Technical Proposal for ESD Based on HIMA

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1. Company Introduction:

1.1. Introduction

CONTROL SAZAN Company is an Engineering company which provides solution in automation systems. The most activity is integration of DCS, ESD and F&G System.

Our experience is design and implementation of industrial solution in variety of industries such as oil and gas, petrochemical, power plant and etc.

CONTROL SAZAN engineering team is expert in system integration by well-known supplier such as:
• SIEMENS, HIMA, ABB and SCA ME
• Net Safety, e2S, Apollo, Kentec

The main objectives are Oil &Gas, Petrochemical, Refinery plant, Cement factory and Metal Melting factory and have been done many projects in related fields. **CONTROL SAZAN** Company combine expertise and experience in design and engineering manufacturing with proven technology from industry leading product partners and supplier to deliver customized safety, control and Automation systems. We are particularly experienced in the implementation of system in accordance with the ATEX regulations for hazardous areas.
This combination of product development and system engineering skills provides the fundamental requirements to fulfill ever increasing demands of technological change in the industries.

1.2. Control Sazan Reference List

End User /Client	*Project Name*	*Plant Type*	*I/O Quantity*	*Number of graphic pages*	*Project Description*	*Year*	*System supplied*
NIGC	Koupal Gas gathering project	Gas gathering plant	3 x 550	22	Commissioning and Erection Koupal Gas gathering project.	**1382**	Siemens S7
Kharg Petrochemical	Kharg Petrochemical 2902 Gas Turbine project	Petrochemical	380	15	control system revamping of Kharg Petrochemical 2902 Gas Turbine project. (HMI & PLC programming)	**1382**	Siemens S7
Keyson-NIOEC	32" Neka-Rey crude oil pipeline project. Phase Neka-Sari-Golpol-Orim-Moghanak & Rey	Oil Pump Station	Neka 430 Sari 580 Golpol 580 Orim 570 Moghanak 350 Rey 320	Neka 18 Sari 25 Golpol 25 Orim 25 Moghanak 15 Rey 12	All Pump stations Control System of 32" Neka-Rey crude oil pipeline project. Neka-Sari-Golpol-Orim-Moghanak & Rey	**1383**	Siemens S7
NIOEC	Control system of Nouvo Pignone MS1002 Turbine	Oil Pump Station	4 x 350	4 x 17	Nouvo Pignone MS1002 Turbine Control System revamping from pump stations of 26" Ahwaz-Rey crude oil pipeline.	**1383**	Siemens S7
NIOEC	Afrineh Trap Station Control System	Oil Pump Station	120	8	Afrineh Trap Station Control System from 16" Tang-e-Fanni Kermanshah Product Pipeline Project.	**1385**	Siemens S7
NIOEC	32" Neka-Rey crude oil pipeline project. Phase 2 and 3 Neka-Sari-Golpol-Orim-Moghanak & Rey	Oil Pump Station	Sari 80 Golpol 80 Orim 80	Sari 3 Golpol 3 Orim 3	All Pump stations Control System of 32" Neka-Rey crude oil pipeline project.Neka-Sari-Golpol-Orim-Moghanak & Rey	**1386**	Siemens S7
NIOEC	Ardebil new oil depot project.	Oil Depot	550	23	Control system of Ardebil new oil depot project	**1387**	Siemens S7
NIGC	Sulphur Degassing System Sulphur solidification of ILAM GAS TREATING PLANT	gas treating plant	750	18	Control system of Sulphur Degassing System Sulphur solidification of ILAM GAS TREATING PLANT.	**1388**	Siemens S7
Omrab-Sadid	ABADAN REFINERY COOLING WATER SYSTEM	Cooling water, WTP and RO plant	2800	48	Control system of ABADAN REFINERY new Cooling water system	**1390**	Siemens S7

End User /Client	*Project Name*	*Plant Type*	*I/O Quantity*	*Number of graphic pages*	*Project Description*	*Year*	*System supplied*
NIOEC	Iran Caspian Oil Transfer & Refining Project, Sari Pump Station Balance Tanks Project	Oil Pump Station	Sari 450 Moghanak 470	Sari 15 Moghanak 18	Control system of Balance Tanks and Booster Pumps Project	**1391**	Siemens S7
NIOEC	Emam Khomeyni Shazan Refinery Expansion Project	Refinery	220	12	Control system of H-1911 Reactor Package	**1391**	HIMA
NIOEC	Emam Khomeyni Shazan Refinery Expansion Project	Refinery	230	15	Control system of H-1921 Reactor Package	**1392**	HIMA
NIOEC	Emam Khomeyni Shazan Refinery Expansion Project	Refinery	220	12	Control system of H-1931 Reactor Package	**1392**	HIMA
IOPTC	Can and Ghochak Oil Depot Control System Revamping Project	Terminal Station	250	15	Can and Ghochak Oil Depot Control System Revamping Project	**1392**	Siemens S7
Danial Petro / NIOEC	NAEIN/ KASHAN/ REY 20" OIL PRODUCT PIPELINE & RELAVANT FACILITES	Oil Pump Station	Naeain PCS1400 Naeain ESD 110 Kashan PCS 430 Kashan ESD 45 Rey PCS 170 Rey ESD 21	Naeain 28 Kashan 15 Rey 12	Control and ESD system for NAEIN/ KASHAN/ REY 20" OIL PRODUCT PIPELINE & RELAVANT FACILITES	**1393**	Siemens S7
IOPTC	Mashad Euro Oil Product Pump Station Project	Oil Pump Station	250	18	Control system of Mashad Euro Oil Product Pump Station Project	**1394**	Siemens S7
IOPTC	Tehran Refinery Crude Oil Booster Pump Station Project	Oil Booster Pump Station	180	9	Control system Revamping for Tehran Refinery Crude Oil Booster Pump Station Project	**1395**	Siemens S7
Petrotec Sun	5MWe Sabalan Geothermal Pilot Power Plant Project	Power Plant	450	17	PMS of 5MWe Sabalan Geothermal Pilot Power Plant Project	**1395**	Siemens S7
Darya Sahel	Rey Oil Depot Revamping EPC Project	Oil Depot	350	26	Control System for Rey Oil Depot Revamping EPC Project	**1395**	HIMA
NIOEC ODCC/ Pars Kayhan	ABADAN NEW PUMP STATIONS	Oil Pump Station	PCS 2900 ESD 600 FGS 550	PCS 43 ESD 28 FGS 23	PCS and ESD and FGS of Abadan new pump stations & terminals complex and mile 40 pump station	**1397**	Siemens S7

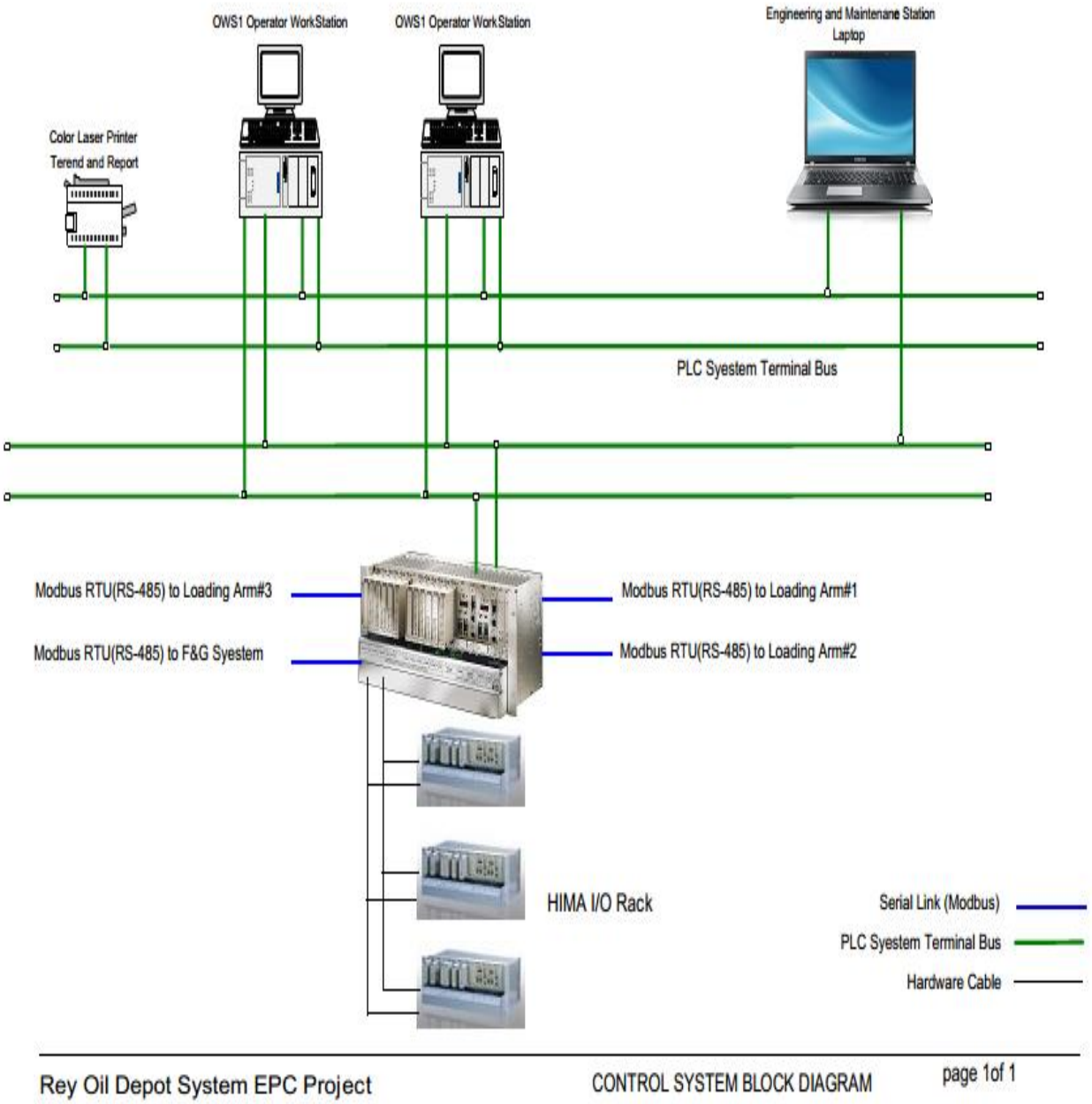
2. Technical Summary of Proposed Systems

2.1. ESD Reference Document

Tender documents have been reviewed thoroughly to provide a compatible proposal. This technical proposal covers design, manufacturing, assembly, internal wiring, programming, test and inspection, training, and shipment for Binak Station. This proposal is provided according to the following documents:

Document Name	*Document / Drawing NO.*	*Rev. No.*
Control/ESD/F&G SYSTEM BLOCK DIAGRAM	BK-GCS-PEDCO-120-IN-BD-0001_D02	D07
INSTRUMENT & CONTROL DESIGN CRITERIA	BK-GCS-PEDCO-120-IN-DC-0002_D00	D00
I/O LIST FOR ESD SYSTEM	BK-GCS-PEDCO-120-IN-LI-0002_D00	D03
SPECIFICATION FOR ESD SYSTEM	BK-GNRAL-PEDCO-000-IN-SP-0003_D05	D05

2.2. SYSTEM ARCHITECTURE: The system architecture is depicted in below picture:



H41q/H51q Central Components are in the passive phase since April 1, 2020

For more than 20 years the HIMA Safety Controller HIQuad H41q/H51q has been a reliable product for many applications within the process industry. But each product life cycle makes it necessary to switch to the best available technology at the appropriate time.

That's why the central components of the H41q and H51q are in the passive phase since 1st April 2020. Affected are the central racks including the central, communication, power supply and coupling modules as well as the corresponding accessories.
The HIQuad I/O modules including field wiring remain unchanged within modernized and function compatible HIQuad X systems.

For passive products, HIMA aims to keep spare parts in stock and provide repair support for at least ten years. Component-related, legal, or normative restrictions may apply. Products entering the passive phase may have limited delivery availability and will not receive further updates with new features or certificates.

HIMA products give you maximum, long-term plant availability. To ensure this, we continually modernize our product portfolio with new technologies. Compatible successor products ensure your safety system continues to operate smoothly many years after installation. This reduces life-cycle costs, avoids unplanned downtime, and ensures investment protection for your assets.

2.2.1. ESD I/O SIGNALS AND MODULES SUMMARY AND SPARE:

The following table summarizes the IO signals and modules of **ESD** system. As a design basis, 20% hot spare IO signals and 20% spare space in the IO racks are considered:

ESD HIMA-based	**Single AI**	**Red AI**	**Sin gle RTD**	**Red RTD**	**Single AO**	**Red AO**	**Single DI**	**Red DI**	**Single DO**	**Red DO**
Number of card channel	**8**		**8**		**8**		**16**		**8**	
I.S. Signals	0	59	0	0	0	0	0	0	0	0
Non-I.S. Signals	0	0	0	0	0	0	0	39	0	89
I.S. Signals + Spare	0	72	0	0	0	0	0	0	0	0
Non-I.S. Signals + Spare	0	0	0	0	0	0	0	47	0	107
Hardwired IO Count	0	72	0	0	0	0	0	47	0	107
H.W IO Module No.	0	9+9	0	0	0	0	0	3+3	0	14+ 14
Total Module No.	**18**		**0**		**0**		**6**		**28**	
Serial Link (Redundant)	**1 (Modbus CP cards: 2)**									
Rack	**8**									
Interposing Relay for all DO signals.	0		0		0		0		107	
Barrier Modules	0	72	0	0	0	0	0	0	0	0
Internal Power Cons.	Power Supply: 2 x SITOP 20A									
Field Power Cons	Power Supply: 2 x SITOP 20A									
System Cabinet	**3**									
Marshalling Cabinet (rear of system cabinet)	**2**									

1.1.1. ESD - Main Parts

The Following items will be provided in this project:

B	**HIMA H51q PLC Hardware Supply**			
ITEM	QTY	MFR	MODEL	DESCRIPTION
1	4	SIEMENS	6EP1336-3BA00	SITOP Modular Stabilized load Power Supply input 115/230 V ac input:24VDC,20A
2	2	SIEMENS	6EP1361-3BA20	SITOP Modular Redundancy Nodule INPUT/OUTPUT 24DC/40Amp fit For decoupling of 2 SITOP Power Supply Module with MAX 20 Amp OUTPUT CURRENT EACH
3	1	HIMA	H510 -HRS	H51Q-HRS MODULAR AUTOMATION SYSTEM, HIGH AVAILABLE, 19" RACK, 5U HIGH) REDUNDANT CPU AND IO-BUS, TUV CERTIFIED, SIL3/RC6/Cat.4
4	2	HIMA	F 8627	ETHERNET COMMUNICATION MODULE, 100BASE-TX SAFE ETHERNET AND OPC, ELOPII TCP AND MODBUS TCP FOR F 8627X WITH OS V4. x OR HIGHER
5	2	HIMA	BV 7053	HSR Cable for redundant F 8625 communication module
6	2	HIMA	BV 7046	SYSTEM CABLE H41Q, H51Q (REDUNDANT CPU)<--->H 7506, L=2m
7	2	HIMA	H 7506	SYSTEM BUS TERMINAL
8	2	HIMA	F 8621A	MODBUS COPROCESSOR MODULE, H41Q,H51Q WITH ELOP II

B	**HIMA H51q PLC Hardware Supply**			
ITEM	QTY	MFR	MODEL	DESCRIPTION
9	4	HIMA	B 9302-0.5	IO RACK 16 SLOT IO, 19", 4U HIGH, WITH 0.5m IO-BUS CABLE
10	6	HIMA	F 3236	16-channel Digital input module safety-related, applicable up to SIL 3 according to IEC 61508, for 1-signals or sensors with safety isolation
11	3	HIMA	Z7116/3236/C5/R	Front cable Plug of Redundant Digital Input Modules
12	28	HIMA	F 3330	8 Channel SIL3 Digital output module, safety isolation, no output signal with break of L- supply
13	28	HIMA	Z 7138/3330/C5	Front cable Plug of Digital Output Modules
14	18	HIMA	F 6217	8 Channel analog input module, safety-related, applicable up to SIL 3 according to IEC 61508, for current inputs 0/4...20 mA, voltage inputs 0...5/10 V, with safe isolation, resolution: 12 bits
15	9	HIMA	Z7127/6217/C5/I/R	Front cable Plug of Redundant analog Input Modules
16	16	HIMA	F 7133	FUSE MODULE 4-FOLD POWER DISTRIBUTION FOR H51Q, H51Q to RACK B9302 INCLUDE. MINIATURE FUSE 4 A-T
17	2	HIMA	M3443	LABELING FIELD , 19INCHES, 1U HIGH, DEPTH 203.5 mm, WITH 1 CABLE DUCT 40x60 mm
18	1	HIMA	K 9203	CIRCULATING FAN DRAWER WITH 3 AXIAL FANS
19	7	HIMA	M2215	COVER PLATE 4SU, 3U HIGH, COMPLETELY

C Engineering & Operator Workstation				
ITEM	QTY	MFR	MODEL	DESCRIPTION
1	1	Advantech	DESKTOP	ENGINEERING STATION. INDUSTRIAL PC, 3.4 GHz. 4GB RAM, 500GB HDD, ON BOARD GRAPHIC CARD. USB PORT. LAN CARD. DVD R/W, 21" LCD COLOR MONITOR, QWERTY KEYBOARD & OPTICAL MOUSE
2	1	DELL	E5540	Laptop for Engineering Work Station; Intel Core™ i5 4310U; 2 Up to 3 GHz; 15.6" HD, 8GB RAM, 1TB Hdd; Intel HD Graphics 4600
3	1	HIMA	ELOP II	ELOP II PROFESSIONAL FOR HIMA PES PROGRAMMING, ENGLISH, FULL PACKAGE, HARD LOCK FOR USB INTERFACE
4	3	CITECT		Citect SCADA - ENGINEERING SOFTWARE

1.1.1. MTO - PANEL AND INTERFACING PARTS

The following table summarizes the ESD Main part list MTO:

	Panel and Interfacing Part List		
Item	***Description***	***Qty.***	***Unit***
1	Body cabinet – **(CPU, I/O, and I/O Panels, Power Distribution Panel**, **Marshaling** cabinet (rear of **I/O Panels**) Phase Tablo Rittal Type, RAL7035, D: 2100*800*800mm, IP42, Front and Rear Accessible With Schneider **Circuit Breakers** Phoenix Fused **Terminal** 220 VAC, Rittal Cooling **Fan and Filter** Rittal **thermal key** Telemechanic **door limit switch** Raad **duct** Zarsim **wire** Phoenix Knife Switch **Terminal**	3 panels	pcs
2	SIL 3 Phoenix or P&F **Interposing Relay** for Digital Output signals	107	pcs
4	P&F **SMART** Isolator **Barrier/Duplicator** for Redundant IS **AI** Signals	72	pcs

1.2. ESD 2 Years Spare Parts

The following table summarizes the ESD 2-year spare part list. The quantity is calculated based on 10% of the quantity of the required main equipment.

D 2 Years Spare Parts				
ITEM	QTY.	MFR	MODEL	DESCRIPTION
1	1	SIEMENS	6EP1336-3BA00	SITOP Modullar Stabilized load Power Supply input 115/230 V ac input:24VDC,20A
2	1	SIEMENS	6EP1361-3BA20	SITOP Modunar Redundancy Niodule INPUT/OUTPUT 24DC/40Amp fit For decoupling of 2 SITOP Power Supply Module with MAX 20 Amp OUTPUT CURRENT EACH
3	1	HIMA	F 3236	16 FOLD DIGITAL INPUT MODULE
4	1	HIMA	F 3230	8 FOLD DIGITAL OUTPUT MODULE, 24 VDC, 0.5A
5	1	HIMA	F 6217	8 Channel analog input module, safety-related, applicable up to SIL 3 according to IEC 61508, for current inputs 0/4...20 mA, voltage inputs 0...5/10 V, with safe isolation, resolution: 12 bits
6	1	HIMA	F 7133	FUSE MODULE 4-FOLD POWER DISTRIBUTION FOR H51Q, H51Q to RACK B9302 INCLUDE. MINIATURE FUSE 4 A-T
7	1	HIMA	F 8627	ETHERNET COMMUNICATION MODULE, 100BASE-TX SAFE ETHERNET AND OPC, ELOPII TCP AND MODBUS TCP FOR F 8627X WITH OS V4. x OR HIGHER
8	1	HIMA	F 8621A	MODBUS COPROCESSOR MODULE, H41Q,H51Q WITH ELOP II

1.2.1. ESD Special tools

We have not considered any special tools for this project.

3. Scope of Supply/Services and Price Breakdown

3.1. Scope of Supply and Work

The proposed control and safety systems will satisfy requirements of **Control System** specification including complete configurations of system database configuration, application/sequence programming, generation of communications to 3rd party equipment, power supplies,
I/O modules, termination, accessories, and etc.
The following components and equipment will be delivered as parts of this offer:

- Two sets of operating workstation with monitors
- PLC Engineering Stations
- Network switches and interconnection cables
- Color Printer
- Office desks and chairs for station in CCR
- Redundant Controllers
- Redundant Communication Modules
- Redundant Data Buses
- Remote I/O Hardware
- Redundant Power Supply
- System and Marshalling Cabinets
- I/O standard and safety interposing relays
- Complete Microsoft Windows XP Package (not original)
- Microsoft Office and Antivirus (not original)
- Graphic Displays
- Spare Parts For Commissioning and Start-up
- Spare Parts For 2 Years of Operation
- Supply of cables between different parts of control system is in our scope
- All cabling and wiring:
  - Wiring inside panels
  - System cables (between panels)
  - Network cables
- Terminals will be screwed type for all wirings , and suitable for wire terminations. For each pair of signal one additional terminal will be considered for earthing . All terminals will be rail, DIN type. The terminals will be installed in vertical column

The following services will be done during project implementation:

- Project management
- Monthly progress reports
- System engineering and configuration
- System documentation
- Panel assembly
- Factory Acceptance Test (FAT)

- Packing and shipment
- Optional training
- SAT
- Site assistance for pre-commissioning
- Supervision on installation, and commissioning

3.2. Exclusion

The following items are out of scope of supply and work:

- Fiber optic cable between CCR and ITR
- Site assistant services will be charged per man-day rate.
- Living, local transportation, and lodging expenses
- Any field cables, JBs, cable trays, cable trench, etc.
- UPS
- Field instruments and packages
- UCPs
- MCC

3.3. Price Table

Khormoj Price Table - Main Items			
#	Description		Price (Euro) ESD
1	System Hardware		
2	Panels & Accessories		
3	Workstation (Monitoring & Engineering Stations)		
4	Main Service	Design and Engineering	
		Programming and HMI Designing	
		Panel Wiring	
		Documentation	
		FAT in Control Sazan workshop	
		Packing and Shipment (CIP at Site)	
5	**Total Price**		
#	**Description (Optional Items)**		**Price (Euro)**
1	Original License		
2	Recommended commissioning and startup spare part		
3	Recommended 2-year operation spare part		
4	SAT and Pre-commissioning and start-up at site (Man/Day), working hours in each day 8 hours for a technician		
5	Training: -Operating (5 persons in two days) -Engineering and Maintenance (3 persons in three days)		
6	Addition DI/O cost impact after PO		
7	Addition AI/O cost impact after PO		
8	Addition graphic objects, software cost impact after PO		

This offer is valid for 120 days.

3.4. Payment Terms

The following payment stages can be considered:

- Advance Payment : 50%
- After shipping of main parts to shop : 25%
- After FAT : 20%
- After final acceptance : 5%

3.5. Contract Effectiveness

The contact will be effective after receiving advance payment and required feed documents for designing PCS.

3.6. Delivery Place

Delivery term/place is Binak Project Site.

3.7. Delivery Time

4 months after receiving advance payment and required project documents.

3.8. Guarantee

The system will be guarantee for operation of equipment, engineering, and against defective material. The duration of guarantee is 12 months from the date of successful start-up or 24 months from the date of transportation whichever occurs first. It is also guaranteed that the spare parts for the modules is available for a period of at least 10 years after the date of purchase.

4. Main Sub-Supplier List

The offered equipment is offered from the following manufacturer and country:

- **PCS** and necessary S/W: SIEMENS
- Industrial PC: Advantech (Taiwan) or eq.
- Relay and Terminals: Phoenix Contact (Germany).
- Panel body and accessories: Phase Tablo (Local)
- Desk: Jalice (Local) (Optional)
- Chair: Nilper (Local) (Optional)

5. Engineering

Engineering consists of following items:

- Project management and coordination with other supplier
- Process study, to define best solution in accordance with standards and related Codes
- Hardware engineering comprise of :

- ✓ Control panel arrangement
- ✓ Panel layout drawing
- ✓ I/O assignment
- ✓ Circuit Wiring diagram
- ✓ Etc.

- Software engineering comprise of:
  - ✓ PLC system configuration
  - ✓ Software programming and setup
  - ✓ Communication and network setup
  - ✓ Logic implementing according to cause and effect
  - ✓ Design HMI graphic Display Page
  - ✓ Faceplate and Dynamic object Design
  - ✓ Etc

6. Factory Acceptance Test (FAT)

The FAT shall be performed at the vendor workshop for the complete, including all hardware and software components. The tests and inspections shall demonstrate the functional integrity of all hardware and software, and conformity to the required specifications.
The vendor shall check the workmanship and perform all his routine tests on the hardware and software, as well as functional checks before staring the final factor/acceptance test. The internal tests and inspections reports shall be made available to the inspector for his view.
The system shall be ready for power-up and all system components shall be assembled and interconnected as per actual interconnecting configuration in the field. During the FAT the whole tests comprising of visual checks and functional checks will be performed.

FAT Procedure:

The following tests and inspections will be performed in FAT:

- Visual inspection, dimensional and mechanical checks
- Conformity check, checking the model number and quantity of all items in accordance with the approved documents
- Wiring check

- Functional tests

  - ✓ The functional tests will include hardware or software simulation of all

inputs and outputs to testify the proper functions and responses of the system. These tests will also cover the programming and configuration of the system and all system peripherals. The following tests will be included:

- ✓ Checking all the digital inputs and outputs by simulating the inputs and forcing the outputs. Checking all the analogue inputs and outputs by applying 4-20 mA signals to the inputs and measuring the 4 - 20 mA output signals.
- ✓ Complete loading system configuration
- ✓ Checking all the digital functions and analogue functions based the relevant logic and analogue diagrams
- ✓ Performance of all controller functions
- ✓ Checking the function of data highway Measurement of system scan time
- ✓ Checking of data base configuration, ranges, alarm and trip limits, engineering units, etc.
- ✓ Checking of all graphic displays for their conformity to the approved drawings and proper quality
- ✓ Checking of all formats, reports for alarm logging and event printing
- ✓ Checking of redundancy features as per the specifications
- ✓ Checking of the diagnostic routines for all system with the fault simulation and reviewing the diagnostic alarms
- ✓ Checking the proper functioning of all peripherals
- ✓ Checking the proper functioning of all auxiliary relays and components
- ✓ Simulation of power failure
- ✓ Checking the spare capability in terms of hardware, memory and software to meet the requirements stated in the specifications
- ✓ Checking of maintenance functions and troubleshooting procedures
- ✓ Checking the function of additional required software

7. Site Acceptance Test (SAT)

After shipment to plant all system components and devices will be installed properly. The testing procedure will include :

- Mechanical checks of the system including all system links connected according to the specification. After this the software will be loaded and self test routines of the PLC will ensure that all systems components are in acceptable condition as well as the communication links are working properly.
- The application software will be loaded and if the system shows no deviation to the normal operation, the system will be ready for loop checks and continuous test run.

- Checking all the digital inputs and outputs by simulating the inputs and forcing the outputs. Checking all the analogue inputs and outputs by applying 4-20 mA signals to the inputs and measuring the 4 - 20 mA output signals.
- Complete loading system configuration

- Checking all the digital functions and analogue functions based the relevant logic and analogue diagrams
- Functional check of all logic of PLC

8. Documentation

Following documents will be submitted to customer after contract:

- ✓ Control panel layout
- ✓ I/O list
- ✓ Sensor list
- ✓ I/O assignment
- ✓ Control Panel Circuit Diagram
- ✓ PLC configuration
- ✓ Communication network
- ✓ HMI display page
- ✓ Material take off
- ✓ Implemented logic diagram
- ✓ FAT procedure
- ✓ Packing list
- ✓ Alarm And Set point List
- ✓ Control Room Arrangement
- ✓ Loop Diagram
- ✓ HMI User Manual

9. Packing for shipment

The control panels and auxiliary equipments will be prepared for packing and shipment after Factory Acceptance Test. The packing of products are usually carried out with nylon cover and wood pallet in workshop. After packing, the products will be sent to an insurance company & will be insured based on approximated evaluation. Finally, the products will be available to send to the site.

10. Guarantee

The system will be guarantee for operation of equipment, engineering, and against defective material. The duration of guarantee is 12 month from the date of successful start-up or 18 month from the date of transportation whichever occurs first.

11. Quality control plan

The quality of the completed system and its timely delivery is of great importance to the project. Therefore, strict quality control standards will be maintained for the entire duration of the project.

The details of the proposed Quality Assurance Program will be submitted to be followed for the work. It will include all raw materials, active and passive components, fabricated assemblies, wiring, inter connections, enclosure, and software. Each piece of equipment all stages of production and commissioning of the system

can be tested and inspected by the client.

When the equipment/work/software ready for testing, the client will be notified by writing. Writing notification, required manuals, approved drawings, test procedures and other pertinent documents will be made available in sufficient time to allow client to prepare for participation in the test.

12. Delivery

The delivery time for scope of supply is 4 months after technical and commercial clarification and signed contract. Point of Delivery is Khormoj Site.

13. Training

Two levels of training are offered to be held at Control Sazan/client's workshop:

- Operation training (5 persons in two days)
- Engineer and maintenance training (3 persons in three days)

14. Project Time Schedule

ID	WBS	Task name
1	1	*COMMENCEMENT DATE OF CONTRACT*
2	2	Phase 0ne(Engineering/ Fabrication/ Fat/ System delivery)
3	2.1	INCEPTION
4	2.1.1	Team Orientation
5	2.1.2	Kick Off Meeting
6	2.2	ENGINEERING DESIGN
7	2.2.1	preparation
8	2.2.2	Hardware
9	2.2.3	Software
10	2.3	PROCURMENT
11	2.3.1	local Purchasing
12	2.3.2	Foreign Purchasing
13	2.4	CONTROL PANEL ASSEMBLY AND TEST
14	2.4.1	FABRICATION
15	2.4.2	FAT(Factory Acceptance Test)
16	2.4.3	PACKING AND TRANSPORTING
17	3	*End of phase one*