TECHNICAL ENQUIRY SPECIFICATION - TES		
RoCa3 Contronic E Migration (The Netherlands)		
CODE	**REVISION Nº**	***DATE OF ISSUANCE***
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PREPARED BY	APPROVED BY
R00 Peter Zuidam 12.05.2021	

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1 Introduction

1.1 Project introduction

Uniper operates a gas-fired combined heat and power plant in Rotterdam Capelle (RoCa) with 2 gas turbines from 1982 GT1 and GT2, and a gas turbine GT3 from 1996. The net electrical capacity is 264 MW.

As unit 3 (GT3) is the youngest unit among the 3 units, UNIPER has decided to perform a DCS migration on this unit 3. After commissioning, the RoCa power plant has a fluctuating production behavior and summer breaks. It is planned that the power plant will run more constantly in the near future.

1.2 Project goal

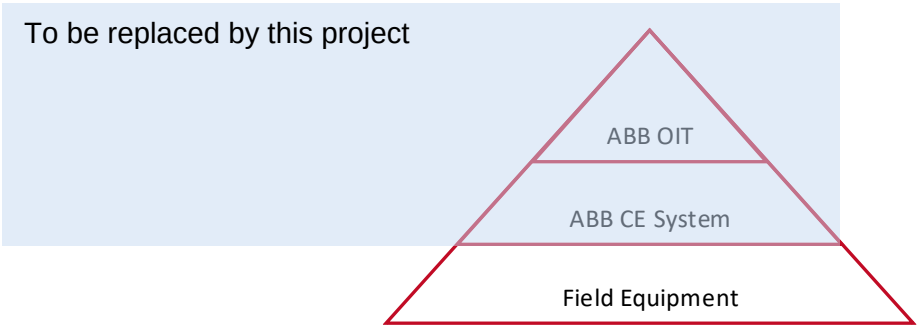
The goal of this project is:

To replace the old out of lifetime distributed control system (DCS) Contronic E (H&B) with the belonging Operator IT (OIT from ABB) HMI system with a new total safety-integrated process control system in order to be well positioned for the future next 25 years in terms of technology, service and support. Copy the current control strategy from Contronic E to the new DCS, the new DCS system has to be on the same level of automation as it is currently or better.

The new system meets all regulatory requirements (e.g. safety) of the authorities and guidelines/standards for HMI and DCS systems for Power Plants.

- KKS System (Kraftwerk-Kennzeichnungs-System VDI/VDE 35323)
- ISO 27001
- VGB R 170 B1 & B2 (edition 2006)
- VGB-R 170 C
- EN 60721 3 3, class 3K3
- EN 60068 2 1/2/3/6
- DIN 40040 class F
- DIN IEC 60364-7-729
- VDE 100, Part 610 (inspections, initial inspections) or national/local requirements
- BGV A3 (electrical systems and equipment) or national/local requirements
- EN 61850
- DIN EN 60947-5-1/-2/-6
- EN 62061 (SIL 1...3)
- EN ISO 13849-1 (PL a...e) directive VDI/VDE 3699 Part 3
- EN 60073
- IEC 60870-5-101 or -104
- EN ISO 11064 Part 1-4
- EN ISO 9241 Part 1-17
- EN ISO 13406 Part 1 and 2 code table 2 "German reference version" (with umlauts) according to DIN 66 003
- EN 61131
- IEC 61850

On-site installation and migration activities are planned for Q1 2022. The final on-site installation will be agreed in mutual consultation with UNIPER. The plant shutdown of the unit 3 is currently scheduled for May 2022.



IMPORTANT NOTE:

The aim of the project is:

- To replace server hardware, which is at the end of technical lifetime, with new hardware with a minimum expected lifetime of 8 years.
- To obtain a from IT security point of view patchable system for the next 8 years.
- To obtain a possibility to separate hardware and software replacement intervals in future (for example by virtualization)
- The new DCS System must be a minimum lifecycle of 25 years. (The System should not be replaced within 25 years)

1.3 Project approach

UNIPER is in search of a supplier:

- Which has experience with DCS systems Migrations in general and especially PC replacements of HMI layers above
  - H&B Contronic E systems and/or
  - ABB Operator IT systems Version B1.1
- Which have experience with HMI replacements for HRSG (Heat Recovery Steam Generator), District heating, FSC Fail-Safe (Honeywell) including all steam and electrical power delivery aspects.
- Which can migrate independently and without the help from UNIPER.
- Which can rewrite the current control strategy from Contronic E to the new DCS, the supplier should show his concept to do a (automatically) new programming and how he ensures that all functions are 1:1 translated

A virtualized environment including all servers, operator clients and 3rd part systems in a hyperconverged edge system, like VMware vSphere and an SVSAN - storage solutions.

The supplier is encouraged to offer a project strategy for the replacement of the existing HMI system, to interrupt the power supply for as short a time as possible and/or without interrupting the monitoring and operator intervention possibilities during the normal operation of unit 1 and 2.

IMPORTANT NOTE:

UNIPER does and has done its utmost in the advance of the project to gather all available information to give the supplier a good impression of the actual situation of the current OIT HMI and Contronic E control system. However, it's supplier's responsibility to check whether this information is complete and/or correct. Supplier can never appeal on incorrect information or information not supplied by UNIPER, or information does not present within existing information.

The project will be executed by the supplier and UNIPER will coordinate to ensure maximum quality and acceptance. Supplier will hand over all design and test specification to UNIPER for approval. UNIPER will review and approve the Specifications in a form of "acceptance". Supplier will at all times have final responsibility for the Specifications and all other project related documents.

This Request for Quotation might subscribe functionality which is already (slightly different) present in suppliers standard HMI. Only during bid period, supplier is encouraged to suggest his solution resulting from his standard HMI.

1.4 Purpose of this document

The purpose of this document is to describe the functional, technical and project specific requirements for the project “RoCa3 Contronic E Migration”.

IMPORTANT NOTE:
This document has to be read especially in association with the UNIPER Standard Specifications as mentioned in the referenced and attached annexes. These documents state the general requirements of a process control and supervision system to be installed at premises.

1.5 Reader ring

This document is intended for internal use by UNIPER as well as for the suppliers requested by Uniper. This document may not be disclosed to third parties without the consent of Uniper.

1.6 References

The documents listed in the table below form an integral part of this TES. Supplier’s delivery must comply with these following references.

Nr.	Document	Version	Description
1	The General Conditions of Purchase		https://www.uniper.energy/benelux/sites/default/files/2017-12/general_conditions_of_purchase_uniper_benelux_uniper-en_2018-01.pdf
2	General safety regulations of Uniper Benelux		https://www.uniper.energy/benelux/sites/default/files/2020-06/general_safety_regulations_of_uniper_benelux_uniper-en_2020-01.pdf
3	CAD drawing directives		Uniper ATS 001 EN.pdf

1.7 Glossary of Terms

1.7.1 Terminology

Use of the words “may”, “will”, “should”, “shall” and “must” imply the degree as to which a request / demand in this specification shall be adhered to.

may	Generally not used in a Project Specification, except when Uniper has no defined concept, approach / solution for a certain issue / problem and he anticipates a response / proposal with Supplier.
will	Recommended /adherence desired (as far as feasible)
should	Strongly recommended provision / action
shall	Required provision / action
must	Mandatory provision / action

1.7.2 Definitions

UNIPER	Uniper Benelux N.V., Capelsweg 400, 3068 AX Rotterdam
Supplier or Counter party	The natural or legal person making the offer and/or charged with the Delivery.
Power station Unit 3 part	References to the location where the systems are to be installed. Uniper RoCa Unit 3, Capelsweg 400, 3068 AX Rotterdam
Work Site	The site where the Installation is to be completed, as well as the site which is made available for site accommodation, temporary storage and parking facilities.

1.8 Used abbreviations

ROCA	UNIPER Rotterdam City Plant
CCR	Central Control Room
CONTRACTOR	The company that is to submit a tender has been awarded the order
PRINCIPAL	The company that places the order: UNIPER Benelux N.V.
DCS	Distributed Control System
EMI	Emission Monitoring installation
FAT	Factory Acceptance Test
HMI	Human Machine Interface
IAT	Internal Acceptance Test
OAT	Operational Acceptance Test
HSE	Health, Safety and Environment
I&C	Instrumentation and Control
KKS	Kraftwerk-Kennzeichen-System (Power Station Identification System)
MCC	Motor Control Center
PID	Piping and Instrumentation Diagram
SAT	Site Acceptance Test
SCADA	Supervisory Control and Data Acquisition
SCC	Safety Certificate for CONTRACTOR
SIS	Safety Instrumented System
TES	Technical Enquiry Specification
VCA	Veiligheid, Gezondheid en Milieu Checklist Aannemers
CE	ABB Contronic E System
RWC	Regional Heat Center for district heating
HCI	Hyperconverged infrastructure
VM	Virtual Machine
PEQB	Project Execution and Quality Book
MOM	Minutes of Meeting
PEP	Project Execution Plan
QA/QC	Quality Assurance and Quality Control

2 Current DCS System

2.1 Overview DCS

General View

This layout generally shows the existing system interrelationships in the ROCA power plant. The red and yellow parts are directly affected by the migration, whereas the orange parts are only partially affected by the migration. Surrounding interfaces must be conceptually described and defined by the provider in the offer.

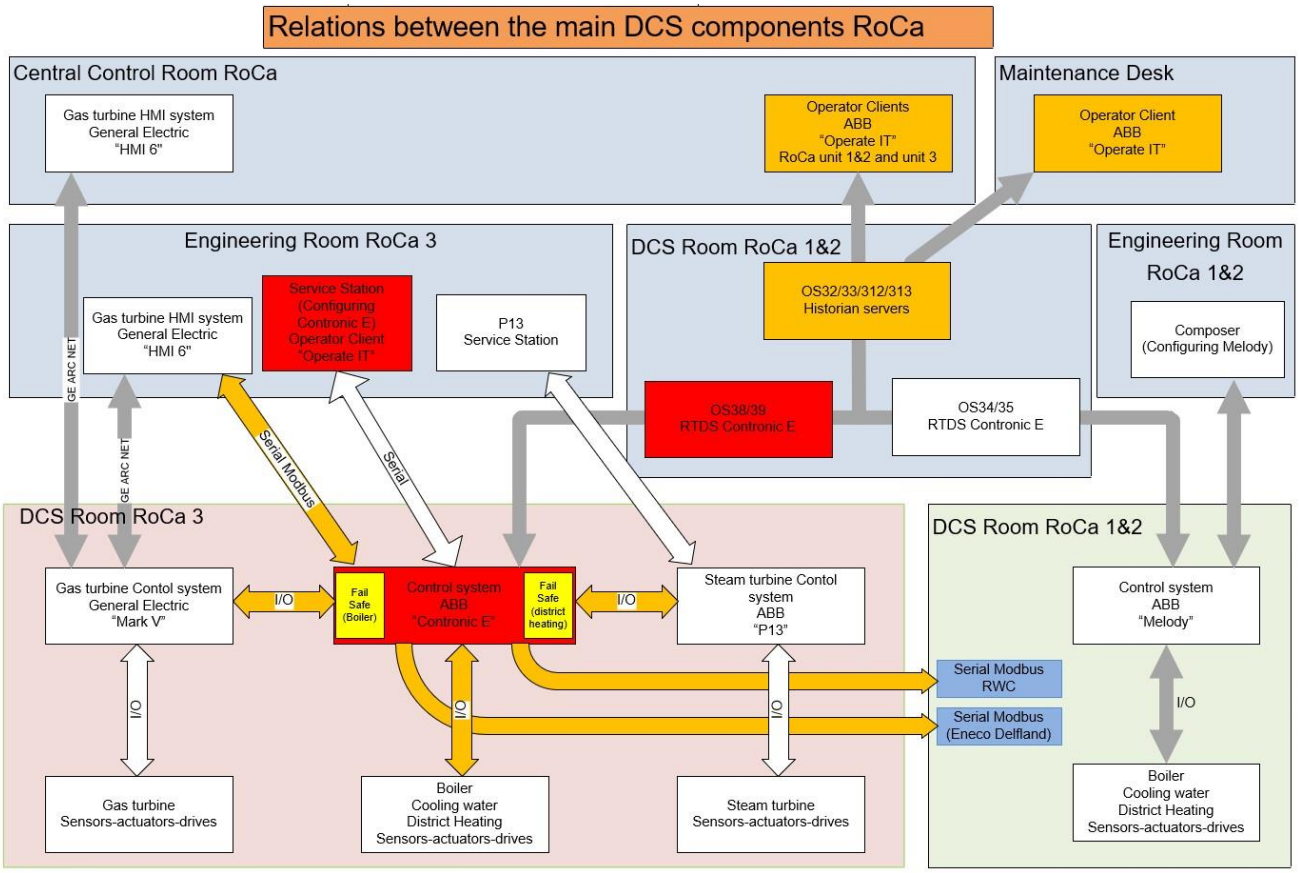
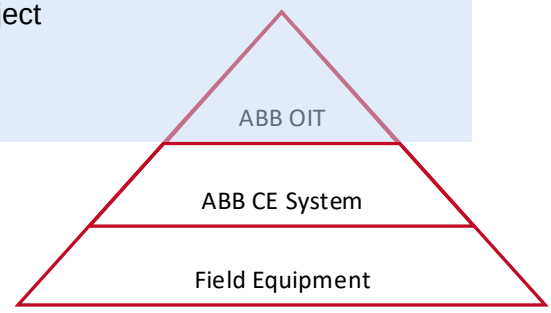


Figure 1: Overzicht DCS Systeem R3

HMI Level

To be replaced by this project
"only RoCa 3 related part"



The following picture shows the part of the IT infrastructure which will be partially affected by the Migration of RoCa 3. The new DCS system and their new virtual platfrom has to be prepared for future joins. The IT infrastructure seen here will stay in place, only the RoCa 3 part of the existing system will be removed (e.g. HMI graphics, trends, alarms, etc.)

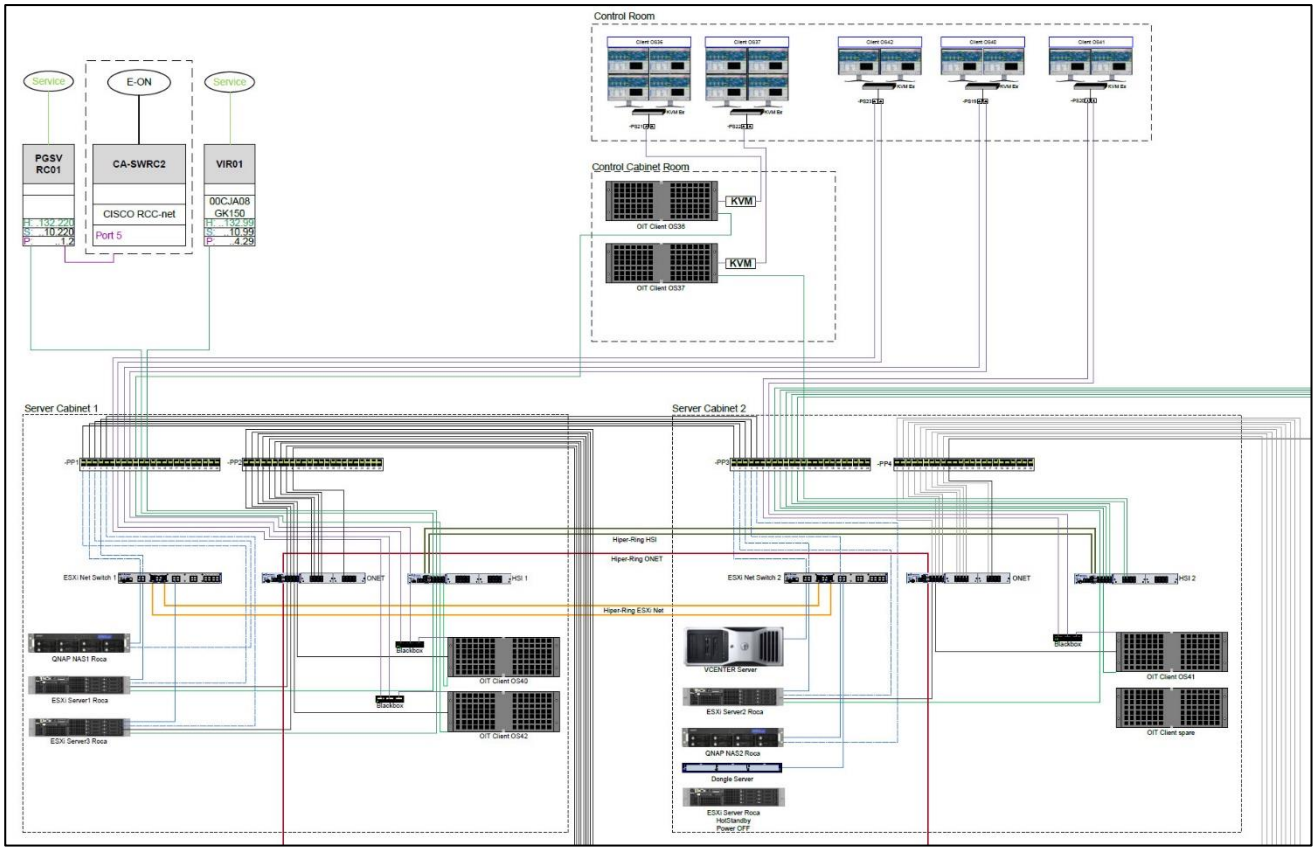


Figure 2: Overzicht DCS Systeem R3

HMI Level existing and new planned Locations

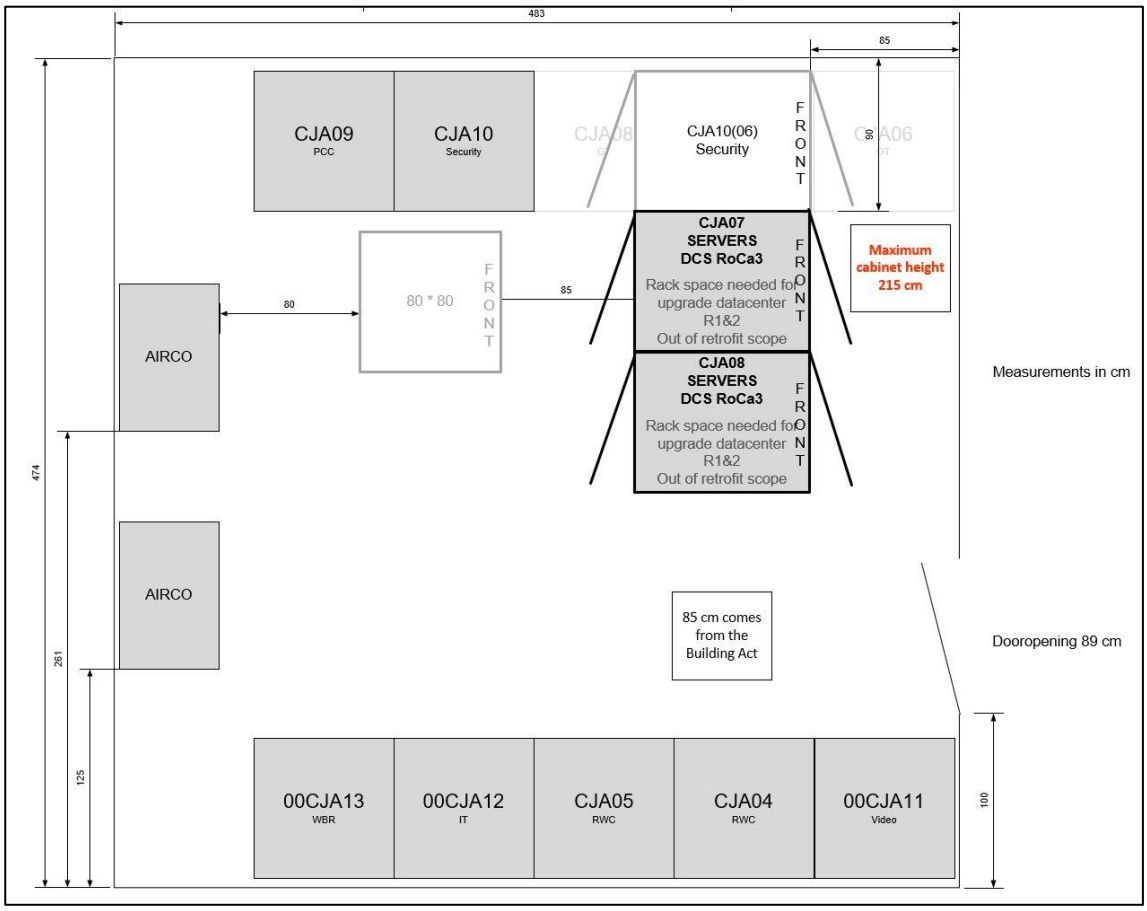
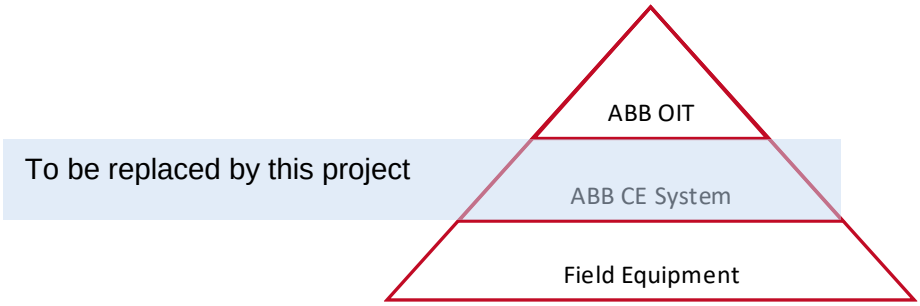
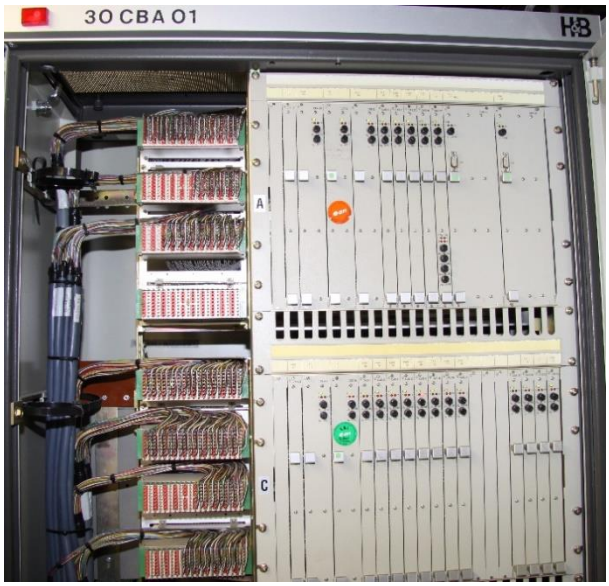


Figure 3 New DCS Server Location

Automation Level



The Automation Level ABB CE System has to be replaced by an state-of the-art fail-safe integrated Automation System. The following pictures shows the CE Cabinet 30CBA01 as Example.



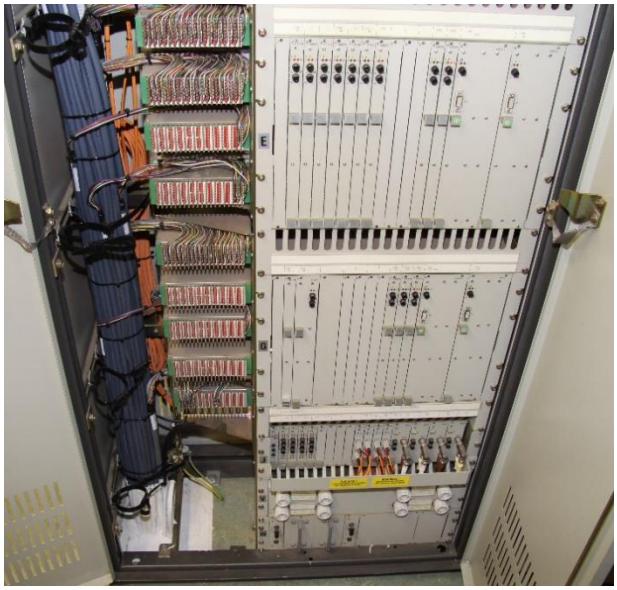


Figure 4 RoCa CE Cabinet 30CBA01 Example 1&2

Automation Level exiting and new planned Locations

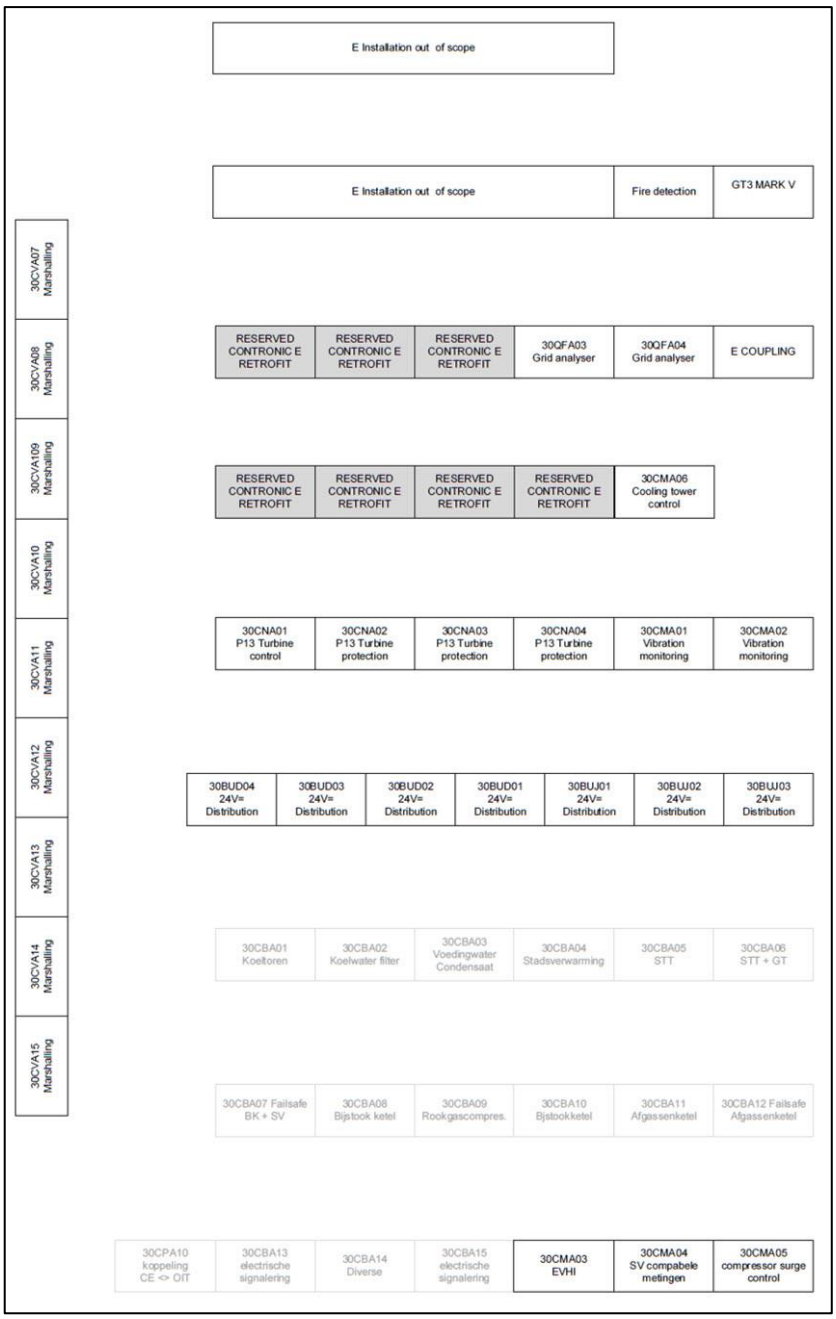


Figure 5 CE System Locations Electronics Room

Automation Level system Layout and OIT interfaces

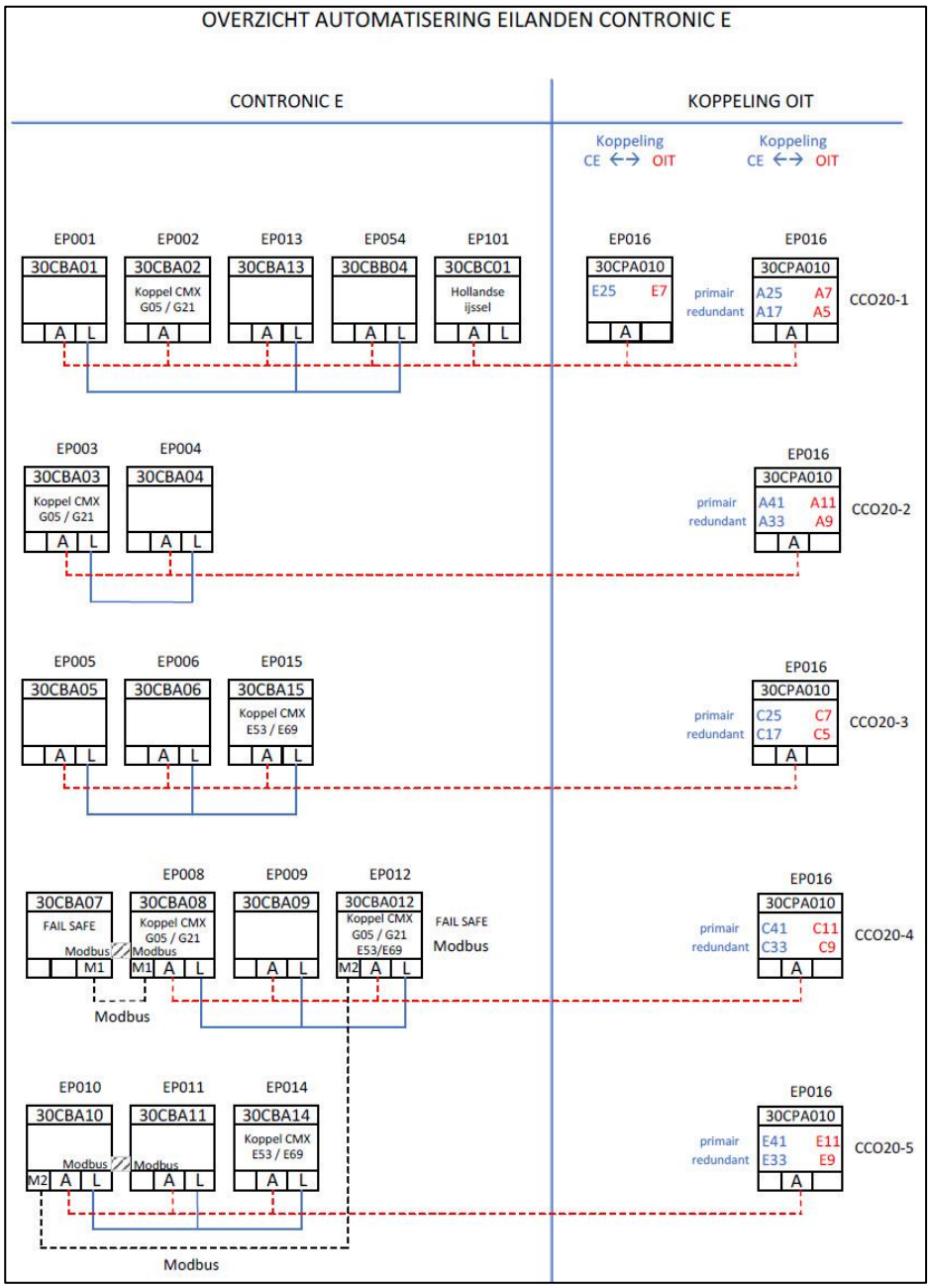


Figure 6: Overzicht Automation Eilanden Contronic E_R1

2.2 As-Build DCS Situation

The actual system is located in 3 areas:

- Location1: Roca3 16 cubicles
- Location2: Roca1&2 1 cubicle
  (obsolete for automation, but will stay for existing power distribution)
- Location3: Hollandse IJssel 1 cubicle

Operator/Engineering-Stations are located in the control room, maintenance room (old control room), Roca 1&2 engineering room and Roca3 engineering room.

NOTE:
The Engineering desk ROCA 3 will be exchanged to the new DCS system.

I/O Channels at ROCA BLOCK 3 incl. actual reserve

I/O Type	Location 1	Location 2	Location 3	Total
Analog Input	1184	0	32	1216
Analog Output	224	32	16	272
Binary Input	1888	32	32	1952
Binary Output	120	640	0	760
Temperature Input	576	0	0	576
Drive (Binary)	484	0	16	500
Drive (Analog)	120	0	0	120
Modbus Interfaces	6	1	0	7

After commissioning, a I/O reserve of 20% of each I/O non-failsafe type must be available.

I/O Channels at ROCA BLOCK 3 Failsafe system

I/O Type	FSC 1	FSC 2	Total
Analog Input	60	27	87
Binary Input	82	19	101
Binary Output	54	11	65

After commissioning, there must be an I/O reserve of 5% of each I/O fail-safe type.

Modbus Channels at ROCA BLOCK 3

I/O Type	EP006G49	EP014C49	EP054E49	Total
Analog Input (Int)	122	39		161
Analog Output (Int)		40	74	114
Binary Input (PB)	2			2
Binary Output (PB)			1	1

NOTE:
The Modbus connections to the failsafe systems will be obsolete after migration, due to the use of a state-of-the-art DCS system with integrated Fail-Safe functionality.

3 New DCS System Design Setup

This following figure shows the new general Setup of the DCS System after migration.

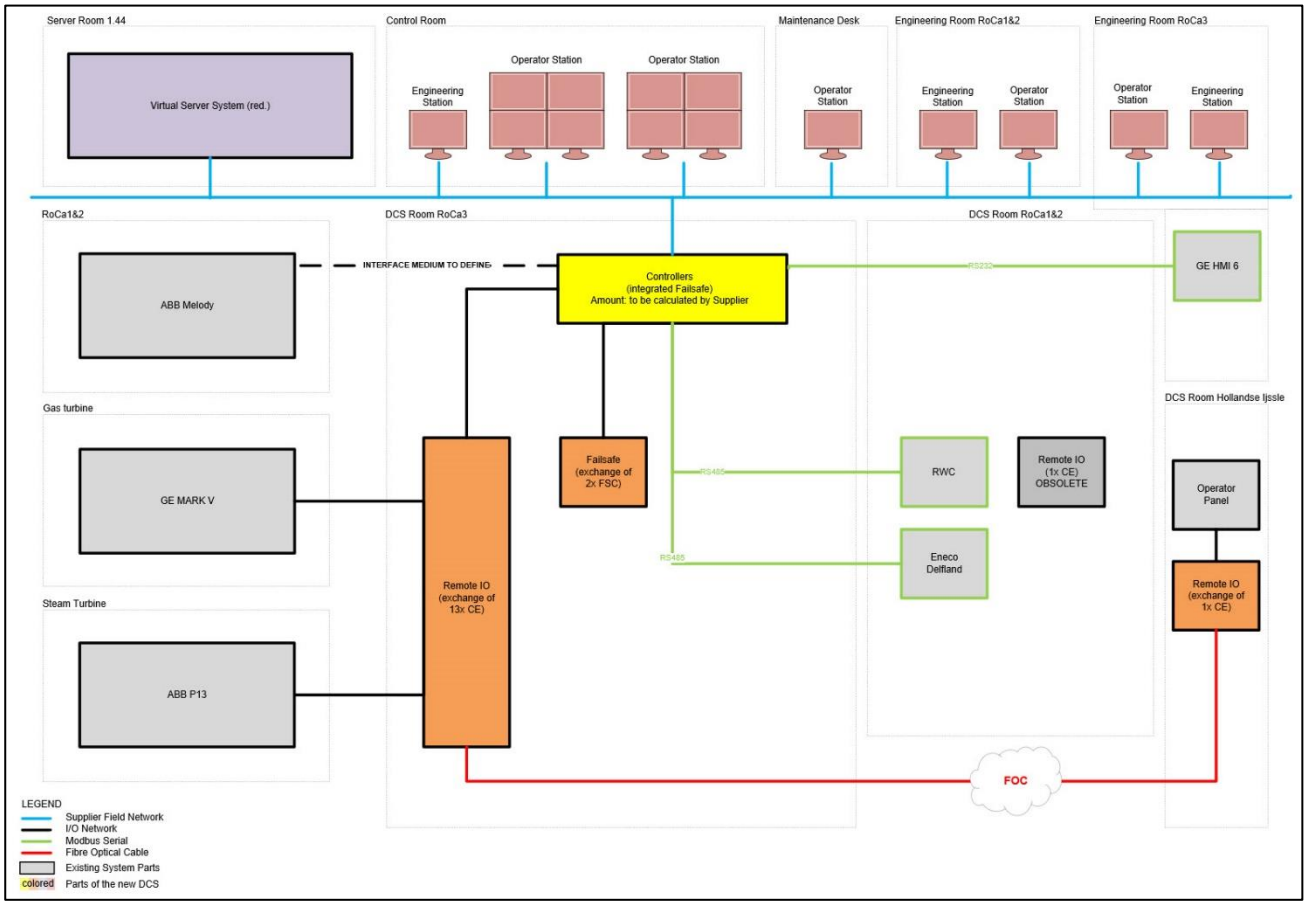


Figure 7: RoCa 3 new System Design Setup

General Equipment

word	**DCS Clients** Control Room: • Engineering Station (1 Screen) • Operator Station 1 (4 Screens, preferred is one big Monitor divided in 4 screens) • Operator Station 2 (4 Screens, preferred is one big Monitor divided in 4 screens) Maintenance Desk: • Operator Station 1 (1 Screen) Engineering Room RoCa 1&2 • Engineering Station (1 Screen) • Operator Station 1 (1 Screen) Engineering Room RoCa 3 • Engineering Station (1 Screen) • Operator Station 1 (1 Screen)
	DCS Servers • DCS Main Servers must be redundant • PI Interface Server must be redundant • DCS Servers must be installed on the above described virtual System

	Automation Controllers
	• Amount must be calculated by Supplier
	• Fail-Safe integrated
	• Controllers must exchange CE System shown here: Figure 6: Overzicht Automation Eilanden Contronic E_R1
	• After commissioning the controllers cannot have more than 50% of workload
	• The network infrastructure:
	  ○ Between DCS Servers and Controllers must be redundant.
	  ○ Between Controllers and I/O-Cabinets must be redundant.
	• Timeserver

	I/O Interfaces • I/O Interface must be state of the art • time stamping at the signal acquisition location • To be connected to the exiting field equipment
	General • Network Equipment such as Switches, Converts, etc. for the new DCS System • Connections to 3rd Party Systems must be re-engineering and has to be established again for the new DCS System. • Compliance to the ISO 27001

4 Scope of delivery

The scope of delivery for Supplier shall be in line with UNIPER's engineering standards and shall be, but not limited to, the following subchapters:

4.1 Scope – General

- All of the Engineering, Procurement, Management, Construction, Commissioning and implementation work/activities required for management, execution, full functionality and completion of the project, RoCa3 Contronic E Migration part.
- Copy the current control strategy from Contronic E to the new DCS, the new DCS system has to be on the same level of automation as it is currently or better.
- The supply of a complete new modern and proven HMI system and Automation system with standard hardware and software including all necessary couplings, instruments if necessary, cabinets, grounding, power supply, cabling and all necessary assembly and mounting equipment etc.
- Redundancies on all level´s HMI, Servers and Automation (redundant CPU´s).
- Power supply and grounding for the HMI system: tie-in on the provisions for the existing system (Check/verification of existing situation. Modification if necessary).
- All necessary field work like cables, cables support, power supplies etc. where applicable.
- Scaffolding, where applicable will be provided by UNIPER.
- The Functional 1-on-1-replacement of the current HMI system and application.
- A system that fulfills all regulatory requirements (e.g. safety) of public authorities and comply with HMI guidelines/norms used in the VGB and European market.
- FAT and SAT with authorities or notified body where applicable (with presence of Uniper representative)
- Specifications, test plans and test forms of IAT and FAT(to be supplied 2 weeks before start).
- Pre-FAT and FAT by approved test plans and forms at Suppliers office. These tests shall include the redundancy tests
- Horizontal and vertical transportation of the delivery to and on site as well installation, erection and mounting on site.
- HSE plan to be approved by UNIPER before any activities on location RoCa3, should contain also fire protection during execution of the project.
- HMI performance measurement before replacement (1 second responses/feedback towards operator on operator actions, redundancy tests, backups, login procedures, alarm testing). Goal is to document the system is working within Uniper's requirements or document possible deviations.
- Specifications, test plans and test forms for installation, SAT and OAT.
- Installation, SAT and OAT ensuring normal operation of the RoCa3 part conform by Uniper approved protocols specifications and strategies.
- Disconnect and removal / disposal of old hardware, obsolete cabling, auxiliaries, peripherals (if not modified/ re-used) and temporary provisions. Handover re-usable parts as spare parts to Uniper (in agreement with and on demand of Uniper)
- All temporary provisions to ensure a flawless installation, migration and startup.

- Supplier shall proof during FAT via parameterlist that old and new setting for e.g. ranges, thresholds, delta bands are equal.
- HMI performance measurement after SAT and handover to Uniper for approval (1 second responses/feedback towards operator on operator actions, redundancy tests, backups, login procedures, alarm testing). Goal is to document the new systems performance has not decreased.
- Assistance on site during first operation for verification of the new HMI / Automation system, direct after successful termination of the SAT and OAT in presence of the authorized representative from Uniper (5 normal working days of normal operation).
- (Remote-)Assistance with a response time of 2 hours during 8 weeks trial run during normal commercial operation of the power plant. Trial run will start within 1 year after OAT. Trial run of 8 weeks during commercial Start/Stop operation. If during trial run the production is tripped, stopped or has reduced power output, due to the migration, the trail run is stopped. After the issue is successfully solved, the trail run starts again.)
- The OAT is the official part of the hot commissioning and does not yet count as a trial operation. The OAT is the operational DCS acceptance of the power plant and is performed between Uniper operators and the supplier. The OAT confirms at least the equivalent or improved operation of the power plant ("Brown Field") by the new DCS system. 10 starts for testing the system and training of the operators. (see also chapter 7.14.5)
- Training of Uniper maintenance personel, 2 levels, and training of Uniper operating personal on changed functionality is part of the offer number of personel is specified at chapter 5.
- Supply and or update ("As-built") of all of the required specifications / documents / drawings / manuals including update of existing documentation within 20 workingdays after SAT.
- All software (if applicable) as backup on direct loadable media carrier and all original licenses at SAT.
- Removal of existing documentation where not applicable anymore, including a list of new and removed documents (for updating our documentation system) within 20 workingdays after SAT.
- Hand-over "For operation" including instruction manuals at SAT.
- Cabinet Drawings, Loop Drawings and Marshalling Drawings in E-PLAN P8 (latest Version).
- Spare parts as recommended by supplier, offered as an option.
- Temporary engineering and operator clients must be provided by the supplier during commissioning and trial operation.
- A maintenance and service price for the next 3 years needs to be offered.

- Supplier must present new and CE-converted DCS Typicals at least 4 weeks before Mass Engineering with at least the following parts:
  - Hardware Typicals (prefered E-PLAN P8 with export to DWG files)
  - Software Typicals
  - HMI Faceplate Typicals
  - Operation Philosophy to each Type incl. alarming, trending and general devinitions

4.2 Scope – HMI specific Level

- The operator monitors should be divided as shown in Figure 6: RoCa 3 new System Design Setup. (4 Screens, preferred is one big Monitor divided in 4 screens)
- All new clients of the DCS system have to be installed as VM in the new HCI cluster and are accessed via VMware Horizen software.
- If due to replacement cabinets, cables, connections etc. have to be replaced this is part of the scope of supplier.
- No change in functionality, redundancy and performance regarding communication towards other third party systems.
- Instructions for login procedure operators to be supplied by Supplier before SAT and as-built at handover. The new DCS System has to function the Uniper DCS Domain in coordination with Uniper IT specialists.
- The IT platform for the new DCS system must be a redundant and has to run on an virtual HCI cluster with a SvSAN software-defined storage solution designed in the hyperconverged compute and storage infrastructure
- Detailed step by step instructions for maintenance personal for replacement of IT equipment and making of backups.
- Prior to installation of the new DCS system, HCI cluster and new network infrastructure, the supplier must prepare a complete project handbook into account the Uniper requirements.
- The supplier must ensure that the old system can be accessed at any time during the project in order to be able to compare the old software, parameters, controls, sequences, etc. with the new software.
- The supplier must submit a changeover concept with the offer.
- During FAT at Suppliers residence the system must be installed and coupled to Suppliers Simulation Controllers. The aim of this is to check HMI mimics, database, redundancy functionality by disconnecting main power supply, bus load, refresh rate, response time after manual operator action, alarm and event testing, System, testing of trending with live data and Historian data, testing of HMI functionality with multiple screens [4 screens], Operator / Maintenance / Engineering and Management Plant / System report testing, Archiving sequences and data storage, accessing time historian data.
- During FAT maintenance engineers of RoCa3 will be demonstrated / trained for at least the following topics:
    - general handling of new DCS System
    - how to login
    - how to program and change logics
    - backup and restore etc. by instruction manual.
- Instruction manual to be handed over to Uniper.
- The replacement of new DCS system during a plant stop which is arranged by Uniper.
- Within this plant stop, the new DCS shall be replaced and made functional.
- Supplier must describe turnaround strategy in its proposal.
- Suppliers turnaround proposal shall be discussed with / and approved by Uniper.
- Supplier must ensure that the hardware thin clients connected to the HCI cluster can support four 16:9 monitors and that they always have smooth image transmission.

5 Specialities for RoCa and this Migration project

There are some factors, that a new DCS system for ROCA 3 needs to fulfill:

- CE uses HART 5.1 with Ibis tool, HART Communication is mandatory
- PI system for history, redundant OPC connection (OPC DA) to implement
- DCS Training for staff:
  - Training Type 1
    - Engineering/Maintenance
    - DCS System Installation and maintenance during building phase
    - Amount: 10 Engineers
  - Training Type 2
    - Daily Maintenance
    - Using DCS for measuring
    - Amount: 10 Engineers
  - Training Type 3
    - Operator – Training
    - Amount: 5x4=20 Operators

- Interface to Roca 1&2 consists of 6 signals. Two signals are obsolete, complex calculations can be done in the new system. 1 signal needs to send to Melody system, a new connection is required, e.g. OPC. Three signals should be moved to the Modbus for district heating, target system is the new DCS.
- Special loops with Contronic 3 cards (AW05, HV12, SL04). Needs to be checked how to replace in new systems or if they are getting obsolete
- CHV01 is the Contronic E card to supply transmitters in the field. These transmitters need to be supplied by new hardware. There are 6 channels used in actual system
- Historical data should be saved for 1 year in general
- OIT will stay as HMI for ROCA 1&2, all parts of ROCA 3 are to remove:
  - Software, Graphics
  - OS38/OS39 Server for CE connection
- Scaffolding and fire bulkheads has to be offered and supervisioned by the supplier. By request of the supplier, UNIPER will inform the supplier about local contractors which are used to work on RoCa side.
- Hold commands for short time voltage breakdowns
- The operator panel at Hollandse IJssel should be exchanged by a touch panel (optional)
- For the “Compressor flue gas” system the logic is obsolete, the hardware should be kept
- The new server system should have enough spare for later expansions, like adding visualization 3rd part systems (20% capacity)
- A merge of existing VMs with new VMs on the new server structure should be possible, the existing server hardware is not up to date (state-of-the-art)

6 Project Requirements

6.1 Milestone Planning

Activity	Date	Comment
Start Project / Kick-Off	After formal purchase	The project will be started directly after a written purchase order by UNIPER. In consideration with UNIPER a kick-off meeting will be organized.
Freezing Point	At initiation of Supplier	Backups shall be made; Modifications will be archived by UNIPER.
Installation Engineering (Software & Hardware) Cabinet Construction	At initiation of Supplier	Activities by Supplier
FAT	After successful internal pre-FAT.	All tests as written in FAT-protocol must past the pre-FAT before FAT can start.
Release for Transport	After a successful FAT	
Start Change-Over	In close cooperation with UNIPER to be determined. UNIPER remains the right to change change-over planning.	All preparations have been made for the change-over.
Release for Operation	After a successful SAT	
Project Close-Out	After Trial Run	Transfer of all project deliveries and after all SAT punch list items has been resolved adequately.

The supplier must trace and document all the complete project incl. all Milestones with MS Project Software.

6.2 Transport

Delivery shall be on workdays between 09.00AM and 16.00PM.
Announcement of deliveries to the site shall be 14 days in advance.

6.3 Disassembling old system

Before disassembling any part of the current system supplier must determine and archive the process values for startup, operation and shutdown in accordance with UNIPER. These values will be handed over to UNIPER for approval. Only after approval of this protocol disassembly of the current system may start.

Holes in floors and/or walls caused by disassembling the old system (e.g. removal of old desk, operating cabinet, HMI cabinets) will be closed by supplier according to standards as used at RoCa UNIPER and according fire protection regulations applicable.

6.4 Pre Start Saftey Review

During on site activities a Pre Startup Safety Review must be done in close cooperation with UNIPER. Supplier must participate in these meetings and take action according the action list resulting from these Pre Startup Safety Review.

6.5 Asbestos

If during work activities on-site asbestos or asbestos containing materials might reveal, supplier must stop his activities immediately and supplier should report this to UNIPER´s project leader who shall take appropriate action for a safe disposal. Possible delay in on-site activities, SAT and/or OAT caused by the revealing of asbestos or asbestos containing materials can never be claimed as extra costs.

6.6 Deviations, Contradictions and Ambiguities

Supplier shall comply fully with the requirements of this specification. When during any phase of the project a deviation of the requirements seems necessary, Supplier shall obtain permission from UNIPER in writing before starting his activities.

UNIPER expects a proper solution for the new DCS System; the current functionality will at least be retained and if possible improved.

Contradictions and or ambiguities in UNIPER's document must be made clear to UNIPER in writing during the bid period.

Contradictions and or ambiguities brought forward by Supplier after signing the purchase order shall be handled by Supplier according request of UNIPER without compensation of extra costs or project time involved.

Headings of chapters and (sub) paragraphs are given for convenience. Supplier shall not limit his scope of supply due to not correct or ambiguities headings.

6.7 Concurrect activities

The existing DCS System will be frozen after Supplier made backups. From this specific moment on, all modifications by UNIPER in both software and hardware will be documented and the consequences will be incorporated in advance of the SAT by the supplier in cooperation with UNIPER as part of the scope.

6.8 Guarantee an Lifecycle support

Guarantee period starts directly after formal take-over and shall be three years. Supplier will perform an update of the system to the latest version when the guarentee period ends.

6.9 CE – requirements

All supplied components and/or third party products used in Supplier's scope of supply must have CE-Marking. Supplier must supply the necessary information concerning components. The signed CE declaration shall at least contain: risk analysis, EMC emission and immunity, Technical construction file.

7 Project execution requirements

7.1 Project Execution and Quality Book

Within four weeks after contract assignment (signed contract), Supplier shall issue the “DRAFT “Project Execution and Quality Book (PEQB).

The PEQB must contain the following:
- every IO loop, physical test
- every control loop, simulation
- every control sub system, during commisioning
- the whole DCS performance and interconnection with other steering systems, during commisioning.

Every single item above has to be approved by UNIPER staf and fully functional, and optimized after commisioning period. The whole plant has reach the same level of automasation is it is now or better.
If a [part off] the system doesn't work coused by or in the scope of work of supplier, supplier is obligated to repair or solve the problem.

The approved "Final" PEQB shall contain the individually approved "Final" Documents mentioned below and as further detailed in the paragraphs hereafter:

- Project aims. Concise project description.
- Project organization, containing:
  - Hierarchy/ function charts, showing assigned (key-) personnel of UNIPER and Supplier/ subcontractors.
  - List of Signature authorized key personnel of UNIPER and Supplier/ subcontractors (Names / short initials / signatures / paragraphs).
  - Responsibility matrix: UNIPER and Supplier as well as his subcontractors.
- Project planning, containing:
  - Overall Planning and Detailed planning hard-/ software bar charts.
- Project Quality Plan, containing:
  - Section: UNIPER specific requirements; shall prevail over standard plans.
  - Section: standard Supplier
  - Section: standard subcontractor(s)
- Internal/ external Audit system.
- Project procedures, containing:
  - Progress reporting procedure/meetings.
  - Communication procedure: UNIPER - Supplier.
  - Review / Approval procedure.
  - Change handling procedure / Definition of recognized Scope Changes.
  - Document Approval and Distribution Procedures / matrixes.
  - Site visit procedure
  - Suppliers "HSE"-plan (Health Safety Environment)
- Project Execution Plan, containing:
  - Description: each phase, activity and validation method.
- Scope of work definition.

- Lists of deliverables: Materials, Documents/ Drawings (all parties involved in the project). Lists shall include details: quantities, make, type, doc/dwg numbers, format and media.
- List of applicable Codes, Standards and Directives.

The Cover page of the PEQB shall state following:

- Qualification: This PEQB is the basis and primary document for scope definition, Project execution and location.
- Reference: <<the specification document number and title>>
- Updates: This PEQB shall continuously update with the latest project developments by means of officially issued revisions for individual documents and lists contained herein.

7.2 Project Team

The supplier shall assign a project team of qualified staff personnel. The team shall include qualified staff personnel of subcontractor(s), if applicable. This team shall handle / execute the entire project, from order date up to the successful project completion with hand-over of the complete integrated and fully operational system including complete as-built documentation.

A qualified Project Manager shall lead the team. A limited number of key personnel shall have Signature authorization. During the entire project, Supplier shall timely notify UNIPER of intended changes in (key) personnel. Such changes shall not be without consent of UNIPER.

7.3 Planning and Milestones

The exact period for installation/migration on site is planned during a plant stop in May 2022.
The dates are not fixed yet:

Date	Milestone
ca. 01 09 2021	Project Start
ca. 21.02.2022	Start On-Site works
ca. 19.05.2022	Start Plant Shutdown

Date	Milestone
ca. 6 Weeks	Plant Shutdown from 19.05.2022 on.

7.3.1 Freezing dates

Mutual agreed freeze dates are set at the start of the project for availability of grouped data/functionality information as well as other (e.g. pending decision making) information.

7.4 Status and Progress Reporting / Meetings

Supplier shall issue, to all parties involved, concise Status/activity reports on a weekly basis and a Progress report on a monthly basis.

The Status/activity reports shall contain concise listing/ description of:

- Activities started/ continued/ completed last week
- Activities scheduled for next week
- Hold points outstanding (date raised) / cleared (date) / new (date raised / latest release)
- Points of concern such as: problem areas, potential risks and critical items.
- Distribution of Status / activity reports shall be by E-mail.

The Progress report shall address project progress on basis of the Overall and Detailed Planning. The reports shall be issued/ distributed by E-mail at the end of each calendar month, at least two workdays in advance of the scheduled Progress Meeting at UNIPER Site.

Progress meetings shall be in the first week of each calendar month. These meetings shall address the following as a minimum:

- Review and approval of the Minutes of the previous meeting
- Review of the Action list. (Outstanding, commenced/ status, completed)
- Review of last month's Progress Report
- Activities performed since last month's meeting, per milestone activity
- Review of the HOLD list (outstanding, released, new)
- Review of design documents: verification of actual progress in software development against progress / milestones
- Points of concern (problem areas, potential risks and critical items) as reported in weekly status reports and new points, if any. Detail discussion and action plan decision.
- Review of deviations from: scope, project- / system-specifications.
- Review planned activities for this new month.
- HSE related issues
- Issue of updated documents such as: project plan, document status list, etc.

At the end of each Progress meeting, Supplier shall issue a signed Minutes Of Meeting (MOM). This draft MOM shall be counter signed by the UNIPER, copied and distributed to all parties present. Supplier shall issue, within 1 week, two signed originals of the typewritten MOM. UNPER shall return one counter signed original within 2 workdays. However, UNIPER reserves the right to comment/request editing of the contents / wording / phrasing in the MOM before signing.

7.5 Communication / language

During the project execution all correspondence and contacts shall be through the UNIPER Project Manager and the Project Manager from Supplier. Direct technical communication between the engineering teams from both parties is possible, but a copy of all documentation has to go to the UNIPER Project Manager. The language used in MOM, reports, meetings and communications / correspondence will be English, unless agreed otherwise.

7.6 Quality Assurance and Control

The PEQB further defines Quality Assurance and Quality Control for the project.
UNIPER reserves the right to perform a project audit at Suppliers premises.

7.7 Project Execution Plan

Supplier shall prepare the Project Execution Plan (PEP) as part of his PEQB. This well-thought-of and defined plan shall be the basis for Development and Validation.
Aim is to assure timely realization of the system according a predefined path and with the required quality level, duly substantiated by records of its compliance with the requirements and directives in this General Requirements Specification.

The PEP shall address following aspects as a minimum:

- Project phases, e.g.: Pre-design / Final design / Construction (workshop) / Testing (FAT) / Installation (-site) / Testing (SAT) / Parallel Operation testing (OAT) / Validation.
- Phase activities, e.g.: Functional and Hard- Software design specifications / Software module design specification and Hardware, Software module / integration Test specifications / Fabrication & Assembly, Programming / Hard- and software tests, Software integration test, System test / Hard- and software installation, System integration, Hardware acceptance test / System acceptance test / System Validation.
- Phase (-activities) validation(s), e.g.: PEQB, Functionality and Software design reviews / Software module design and Tests reviews / Fabrication review / FAT witnessed, Release for Transport / Installation acceptance / Functional acceptance SAT witnessed, Release for Parallel Operation / Operational acceptance OAT, Acceptance report, Release for Operation.
- List of documents, e.g.
- FAT/SAT/OAT specifications, Hard- and software design specifications, progress and status reports, certificates.

7.8 Scope changes

Work / re-work CANNOT be subject of Scope Change when caused by:

a) Premature detailing / programming for aspects / items before their mutually agreed freezing date(s).
b) Premature detailing/ programming for aspects / items identified and recorded as "HOLD/ release not later than"
c) Premature detailing/ programming on basis of typical functionality / design aspects not (timely) submitted to review/approval by Supplier
d) Mistakes caused by omissions in the as built documentation. Terminal should operate at the same quality level as before the migration as a minimum.

Supplier shall report in writing any scope deviation and inform UNIPER immediately of such event. UNIPER's agreement and approval shall be obtained prior implementation.

Scope changes shall be handled on basis of Unit Rates and Prices submitted with Quotation.

7.9 Site visits

Site visits shall always be announced minimal 2 working days in advance to and coordinated with the contact person(s) in question and further in accordance with the procedures for the specific location.

7.10 Specifications by Supplier

An experienced senior engineer of Supplier shall prepare specifications according to descriptions in the paragraphs hereafter.

The functional and design specifications shall, each and in connection, form a well-structured, clear and univocal description of the actual installed functionality/ functional breakdown, respectively the actual system hardware, installed software and the software modular design.

Software design documents shall be up to the level of direct and correct programming without the need for constant supervision by the design engineer.

The design engineer may make limited use of system self-generated documents and parts or excerpts from sections in supplier standard system manuals. He shall however screen and edit the latter where necessary to prevent delivery of not related parts. Superfluous information shall at least be clearly marked as "not applicable" if not deleted.

The test specifications shall form a well-structured, clear and univocal description of the test tools / methods and details, required to enable efficient testing of all aspects of the actual functionality and design as identified / detailed in the aforementioned functional and design specifications.

7.10.1 Specification development/ Approvals & project schedule

All specifications shall be updated regularly and have the status "Final" with UNIPER approval prior to FAT.

During the pre- / final design phases, the design engineer shall regularly submit draft, respectively completed portions of hardware / software typical (-module) design to UNIPER for review/approval. Document shall be submitted for final review in electronic format (pdf). Draft documents may be issued in Word and Excel format, in order to be able to use “track changes” functionality. As built should however be delivered in original WORD/EXCEL etc. format too.
UNIPER shall comment within 10 working days.

Supplier shall give timely notice when larger, cohesive and dynamic / interactive parts of system functionality / software design are ready and shall schedule with UNIPER Engineering a review / approval session at Supplier premises, in order to be capable to perform a review within 10 working days.

Comments and defects shall be implemented / repaired during the session, else officially recorded for execution before and review / approval in the next session.

The PEQB shall include a mutually agreed procedure reflecting the above QA/QC objective. Definition of recognized Scope Changes shall refer to this procedure.

7.10.2 Specification structure and breakdown / test protocols

The intended structure in the specifications shall facilitate the creation of grouped functional / design / test specification sections. Sets of groups shall be included in the FAT and SAT Protocols.

7.11 Technical documentation and drawings

7.11.1 General

Paragraph 7.11.3 provides an overview of documents / drawings for this project.
In principle all documentation intended for operational use, as indicated in the section “Manuals” below, shall be in the English language.

All existing documentation which changes as a result of the replacement (e.g. documentation with references to parts replaced in this project) is part of the scope. Supplier must update this documentation in order that the complete documentation set for the new system at RoCa 3 is correct after the project.

All documents, drawings, certificates, etc. shall be delivered as electronic media and hard copies. Hard copies include printouts of all lists and (data-) files, but not the actual source code. At System Hand-over all documents/ drawings / lists/ (data-) files, including source codes shall additionally be delivered in twofold on electronic media.

Electronic media formats shall be limited to the following formats unless otherwise agreed:

- E-PLAN P8 latest version
- MS Office (word, excel etc.), version 2010 or later

Application software documentation comprises documentation such as:

- Software / configuration manuals
- Configuration module block-diagram (functional block linkages)
- Configuration documents (flowcharts, calculation algorithms, etc.)
- Complete database listing, if applicable
- Listing of local and global parameters
- Program listing
- Cross-reference listing
- Scripts
- Total system back up

Manuals comprises:

- Maintenance manuals including system recovery plans
- Hardware reference manuals
- User / Operating system manuals
- Engineering manuals

7.11.2 Approval of documents

Approval by UNIPER is for the purpose of obtaining conformity to specifications and standards and does not relieve the supplier from his responsibility to provide a fully operational system.

A period of 10 (ten) working days after the receipt shall be allowed for review and approval, also taken into account the requirements.

The supplier shall not commence any activity without the approval of the relevant preceding documents/drawings.

7.11.3 Overview project documentation

Documents
Project • PEQB, complete • Status reports (weekly) • Progress reports (monthly) • MOM's (progress)
Specifications • Functional • Designs • Tests
Drawings • System overv. block diagr. • PS/ UPS, PS distr. 1-lines, Earthing details, etc. • Loop drawings • Construction worksets
Application Software
Manuals
Training courses/manuals
Test/ Validation docs • Protocols + checklists/logs, FAT, SAT, OAT • Test Logs /results • Certificates

7.12 Electrical Design Specification

To verify that the electrical installation meets the requirements specified by UNIPER, the Supplier will create an Electrical Design Specification. This specification describes the way of installation and will contain all electrical drawings, marshalling lists, hardware connection typicals, power supply requirements, cable lists, loop diagrams, cabinet layouts and cabinet component descriptions.

Suppliers are encouraged to indicate their possibilities to deliver integrated tools for generating loop diagrams out of the actual software application.

Before start of assembly of cabinets and before start installation, this Electrical Design Specification has to be approved by UNIPER.

Supplier will have final responsibility for the Electrical Design Specification at all times.

7.13 Quality related requirements

It is the supplier's responsibility to acquire knowledge and be familiar with the applied national and European legislation, regulations and standards.

At all times supplier must comply with "good workmanship".

7.13.1 Document and Software Version Control

The supplier shall submit a document and software version control procedure.

This procedure describes unambiguous which version codes are used under which condition and who is allowed to submit a new version.

7.13.2 Rigths of ownership and licenses

At project handover, all applied user licenses and software must be handed over to UNIPER. For version control it must be clearly stated which version of the software and which licenses are installed.

The application software and all data sources are part of suppliers delivery and will become property of UNIPER.

7.14 Acceptance and validation

7.14.1 General

All System checks and testing shall be tested during the FAT. Remaining required checks and tests on-site shall be limited to the absolute minimum.

7.14.2 Modular tests / Supplier internal tests and checks

Development of specifications / (modular) test specifications and review/ approval sessions with UNIPER shall be completed two weeks in advance of the FAT.

All internal checks/ tests (pre-FAT) by Supplier shall be complete and with all previous recorded faults corrected prior to FAT. Related test sheets shall be made available upon request.

7.14.3 FAT

7.14.3.1 PRE-FAT

Before the FAT supplier shall do an internal test which equals the FAT. Intention of this test is to confirm Supplier and UNIPER the system is ready for FAT. Supplier shall archive logs of the pre-FAT which will be used in the “Release for FAT certificate”.

One week before start of the pre-FAT supplier shall invite UNIPER to witness the pre-FAT.

7.14.3.2 FAT protocol

The invitation for the FAT and its related Test Protocol shall be issued to all parties involved at least 2 (two) weeks prior the start date of FAT. The Protocol shall contain as a minimum:

- Scenario and planning/time schedule
- Checklists
- Logs shall reflect the detailed tests to be performed.
- Test documents
- Performance measurement

7.14.3.3 Documents

The document check addresses as a minimum the following items:

- Drawings and manuals as delivered by Supplier
- Functional specification, Hardware/ Software Design and Test specifications
- The Logs of the tests performed

7.14.3.4 FAT records and mark-ups (for Validation)

During FAT logs will be archived. FAT-log's shall be categorized in the following:

- Showstopper
- Must Fix
- Minor

A log of the category showstopper will abort the FAT. Supplier will inform UNIPER within 2 working days how the problem will be fixed and when the FAT starts again.

A log of the category Must fix will not abort the FAT however must be fixed and retested before the end of the FAT.

A log of the category minor will not block the release for transport. The minor logs shall all be fixed before SAT.

Logs of the category Showstopper or Must Fix will result in restarting the FAT complete or retesting parts of the FAT.

All FAT-logs will be part of the final FAT-protocol.

7.14.3.5 Release certificate (for transport)

After successful completion of FAT a release certificate shall be issued.

Successful completion means that all recorded logs of the category "Showstopper" and "Must Fix " are solved.

7.14.4 SAT

7.14.4.1 SAT protocol

The invitation for the SAT and its associated Protocol shall be issued to all parties involved at least 2 (two) weeks before start of SAT.

The Protocol shall contain as a minimum:

- Test scenario and planning/time schedule
- Logs shall reflect the detailed tests to be performed, in the order of execution
- Installation documents and drawings.
- Test specification for these tests which can't be performed during FAT.

7.14.4.2 Installed Hardware

The hardware installation verification on basis of the Installation specifications and drawings addressing aspects such as, but not limited to:

- All applicable hardware installation aspects (e.g.: busses, cabling, connections, power supplies / distribution, etc.
- Temporary provisions/ installation in parallel operation
- Visual inspection for System ergonomic aspects, finish, damages
- Insulation, earth measurements.

7.14.4.3 Functionality

Functional check of all equipment/functionality belonging to DCS replacement

- Loop checks of all field equipment related to DCS
- Testing of analogue measurements: scaling and range presentation,
- pre-alarm set values as well as over-/ under-range and loop fault
- Testing of alarm / event functions
- Testing of complete sequence functions
- Testing of Algorithms
- Additional tests

7.14.4.4 SAT records and mark-upsl

- The Logs / results of the performed SAT tests and checks (Validation documents)
- Drawings and documents delivered by Supplier and marked-up for "As built"
- All SAT-logs will be part of the final SAT-protocol.

7.14.4.5 Release certificate (for OAT)

After successful completion of SAT a release certificate shall be issued.

Successful completion means that all recorded deficiencies from the FAT and SAT are solved.

7.14.5 OAT & validation

7.14.5.1 OAT protocol

The OAT protocol concerns all system functionality and particular those aspects, which could not be tested / verified in full scope during the previous validation phases of FAT and SAT.
Special attention shall be given to:

- Communication with external systems
- Response times, update times
- Algorithm results
- Trip / Alarm / Warning and event generation
- Sequence handling
- Stress test: Bus loads, particularly at high activity
- Performance measurement

7.14.5.2 OAT records and mark-ups

Logs / results of the performed OAT tests and checks

7.14.5.3 Validation to Hand-Over

Successful completion of the OAT means that all recorded deficiencies are solved.
Official Hand-over for Operation takes place when the following requirements are met.

OAT Release certificate (For operation) is signed, accompanied by:

- The Logs / results of the performed OAT tests and checks
- The Logs / results of the performed SAT tests and checks; SAT certificate
- The Logs / results of the performed FAT tests and checks; FAT certificate
- CE-Marking certificate
- All Manuals / Specifications and "As built" System Documents
- Actual and mutually signed Punch list, with the outstanding corrections / improvements and tasks to be performed.

7.15 Release Certificate

Following Release Certificates shall be provided within 1 week after FAT/SAT by Supplier and signed by UNIPER involved:

a) Release For FAT Certificate. A representative of Supplier, representatives of UNIPER shall sign this certificate after successful pre-FAT.

b) Release For Transport Certificate. A representative of Supplier, representatives of UNIPER shall sign this certificate after successful FAT.

c) Release For start SAT Certificate. A representative of Supplier, representatives of UNIPER shall sign this certificate after successful transport and pre SAT.

d) Release For Operation Certificate. A representative of Supplier, representatives of UNIPER shall sign this certificate after successful OAT and SAT

These certificates shall be part of respectively the FAT, SAT and OAT protocols. All certificates will be accompanied by a list with the outstanding issues of the test.

Supplier shall distribute signed copies to all parties involved.

7.16 Installation

7.16.1 General

Installation/migration shall be done within a limited timeframe, agreed with UNIPER. Installation involves risk assessment for continued safe operation with minimum to none disturbance during installation / integration. Supplier shall fully prepare for this challenge with an UNIPER approved Installation scenario and detailed specification.

Execution of all installation works shall fully comply with the applicable codes and standards, including Supplier Safety, Health, Environment plan, and as further arranged/ agreed with UNIPER. Supplier shall handover its HSE-plan for approval. Before Installation at location RoCa Supplier must have a, by UNIPER, approved HSE plan.

Supplier will prepare his installation with a day to day installation scenario, startup scenario and related planning. The installation scenario, startup scenario and related planning have to be approved in advance by UNIPER.

Execution of major on-site work activities and temporary arrangements shall then restrict to this scheduled shutdown. The installation scenario shall aim to limit the remaining work and activities after start-up till system hand-over to the absolute necessary minimum.

7.17 Training

Supplier shall organize a training course how to maintain the DCS, engineering system etc. and give a short instruction towards the operators (and a written electronic description) how to logon to the DCS.

During FAT maintenance personal of RoCa shall be trained/instructed how to backup and restore the system/application by means of an instruction manual. This instruction manual is part of the delivery.

8 Spare Parts

8.1 General

Spare parts to be advised by supplier and agreed with UNIPER. Spare parts are a part of the offer which at least includes 1 spare for each unique element.

9 List of figures