checked Pass	Checked Fail	Remarks / Punch No.
3 System Cabinet Functional Check				
3.1 Power-up Check - Main Distribution				
- Incoming Main Feeder 1 voltage (220 - 230VAC)				
_____ Volts, AC				
- Incoming Main Feeder 2 voltage (220 - 230VAC)				
_____ Volts, AC				
3.2 Power-up Check - Secondary Distribution				
- 220 VAC Distribution				
- Fan1 / Fan3				
- Fan2 / Fan4				
- Lamp1				
- Lamp2				
- PSU1A				
- PSU1B				
- PSU2A				
- PSU2B				
- SCS : Node: _____				
- SCS : Node: _____				
- SCS : Node: _____				
- SCS : Node: _____				
- SCS : Node: _____				
- SCS : Node: _____				
- SCS : Node: _____				
- SCS : Node: _____				
- SCS : Node: _____				
- SCS Node Fan Comp. No.: _____				
- SCS Node Fan Comp. No.: _____				
- Spare CB (Voltage Out Comp. No.: _____				
Check) _____				
3.3 Lamp Function Check				
- Lamp "ON" when door is open Comp. No.: _____				
- Lamp "OFF" when door is closed Comp. No.: _____				
3.4 24 VDC PSU Voltage Check				
- Voltage Check (PSU1A "ON", PSU1B "OFF") _____ VDC				
- Ripple Check (PSU1A "ON", PSU1B "OFF") _____ mV				
- Voltage Check (PSU1A "OFF", PSU1B "ON") _____ VDC				
- Ripple Check (PSU1A "OFF", PSU1B "ON") _____ mV				
- Voltage Check (PSU2A "ON", PSU2B "OFF") _____ VDC				
- Ripple Check (PSU2A "ON", PSU2B "OFF") _____ mV				
- Voltage Check (PSU2A "OFF", PSU2B "ON") _____ VDC				
- Ripple Check (PSU2A "OFF", PSU2B "ON") _____ mV				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

System Cabinet Check

Cabinet Number :

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
3.5 Power-up Check - Secondary Distribution				
- 24 VDC Distribution				
- IOBP Comp. No.:_____				
- ISBP Comp. No.:_____				
- GFD Comp. No.:_____				
- Field Terminal Blocks (for field devices with external 24VDC supply)				
3.6 24VDC Redundancy Check				
- PSU1A "ON", PSU1B "OFF", CB____A "ON", CB____B "OFF"				
- PT_____ Voltage Check (DC) _____ VDC				
- IOBP / ISBP / GFD status = ON				
- Voltage Check for Field Terminal Blocks (for field devices with external 24VDC supply)				
- PSU1A "ON", PSU1B "OFF", CB____A "OFF", CB____B "ON"				
- PT_____ Voltage Check (DC) _____ VDC				
- IOBP / ISBP / GFD status = ON				
- Voltage Check for Field Terminal Blocks (for field devices with external 24VDC supply)				
- PSU1A "OFF", PSU1B "ON", CB____A "ON", CB____B "OFF"				
- PT_____ Voltage Check (DC) _____ VDC				
- IOBP / ISBP / GFD status = ON				
- Voltage Check for Field Terminal Blocks (for field devices with external 24VDC supply)				
- PSU1A "OFF", PSU1B "ON", CB____A "OFF", CB____B "ON"				
- PT_____ Voltage Check (DC) _____ VDC				
- IOBP / ISBP / GFD status = ON				
- Voltage Check for Field Terminal Blocks (for field devices with external 24VDC supply)				
- PSU2A "ON", PSU2B "OFF", CB____A "ON", CB____B "OFF"				
- PT_____ Voltage Check (DC) _____ VDC				
- IOBP / ISBP / GFD status = ON				
- Voltage Check for Field Terminal Blocks (for field devices with external 24VDC supply)				
- PSU2A "ON", PSU2B "OFF", CB____A "OFF", CB____B "ON"				
- PT_____ Voltage Check (DC) _____ VDC				
- IOBP / ISBP / GFD status = ON				
- Voltage Check for Field Terminal Blocks (for field devices with external 24VDC supply)				
'- PSU2A "OFF", PSU2B "ON", CB____A "ON", CB____B "OFF"				
- PT_____ Voltage Check (DC)				
- IOBP / ISBP / GFD status = ON				
- Voltage Check for Field Terminal Blocks (for field devices with external 24VDC supply)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

System Cabinet Check

Cabinet Number :

Description	NA	Checked Pass	Checked Fail	Remarks / Punch No.
- PSU2A "OFF", PSU2B "ON", CB____A "OFF", CB____B "ON"				
- PT_________ Voltage Check (DC) _______ VDC				
- IOBP / ISBP / GFD status = ON				
- Voltage Check for Field Terminal Blocks (for field devices with external 24VDC supply)				
3.7 Cabinet Alarm Check				
- PSU1A "OFF" Fault Alarm				
- PSU1B "OFF" Fault Alarm				
- PSU2A "OFF" Fault Alarm				
- PSU2B "OFF" Fault Alarm				
- GFD1 Ground Fault Alarm				
- GFD2 Ground Fault Alarm				
- TE1 Thermostat Fault Alarm				
- TE2 Thermostat Fault Alarm				
3.8 Earthing Check				
- PE connection to doors and devices				
- IE connection to devices				
- ISE connection to devices				
- IE and ISE connection check				
- PE to IE/ISE Isolation Check				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: ____________________

EWS/SOE Workstation Check

Station Number :

Description	NA	Checked Pass	Checked Fail	Remarks / Punch No.
1 PC Model				
Monitor				
Vnet/IP interface card (VI702)				
Domian:				
Station:				
Operation System (OS)				
Product Key				
Prosafe-RS system				
Version:				
License ID:				
License Details:				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS System Architecture and BOM Check

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
1 System Architecture Check				
(As per reference document)				
2 Bill of Materials Check				
(As per reference document)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS IO Nestloading and System Cable schedule Check

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
1 IO Assignment/Nest Loading Check				
(As per reference document)				
2 System Cable Schedule Check				
(As per reference document)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: ____________________

SIS Standard System Function Check

Cabinet Number : **SCS Station Number :**

	Description	NA	Checked Pass	Checked Fail	Remarks / Punch No.
1	**System Startup Test**				
	(As per procedure 7.6.1)				
1.1	Power-on start				
	(The Operating Mode of the SCS should remain unchanged during				
	and after failure of one of the Power Supply Module)				
1.2	Operating Mode after cold start				
	(The Operating Mode of the SCS should go to "Waiting"				
	mode after boot up sequence is complete)				
1.3	Output status				
	(All outputs channels remain disabled. After an "Output enable"				
	operation is performed, all output channels which are healthy				
	and have valid output devices wired will be "enabled".)				
1.4	Safety Communication Output status				
	("Output enable operation" just after starting up the SCS,				
	also enables the output of inter-SCS safety communication,				
	SCS Link Transmission)				
1.5	System Status Display				
	(OWS/ SENG System status display should show SCS in				
	"Waiting" mode after start up sequence is complete)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: _____

Cabinet Number : **SCS Station Number :**

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
2 SCS CPU Backup Function Test				
(As per procedure 7.6.2)				
2.1 CPU Switch Over				
(Redundantly configured CPUs should be able to successfully				
switch control over to the standby unit)				
2.2 Operating Mode				
(The Operating Mode of the SCS should remain unchanged during				
and after the control switch over)				
2.3 Logic Check				
(During CPU switch over, logic status should remain unchanged				
if there is no change in logic conditions)				
2.4 IO Check				
(During CPU switch over, IO status should remain unchanged				
if there is no change in logic conditions)				
2.5 System Diagnostic Alarm Check				
(CPU switchover and failure are annunciated in the system				
diagnostics/ OWS System Alarms, and status at System Overview				
window in OWS changes accordingly.)				
2.6 Failsafe condition check				
(When both CPUs are stopped, outputs assume failsafe condition)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: _____

Cabinet Number : **SCS Station Number :**

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
3 SCS ESB Redundancy Test				
(As per procedure 7.6.3)				
3.1 Operating Mode				
(The Operating Mode of the SCS should remain unchanged during				
and after failure of one of the ESB bus)				
3.2 Logic Check				
(During failure of one of the ESB bus,				
logic status should remain unchanged if there is no change in				
logic conditions)				
3.3 IO Check				
(During failure of one of the ESB/Optical ESBbus,				
IO status should remain unchanged if there is no change in				
logic conditions)				
3.4 System Diagnostic Alarm check				
(During failure of one of the ESB bus or one of the				
optical ESB bus repeater modules in a redundant configration or				
disconnection or other abnormality in any fiber-optic cable				
connecting these modules, the error is notified to the user via a				
diagnostic information message/ OWS System Alarms), and				
fail status at System Overview window in OWS is displayed.)				
3.5 Fail-safe Condition check				
(On both ESB/Optical ESB bus failure, outputs				
assume failsafe condition)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: _____

Cabinet Number : **SCS Station Number :**

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
4 SCS Power Supply Module Redundancy Test				
(As per procedure 7.6.4)				
4.1 Operating Mode				
(The Operating Mode of the SCS should remain unchanged during				
and after failure of one of the Power Supply Modules)				
4.2 Logic Check				
(During failure of one of the Power Supply Modules, logic status				
should remain unchanged if there is no change in logic conditions)				
4.3 IO Check				
(During failure of one of the Power Supply Modules, IO status				
should remain unchanged if there is no change in logic conditions)				
4.4 System Diagnostic Alarm check				
(Power supply failure alarm on OWS System Alarms,				
and fail status at System Overview window in OWS is displayed.)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: ____________________

Cabinet Number : **SCS Station Number :**

Description		NA	Checked Pass	Checked Fail	Remarks / Punch No.
5	**IO Module Redundancy Test**				
	(As per procedure 7.6.5)				
5.1	Logic Check				
	(Failure of active IO module should not affect IO status, provided				
	there is no change in logic conditions. Control right should switch				
	automatically to standby IO module)				
5.2	IO Check				
	(Failure of active IO module should not affect IO status, provided				
	there is no change in logic conditions. Control right should switch				
	automatically to standby IO module)				
5.3	System Diagnostic Alarm check				
	(IOM switchover alarm on OWS System Alarms, and status at				
	System Overview window in OWS changes accordingly.)				
5.4	Redundant path				
	(Switch over to standby module and verify all IO channels are				
	normal (No IOP or channel Fault))				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: _____

Cabinet Number : **SCS Station Number :**

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
6 SIS Field Power Supply Redundancy Test				
(As per procedure 7.6.6)				
6.1 IO Check (sample check)	NA			
(During failure of one of the Cabinet power feeds, IO status				
should remain unchanged if there is no change in logic conditions)				
6.2 System Alarm check	NA			
(Power supply failure alarm)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: _____

Cabinet Number : **SCS Station Number :**

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
7 SIS Scan time overrun				
(As per procedure 7.6.7)				
7.1 Current CPU Idle Time: _____	NA			
(Criteria: Above 18 seconds)				
7.2 Idle Time lower than 18 seconds	NA			
(Change scan time and make on online download.				
Verify CPU idle time low alarm and System common trouble				
alarm are generated.)				
7.3 Put back the required Idle time (above 18 seconds)	NA			
(Change scan time and make on online download.				
Verify CPU idle time low alarm and System common trouble				
alarm are normalized.)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: _____

Cabinet Number : **SCS Station Number :**

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
8 Vnet/IP Bus Redundancy Test				
(As per procedure 7.6.8)				
8.1 Logic Check	NA			
(Failure of one Vnet/IP bus connection (on SCS/L2SW) should not				
affect logic status, provided there is no change in logic conditions.				
Communication should be uninterrupted on remaining Vnet/IP bus)				
8.2 EWS/SOE PC	NA			
(EWS/SOE PC should be able to continue monitoring SCS status				
when one of the Vnet/IP bus connection has failed (from VI702 card)				
8.3 System Alarm Message	NA			
(Vnet/ IP Failure alarm on OWS System Alarms,				
and fail status at System Overview window in HIS is displayed.)				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: _____

Cabinet Number : **SCS Station Number :**

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
9 SCS Resource Capacity Check				
(As per procedure 7.6.9)				
SCS Station No. : Capacity : _____ %	NA			

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: _____

Cabinet Number : **SCS Station Number :**

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
10 SCS CPU Loading Check				
(As per procedure 7.6.10)				
SCS Station No. : Loading : _____ %	NA			
Idle Time: _____				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SIS Standard System Function Check

Reference No: _____

Cabinet Number : **SCS Station Number :**

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
11 SCS Online / Offline Loading Test				
(As per procedure 7.6.11)				
11.1 Online Download				
(Application logic with modifications within allowable guidelines				
should be able to be Online Downloaded to the SCS, without				
stopping or affecting its operation)				
11.2 Offline Download				
(Application logic with modifications outside allowable guidelines				
will require Offline Download to the SCS. This will stop its operation)				
12 SCS Online / Offline Loading Test				
(As per procedure 7.6.8)				
Remote				
Program				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: ____________________

Backup/Restore Function Test

Description	NA	Checked Pass	Checked Fail	Remarks / Punch No.
1 Backup Function Test				
1.1 Start Back-up				
1.2 Backup completed				
Error Message (if any):				
2 Restore Function Test				
2.1 Start Restore of data				
2.2 Restore completed				
Error Message (if any):				
3 EWS PC Version Control				
- Back up using version control tool				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Test Phase: Internal / FAT **IO Database Rev:** **Process Area:**

* IO List will updated after all documents of IO assignment and wiring drawing approved.

Ref. No.	Inst Tag	SIS/FGS Tag	Comm	Data Range Min	Data Range Max	Data Range Units	IS	Marshalling Cabinet No.	Marshalling Cabinet			Field Control Station								0%			50%			100%			Engineering Unit	Alarm (SOE & ANN)	Trip (SOE & ANN)	IOP (-) (SOE & ANN)	TRNS (-) (SOE & ANN)	TRNS (+) (SOE & ANN)	IOP (+) (SOE & ANN)	Fail Safe Value	IOP	Tested	Tested By	Witnessed by	Date Tested
									Terminal Block No.	TB A or (+)	TB B or (-)	SCS Cabinet	Card Type	Redundant	Domain	Station	Node	Slot	Channel	Expected Value		Actual Value	Expected Value		Actual Value	Expected Value		Actual Value												
																				Lower Limit	Upper Limit		Lower Limit	Upper Limit		Lower Limit	Upper Limit												
1																																				Pass / Fail			
2																																				Pass / Fail			
3																																				Pass / Fail			
4																																				Pass / Fail			
5																																				Pass / Fail			
6																																				Pass / Fail			
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																																			Pass / Fail			

Note : Confirm for the SOE Event occurance whenver the Input or Output is simulated beyond the Trip/Alarm status of the Signal.

Responsible Parties	Representative	Date	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Test Phase: Internal / FAT **IO Database Rev:** **Process Area:**

* IO List will updated after all documents of IO assignment and wiring drawing approved.

Ref. No.	Inst Tag	SIS/FGS Tag	Tag Comment	Tested	Sig	IS	Marshalling Cabinet				Safety Control Station							Close Contact		Open Contact		Line Monitoring		Fail Safe Value	Tested	Tested by	Witnessed by	Tested Date
							Marshalling Cabinet No.	Terminal Block No.	TB A or (+)	TB B or (-)	SCS Cabinet	Card Type	Domain	Station	Node	Slot	Channel	Expected Value	Actual Value	Expected Value	Actual Value	Open	Short					
																			SOE &ANN		SOE &ANN	SOE &ANN	SOE &ANN					
1																												
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Responsible Parties	Representative	Date	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Test Phase: Internal / FAT **IO Database Rev:** **Process Area:**

* IO List will updated after all documents of IO assignment and wiring drawing approved.

Ref. No.	Inst Tag	SIS/FGS Tag	Tag Comment	Tested	Sig	IS	Marshalling Cabinet	Marshalling Cabinet			Safety Control Station							DO=0(False)		DO=1(True)		Line Monitoring		Fail Safe Value	Tested	Tested by	Witnessed by	Tested Date
							Marshalling Cabinet No.	Terminal Block No.	TB A or (+)	TB B or (-)	SCS Cabinet	Card Type	Domain	Station	Node	Slot	Channel	Expected Value	Actual Value	Expected Value	Actual Value	Open	Short					
																			SOE &ANN		SOE &ANN	SOE &ANN	SOE &ANN					
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Responsible Parties	Representative	Date	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SAT PUNCH RECORD	Punch Record No.	Date
Process Area:	**System:**	

Please enter all fields or indicate 'Not Applicable' where appropriate

Test reference / item:	Classification : Correction (Code C) ☐ Modification (Code M) ☐

Punch Item description: (Attach Separate sheets/attachments, if necessary)

Related to: Hardware ☐ Software ☐ Documentation ☐

Details of change required: (Attach Separate sheets/attachments, if necessary)

Tester (Name)	Signature	Date
Witness (Name)	Signature	Date

Repeat the test? : YES ☐ NO ☐

If NO, reason: _____

Resolution: (Attach Separate sheets/attachments, if necessary)

SAT CLOSURE APPROVAL SIGNATORIES BY :

	Names	Company	Signatures	Date
Prepared By		YOKOGAWA		
Witnessed By		ROSETTI MARINO		
Approved By		CROSSWIND		

SAT PUNCH LEDGER

Customer Group: _____
Project: _____
Record Date: _____

Recorded By: _____
Witnessed By: _____

Punch Record No.	Punch Description	Cause (C/M)	Initiated by	Action By	Date of Completion	Re-test By (MAC)	Witnessed by (EPC/End-User)

Legend for cause column:
C = Correction, items is to be corrected by YOKOGAWA
M = Modification, items is to be modified, deleted or added due to design input changes

YOKOGAWA	Appendix 19.9 - SAT Punch Record (SIS FGS) SIS Punch Record	Ref. No.

Project No.		Project Name	
Contractor			
EPC Subcontractor			
Employer			
System		Proc.Area/Unit	
Stage		Controller No.	

Punch Description

Noted By		Approved By		Date		Category	
Proposed/Agreed Solution						Action By	

Impact Analysis

Impacted Aspects	☐ Hardware	☐ Software	☐ Documentation	☐ Graphics	☐ Other Non-Safety Items	☐ No Impact

Safety Related		Re-Test Required?		Impact Analysis By	

Impacted Documents and Revision Details

Punch Record Status

Status			
Implemented By		Verified/Tested By	
Implemented Version (VC)			

Yokogawa	Sign		Rosemetti Marino	Sign		Crosswind	Sign	
	Name			Name			Name	
	Date			Date			Date	

Notes:
1) Safety Impact defined by any hardware or software change in the safety path of the applicable SIF.
2) Detailed Impact analysis shall be elaborated in Impact analysis section including Impacted Documents with Revision Details.
3) Punch Description should include summary of the issue including deviations to project specifications - if any.

YOKOGAWA

SIS Punch Record Summary

Project No.		Project Name	
Contractor	Rosetti Marino	EMPLOYER	Crosswind

Sl. No.	Punch Record Reference No	Date	Stage	System	Punch Description	Category	Action By	Safety Related	Proposed / Agreed Solution	Punch Status

Yokogawa **Rosetti Marino** **Crosswind**

Check Sheet Third party System
PLANT NAME
FAR Number
SUBSYSTEM NAME
SUBSYSTEM Comp Number
:

Reference No: _____

Description		NA	Checked		Remarks / Punch No.
			Pass	Fail	
1 Physical Location					
1.1 FCS Number	FCS0101				
1.2 Node Number	**1** Slot No:				
1.3 MODBUS cable					
1.3.1 Type	TCP/IP				
1.4 **Fibre Optic Converter**	NO				
1.4.1 Quantity					
1.4.1 Model Number					
1.5 **REDUNDANT MODULES**	Yes				
2 COMMUNICATION PARAMETERS					
2.1 BAUD RATE	19200				
2.2 PARITY	Even				
2.3 STOP BIT	1				
2.4 START BIT	1				
2.4 DATA BIT	8				
3 REDUNDNACY TEST (if applicable)					
3.1 ALE111 Primary Failure					
3.2 ALE111 Secondary Failure					
3.3 Communication Cable Failure					
3.4 Subsytem Primary equipment Failure					
3.5 Subsytem Primary equipment Failure					
4 Communication Test					
4.1 Communication Status - SND/RCV on Module					
4.2 Sub-System Comm Alarms/messages					

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Check Sheet Third party System
PLANT NAME
FAR Number
SUBSYSTEM NAME
SUBSYSTEM Comp Number
:

Reference No: _____

Description	NA	Checked		Remarks / Punch No.
		Pass	Fail	
1 CI SERVER				
1.1 Station Number				
1.2 IP Address				
1.3 Station Number				
1.4 IP Address				
2 CI SERVER Redundancy test (if applicable)				
Standby switch over				
3 CI SERVER Communication test				
OPC Communication System Alarms				

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

SYSTEM ACCEPTANCE CERTIFICATE

JOB NAME	:	BASE LOAD POWER HUB
END USER	:	CROSSWIND
CUSTOMER	:	ROSETTI MARINO
PLANT	:	OFFSHORE HKN WIND FARM
SYSTEM DESCRIPTION	:	PCS/SIS/FGS/EMCS INTEGRATED WITH CI SERVER

This is to certify that it is mutually agreed by all parties that the **PCS/SIS/FGS/EMCS INTEGRATED WITH CI SERVER** is turned over to CROSSWIND for next stage of plant loop check and commissioning activities.

[Remarks]

_____

_____

_____

Signed in agreement by;

YOKOGAWA : _____ Date: _____

ROSETTI MARINO : _____ Date: _____

CROSSWIND : _____ Date: _____

SITE ACCEPTANCE TEST COMPLETION CERTIFICATE

JOB NAME	:	BASE LOAD POWER HUB
END USER	:	CROSSWIND
CUSTOMER	:	ROSETTI MARINO
PLANT	:	OFFSHORE HKN WIND FARM
SYSTEM DESCRIPTION	:	PCS/SIS/FGS/EMCS INTEGRATED WITH CI SERVER

This is to certify that it is mutually agreed by all parties that the Site Acceptance Test for PCS/SIS/FGS/EMCS INTEGRATED WITH CI SERVER has been completed to the satisfaction of all parties concerned.

[Remarks]

_____

_____

_____

Signed in agreement by;

YOKOGAWA : _____ Date: _____

ROSETTI MARINO : _____ Date: _____

CROSSWIND : _____ Date: _____

Reference No: ____________________

Application Revision Record Sheet Start SAT

No.	Controller	Revision	CRC (Attached Database Validity Tool result)	NA	Checked		Remarks / Punch No.
					Pass	Fail	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			

Reference No: ____________________

Application Revision Record Sheet End SAT

No.	Controller	Revision	CRC (Attached Database Validity Tool result)	NA	Checked		Remarks / Punch No.
					Pass	Fail	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

Responsible Party	Representative	Date:	Signature
YOKOGAWA			
ROSETTI MARINO			
CROSSWIND			