Technical Proposal for DCS Based on SIEMENS

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Revision Index

Sheet	Rev.								Sheet	Rev.							
	A	B	C	D	E	F	G	H		A	B	C	D	E	F	G	H
1	X	X	X	X	X				41								
2	X	X	X	X	X				42								
3	X	X	X	X	X				43								
4	X	X	X	X	X				44								
5	X	X	X	X	X				45								
6	X	X	X	X	X				46								
7	X	X	X	X	X				47								
8	X	X	X	X	X				48								
9	X	X	X	X	X				49								
10	X	X	X	X	X				50								
11	X	X	X	X	X				51								
12	X	X	X	X	X				52								
13	X	X	X	X	X				53								
14	X	X	X	X	X				54								
15	X	X	X	X	X				55								
16	X	X	X	X	X				56								
17	X	X	X	X	X				57								
18	X	X	X	X	X				58								
19	X	X	X	X	X				59								
20	X	X	X	X	X				60								
21	X	X	X	X	X				61								
22	X	X	X	X	X				62								
23	X	X	X	X	X				63								
24	X	X	X	X	X				64								
25	X	X	X	X					65								
26	X	X	X	X					66								
27	X	X	X	X					67								
28	X	X	X						68								
29	X	X	X						69								
30	X	X	X						70								
31	X	X	X						71								
32	X	X	X						72								
33	X	X	X						73								
34	X	X	X						74								
35	X	X	X						75								
36	X	X	X						76								
37	X	X	X						77								
38	X	X	X						78								
39									79								
40									80								

TABLE OF CONTENTS

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. DCS 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 CONTROL SYSTEM	BK-GCS-PEDCO-120-IN-LI-0002_D00	D04
SPECIFICATION FOR CONTROL SYSTEM	BK-GNRAL-PEDCO-000-IN-SP-0002_D03	D03

2.2. SYSTEM ARCHITECTURE:

System Architecture it was shown in attachment one.

2.3. Station Control System(DCS)

2.3.1. Siemens PCS7-400H for PLC

The offered system for requested PCS is SIMATIC PCS7-400H, the Siemens plat form using dual CPU architecture. SIMATIC PCS 7's modern design and flexible architecture permit the Cost-effective design and economical operation of a plant throughout all life cycles including Planning, engineering, commissioning, training, operation and maintenance, including future Extensions.

The fault-tolerant automation systems of SIMATIC PCS7 are based on the1 out of 2 principle. In the event of a fault, they switch over to the standby system. These systems use a completely Redundant design to maximize availability. Therefore all important system components are Present twice, such as:

- Central processing unit
- Power supply
- Hardware for linking the two CPUs

Which other components are also made available in pairs in the interest of availability depends on the application-specific system architecture.

The two sub systems of a redundant automation system are electrically isolated from one another.

This increases the system stability with respect to electromagnetic interference.

The SIMATIC PCS7-400H is a controller with two H CPUs of the same type; in the event of a fault, changeover takes place from the master system to the standby station. It is suitable for high-availability processes with hot standby requirements. Two CPUs are available for the SIMATIC S7-400H to suit different performance requirements.

Apart from high volumes, the H-CPUs are also characterized by high performance. The two H CPUs are connected over fiber-optic cables and so called Sync modules that can be directly plugged into the CPU. This means that no slot in the rack is lost and that communication is Extremely fast. The Sync modules can be replaced with the voltage applied.

2.3.2. DCS Major Specifications

The designed DCS for this project has the following major specifications:

- PLC is designed based on PCS7-400H
- The following items are redundant:
  - Controllers,

- Controller power supply, IO rack power supply, and field power supply
- Network interfaces
- Modbus RTU links
- IO rack interfaces (by redundant ProfiBus DP links)
- Part of IO signals based on IO list

• 20% hot spare, 20% spare space, and 30% power spare is considered in PCS system Design.
• Marshalling is done in rear of system cabinets (system cabinets are front and rear accessible).

2.3.3. DCS Modules Specification

•□IO Rack Interfaces: Controllers communicate with IO module via IO interfaces (ET200M) based on redundant Profibus DP links.
•□Digital Input (DI) Module: SIMATIC S7-300, Digital input SM 321, isolated, 16 DI, 24 V DC, 1x 20-pole
•□Digital Output (DO) Module: SIMATIC S7-300, Digital output SM 322, isolated, 16 DO, 24 V DC, 0.5A 1x 20-pole□
•□Analog Input (AI) Modules: SIMATIC DP, HART analog input SM 331, 8 AI, 0/4 - 20 mA HART, for ET200M with IM153-2, 1 x 20-pole, Functions: FW update, HART auxiliary variables, redundancy, local diagnostic buffer with time stamping, Product family. Analog input module with HART.
•□Analog Output (AO) Modules: SIMATIC DP, HART analog output, SM 332, 8 AO, 0/4 - 20 mA HART, for ET200M with IM153-2, IM 153-2, 20-pole Functions: FW update, HART auxiliary variables, redundancy, local diagnostic buffer with time stamping, Product family. Analog output module with HART.
•□RS485 Communication Processor: CP 341 communication processor with RS422/485
•□Controller Power Supply Module: redundant power supply PS407, 10A, wide range, 120/230V UC, 5V DC/10A, redundant
•□Internal and Field Power Supply Module: redundant 24 VDC SITOP Power Supply, Input: 24VDC, Output: 24VDC/10A, or 20A.

For All analog input and output signals we have On-line/Off-line routine diagnostic.

2.3.4. DCS I/O SIGNALS AND MODULES SUMMARY AND SPARE:

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

DCS Siemens-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**		**4**		**16**		**16**	
I.S. Signals	33+0	47+39	0	0	0	23+3	0	0	0	0
Non-I.S. Signals	0	0	0	0	0	0	182+38	0	73+16	2
I.S. Signals + Spare	41+0	57+47	0	0	0	26+4	0	0	0	0
Non-I.S. Signals + Spare	0	0	0	0	0	0	219+46	0	88+20	3
Hardwired IO Count	41	104	0	0	0	30	265	0	108	3
H.W IO Module No.	6	13+13	0	0	0	8+8	16	0	7	1+1
Total Module No.	**32**		**0**		**16**		**16**		**9**	
Serial Link (Redundant)	**2 (Modbus CP cards: 4)**									
ET200M	**8**									
Interposing Relay for all DO signals.	0		0		0		0		108	
Barrier Modules	41	104	0	0	0	30	0	0	0	0
Internal Power Cons.	Power Supply: 2 x SITOP 40A									
Field Power Cons	Power Supply: 2 x SITOP 40A									
System Cabinet	**4**									
Marshalling Cabinet (rear of system cabinet)	**3**									

2.3.5. MTO - MAIN PARTS

The Following items will be provided in this project:

	Main Part List – Siemens			
Item	***Description***	***Order Code.***	***Qty***	***Unit***
1	SIMATIC S7-400H, **CPU 414-5H**, CENTRAL UNIT FOR S7-400H AND S7-400F/FH, 5INTERFACES: 1X MPI/DP, 1X DP, 1X PN AND 2 FOR SYNC MODULES 4 MB MEMORY(2 MB DATA/2 MB CODE	**6ES7414-5HM06-0AB0**	2	pcs
2	SIMATIC S7-400H, **UR2-H RACK**, CENTRALIZED AND DISTRIBUTED WITH 2 X 9 SLOTS	**6ES7400-2JA00-0AA0**	1	pcs
3	SIMATIC S7-400, **POWER SUPPLY PS407**: 10A, WIDERANGE, 120/230V UC, 5V DC/10A	**6ES7407-0KA02-0AA0**	2	pcs
4	SIMATIC S7-400, **BACK-UP BATTERY** 3.6 V/2.3 AH FOR PS 405 A/10A/20A AND PS 407 4A/10A/20A	**6ES7971-0BA00**	4	pcs
5	SIMATIC S7, **RAM MEMORY** CARDFOR S7-400, LONG VERSION, 4 MBYTES	**6ES7952-1AM00-0AA0**	2	pcs
6	SIMATIC S7-400H, **SYNC SUBMODULE** FOR PATCH CABLES UP TO 10M	**6ES7960-1AA06-0XA0**	4	pcs
7	SIMATIC S7-400H, **PATCH CABLE** FO 1M FOR SYNC-MODULE	**6ES7960-1AA04-5AA0**	2	pcs
8	SIMATIC NET **CP 443-1**, 2 X 10/100 MBIT/S (IE SWITCH); RJ 45 PORTS; ISO; TCP; UDP; PROFINET-IO CONTROLLER; S7-COMMUNCATION; OPEN COMMUNICATION (SEND/RE-CEIVE); S7-ROUTING; IP-CONFIGU- RATION VIA DHCP/BLOCK; IPACCESSS CONTROL LIST; TIME- SYNCHRONISATION; EXTENDED WEBDIAGNOSIS; FAST STARTUP; PROFIENERGY SUPPORT	**6GK7443-1EX30-0XE0**	2	pcs
9	SIMATIC DP, **ET200M**-RED.-BUNDLE CONSISTING OF TWO IM153-2HF (-2BA02) AND ONE BUSMODULE IM/IM 6ES7195-7HD10-0XA0	**6ES7153-2AR04-0XA0**	8	pcs
10	SIMATIC DP,**BUS CONNECTOR FOR PROFIBUS** UP TO 12 MBIT/S 90 DEGREE ANGLE OUTGOING CABLE, (WX H X D): 16 X 72,7 X 34 MM IPCD TECHOLOGY FAST CONNECT, **WITHOUT PG SOCKET**	**6ES7972-0BA52-0XA0**	16	pcs
11	SIMATIC DP, **BUS CONNECTOR FOR PROFIBUS** UP TO 12 MBIT/S 90 DEGREE ANGLE OUTGOING CABLE, (W X H X D): 15.8 X 54 X 34 MM TERMINAT. RESIST. WITH ISOLAT. FUNCTION, **WITH PG SOCKET**	**6ES7972-0BB12-0XA0**	2	pcs
12	SIMATIC DP, **RAIL** FOR ET 200M 530 MM LONG F. MAX. 5 BUS MOD. FUNCTION: INSERT/REMOVE	**6ES7195-1GG30-0XA0**	8	pcs

Item	*Description*	*Order Code.*	*Qty.*	*Unit*
13	SIMATIC DP, **BUS UNIT** FOR ET200M F. THE INTEGR.OF TWO 40 MM WIDE I/O SUBMODULES FOR INSERT/REMOVE	**6ES7195-7HB00-0XA0**	40	pcs
14	SIMATIC S7-300, DIGITAL INPUT SM 321, OPTICALLY ISOLATED, 16DI, 24 V DC, 1 X 20 PIN. Supply voltage. Load voltage L+. Rated value (DC	**6ES7321-1BH02-0AA0**	16	pcs
15	SIMATIC S7-300, DIGITAL OUTPUT SM 322, OPTICALLY ISOLATED, 16 DO, 24V DC, 0.5A, 1 X 20 PIN SUM OF OUTPUT CURRENTS 4A/GROUP. (8A/MODULE).	**6ES7322-1BH01-0AA0**	9	pcs
16	SIMATIC DP, **ANALOG INPUT** SM 331, 8 AI, 0/4 - 20MA HART, FOR ET200M WITH IM153-2, 20 PIN FEATURES: FW UPDATE, HART SECONDARY VARIABLES, REDUNDANCY, LOCAL DIAGNOSTIC BUFFER WITH TIMESTAMP, NECESSARY: S7 V7.0, SP	**6ES7331-7TF01-0AB0**	32	pcs
17	SIMATIC DP, **ANALOG OUTPUT** SM 332, 4 AO, 0/4 - 20MA HART, FOR ET200M WITH IM153-2, 20 PIN FEATURES: FW UPDATE, HART SECONDARY VARIABLES, REDUNDANCY, LOCAL DIAGNOSTIC BUFFER WITH TIMESTAMP, NECESSARY: S7 V7.0, SP1	**6ES7332-8TF01-0AB0**	16	pcs
18	SIMATIC S7-300, **FRONT CONNECTOR** 392 WITH SCREW CONTACTS, **40-PIN**	**6ES7392-1AM00-0AA0**	0	pcs
19	SIMATIC S7-300, **FRONT CONNECTOR** 392 WITH SCREW CONTACTS, **20-PIN**	**6ES7392-1AJ00-0AA0**	73	pcs
20	**SITOP MODULAR**/3AC/24VDC/**40A** **SITOP modular** 40 A Stabilized power supply input: 3 AC 400-500 V output: 24 V DC/40 A	**6EP1437-3BA00**	4	pcs
21	**SITOP MODULAR REDUNDANCY MODULE** INPUT/OUTPUT: 24 V DC/40 A FIT FOR DECOUPLING OF 2 SITOP POWER SUPPLY MODULES WITH MAX. 20 A OUTPUT CURRENT EACH	**6EP1961-3BA21**	2	pcs
22	SIMATIC S7-300, **CP341 COMMUNICATION PROCESSOR** WITH RS422/485 INTERFACEINCL and License and Hardware dongle. CONFIG. PACKAGE ON CD	**6ES7341-1CH02-0AE0**	4	pcs
23	SIMATIC S7, MODBUS Master V3.1 single license for 1 installation R-SW, SW and DOCU on CD, HW dongle, Class A, 3 languages (de, de, fr, en fr), executable in STEP 7 V4.02 or higher, reference hardware: CP 341 and CP 441-2	**6ES7870-1AA01-0YA0**	4	pcs
24	SIMATIC NET, PB FC STANDARD BUS CABLE, 2-WIRE, SHIELDED SPECIAL DESIGN FOR RAPID INSTALLATION, MAX. CONSIGNMENT: 1000 M, MIN. ORDERING QUANTITY: 20 M SOLD BY THE METE	**6XV1830-0EH10**	40	m

2.3.6. MTO - PANEL AND INTERFACING PARTS

The following table summarizes the PLC 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**	4 panels	pcs
2	Phoenix **Interposing Relay** for Digital Output signals	104	pcs
3	P&F 1-Ch. **SMART** Isolator **Barrier** for Single IS **AI** Signals	41	pcs
4	P&F **SMART** Isolator **Barrier/Duplicator** for Redundant IS **AI** Signals	104	pcs
5	P&F **SMART** Isolator **Barrier/Duplicator** for Redundant IS **AO** Signals	30	pcs

2.3.7. 2-Year Spare Part

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

	2-Year Spare Part– Siemens			
Item	***Description***	***Order Code.***	***Qty***	***Unit***
3	SIMATIC S7-400, **POWER SUPPLY PS407**: 10A, WIDERANGE, 120/230V UC, 5V DC/10A	**6ES7407-0KA02-0AA0**	1	pcs
4	SIMATIC S7-400, **BACK-UP BATTERY** 3.6 V/2.3 AH FOR PS 405 A/10A/20A AND PS 407 4A/10A/20A	**6ES7971-0BA00**	1	pcs
7	SIMATIC S7-400H, **PATCH CABLE** FO 1M FOR SYNC-MODULE	**6ES7960-1AA04-5AA0**	1	pcs
9	SIMATIC DP, **ET200M**-RED.-BUNDLE CONSISTING OF TWO IM153-2HF (-2BA02) AND ONE BUSMODULE IM/IM 6ES7195-7HD10-0XA0	**6ES7153-2AR04-0XA0**	1	pcs
10	SIMATIC DP,**BUS CONNECTOR FOR PROFIBUS** UP TO 12 MBIT/S 90 DEGREE ANGLE OUTGOING CABLE, (WX H X D): 16 X 72,7 X 34 MM IPCD TECHOLOGY FAST CONNECT, **WITHOUT PG SOCKET**	**6ES7972-0BA52-0XA0**	1	pcs
11	SIMATIC DP, **BUS CONNECTOR FOR PROFIBUS** UP TO 12 MBIT/S 90 DEGREE ANGLE OUTGOING CABLE, (W X H X D): 15.8 X 54 X 34 MM TERMINAT. RESIST. WITH ISOLAT. FUNCTION, **WITH PG SOCKET**	**6ES7972-0BB12-0XA0**	1	pcs
13	SIMATIC DP, **BUS UNIT** FOR ET200M F. THE INTEGR.OF TWO 40 MM WIDE I/O SUBMODULES FOR INSERT/REMOVE	**6ES7195-7HB00-0XA0**	2	pcs
14	SIMATIC S7-300, Digital input SM 321, isolated, 16 DI, 24 V DC, 1x 20-pole	**6ES7321-1BH02-0AA0**	2	pcs
15	SIMATIC S7-300, Digital output SM 322, isolated, 16 DO, 24 V DC, 0.5A, 1x 20-pole, Total current 4 A/group (8 A/module)	**6ES7322-1BH01-0AA0**	1	pcs
16	SIMATIC DP, **ANALOG INPUT** SM 331, 8 AI, 0/4 - 20MA HART, FOR ET200M WITH IM153-2, 20 PIN FEATURES: FW UPDATE, HART SECONDARY VARIABLES, REDUNDANCY, LOCAL DIAGNOSTIC BUFFER WITH TIMESTAMP, NECESSARY: S7 V7.0, SP	**6ES7331-7TF01-0AB0**	2	pcs

Item	SM 322, **DIGITAL OUTPUT** module, optically isolated, 32 DO, 24V DC, 0.5A	*Order Code.*	*Qty.*	*Unit*
17	SIMATIC DP, **ANALOG OUTPUT** SM 332, 4 AO, 0/4 - 20MA HART, FOR ET200M WITH IM153-2, 20 PIN FEATURES: FW UPDATE, HART SECONDARY VARIABLES, REDUNDANCY, LOCAL DIAGNOSTIC BUFFER WITH TIMESTAMP, NECESSARY: S7 V7.0, SP1	**6ES7332-8TF01-0AB0**	1	pcs
18	SIMATIC S7-300, **FRONT CONNECTOR** 392 WITH SCREW CONTACTS, **40-PIN**	**6ES7392-1AM00-0AA0**	0	pcs
19	SIMATIC S7-300, **FRONT CONNECTOR** 392 WITH SCREW CONTACTS, **20-PIN**	**6ES7392-1AJ00-0AA0**	5	pcs
20	**SITOP MODULAR**/3AC/24VDC/**40A** **SITOP modular** 40 A Stabilized power supply input: 3 AC 400-500 V output: 24 V DC/40 A	**6EP1437-3BA00**	1	pcs
21	SITOP **PSE202U REDUNDANCY** MODULE INPUT/OUTPUT: 24 V/40 A DC CAN BE USED FOR DECOUPLING OF 2 SITOP POWER SUPPLIES WITH 20 A MAX. OUTPUT CURRENT EACH	**6EP1961-3BA21**	1	pcs
22	SIMATIC S7-300, **CP341 COMMUNICATION PROCESSOR** WITH RS422/485 INTERFACEINCL and License and Hardware dongle. CONFIG. PACKAGE ON CD	**6ES7341-1AH02-0AE0**	1	pcs
10	Phoenix **Interposing Relay** for Digital Output signals	-	5	pcs
22	P&F 1-Ch. **SMART** Isolator **Barrier** for Single IS **AI** Signals	-	4	pcs
22	P&F **SMART** Isolator **Barrier/Duplicator** for Redundant IS **AI** Signals	-	5	pcs
24	P&F **SMART** Isolator **Barrier/Duplicator** for Redundant IS **AO** Signals	-	3	pcs

2.3.8. PCS Commissioning Spare Part

The following table summarizes the **PCS Commissioning** spare part list.

	PLC Commissioning Spare Part– Siemens			
Item	***Description***	***Order Code.***	***Qty***	***Unit***
1	SIMATIC S7-400, **BACK-UP BATTERY** 3.6 V/2.3 AH FOR PS 405 A/10A/20A AND PS 407 4A/10A/20A	**6ES7971-0BA00**	1	pcs
4	SIMATIC S7-400H, **PATCH CABLE** FO 1M FOR SYNC-MODULE	**6ES7960-1AA04-5AA0**	1	pcs
5	SIMATIC DP,**BUS CONNECTOR FOR PROFIBUS** UP TO 12 MBIT/S 90 DEGREE ANGLE OUTGOING CABLE, (WX H X D): 16 X 72,7 X 34 MM IPCD TECHOLOGY FAST CONNECT, **WITHOUT PG SOCKET**	**6ES7972-0BA52-0XA0**	1	pcs
6	SIMATIC DP, **BUS CONNECTOR FOR PROFIBUS** UP TO 12 MBIT/S 90 DEGREE ANGLE OUTGOING CABLE, (W X H X D): 15.8 X 54 X 34 MM TERMINAT. RESIST. WITH ISOLAT. FUNCTION, **WITH PG SOCKET**	**6ES7972-0BB12-0XA0**	1	pcs
7	SIMATIC DP, **BUS UNIT** FOR ET200M F. THE INTEGR.OF TWO 40 MM WIDE I/O SUBMODULES FOR INSERT/REMOVE	**6ES7195-7HB00-0XA0**	1	pcs
8	SIMATIC S7-300, **FRONT CONNECTOR** 392 WITH SCREW CONTACTS, **40-PIN**	**6ES7392-1AM00-0AA0**	2	pcs
9	Phoenix **Interposing Relay** for Digital Output signals		2	pcs

2.3.9. PCS Special tools

We have not considered any special tools for this project.

2.3.10. Workstation MTO

Workstation part list for PCS is as follows:

		Workstation MTO			
		Workstation license and Software			
Item	***Description***		***Order Code***	***Qty.***	***Unit.***
1	**SIMATIC PCS7 AS/OS LICENSE**	SIMATIC PCS 7, software, Software Media Package V9.0 SP1 Data medium without license usage only in connection with valid license Trial license for 14 days without liability and warranty with restricted functionality (see Product Information) R-SW, SW on DVD without documentation 5 languages (de, en, fr, it, es), executable on WIN 7 Ultimate WIN 10 Enterprise LTSB Server 2012 R2 / Server 2016 For further information see PCS 7 V9.0 SP1 Readme Reference HW: PCS 7 IPC Bundle	**6ES7658-4XX58-0YT8**	2	pcs
2	**SIMATIC PCS7 AS/OS LICENSE**	SIMATIC PCS 7, SOFTWARE, AS/OS ENGINEERING V9.0 FLOATING LICENSE FOR 1 USER E-SW, WITHOUT SW AND DOCU. LICENSE KEY ON USB STICK, CLASS A, 5	**6ES7658-5AX58-0YA5**	2	pcs
3	**SIMATIC PCS7 OS LICENSE**	SIMATIC PCS 7, software, OS Software Single Station V9.0 (PO 100) Single license for 1 installation R-SW, without SW, without documentation License Key on USB stick, Class A, 5 languages (de, en, fr, it, es), executable on WIN 7 Ultimate WIN 10 Enterprise LTSB for more information, see PCS 7 V9.0 Readme Reference HW: PCS 7 IPC Bundle	**6ES7658-2AA58-0YA0**	2	pcs
		Workstation Hardware			
Item	***Description***		***Order Code***	***Qty.***	***Unit.***
1	**CP**	SIMATIC NET, IE, **CP 1613 A2 PCI CARD** (32BIT; 33MHZ/66MHZ; 3.3V/5V UNIVERSAL KEY) FOR CONNECTION TO IND. ETHERNET (10/100MBIT/S) WITH ITP AND RJ 45 PORT VIA S7-1613 AND S7-REDCONNECT. INCL. DRIVER F. MS WINDOWS (32BIT),2000PRO/SERVER, XP PRO, 2003 SERVER.	**6GK1161-3AA01**	4	pcs
2	**DCS Operator Station**	**IPC -ADVANTECH** or, with redundant storage device - Chassis: 4U Chassis ACP-4000MB-00XE - Power Supply: PS8-300ATX-ZBE Industrial Power Supply - Motherboard: AIMB-782QG2-00A1E ATX Industrial MB with Dual Display, Dual GbE LAN - CPU: Core i5 2400 - Memory: 2* RAM 4GB DDR3/ FSB 1333/ 240 Pin - 2*Hard Disk Drive: 1 TB SATA II 3.5" - Raid Controller SATA (Supported 0, 1, 5) - DVD R/W – SATA - **Two 32" LED Monitor** and Mouse and keyboard	**ACP-4000MB**	2	pcs

Item	*Description*		*Order Code*	*Qty.*	*Unit.*
4	**DCS and ESD EWS ENGINEERING WORK STATION**	**IPC -ADVANTECH**, with redundant storage device - Chassis: 4U Chassis ACP-4000MB-00XE - Power Supply: PS8-300ATX-ZBE Industrial Power Supply - Motherboard: AIMB-782QG2-00A1E ATX Industrial MB with Dual Display, Dual GbE LAN - CPU: Core i5 2400 - Memory: 2* RAM 4GB DDR3/ FSB 1333/ 240 Pin - 2*Hard Disk Drive: 1 TB SATA II 3.5" - Raid Controller SATA (Supported 0, 1, 5) - DVD R/W – SATA - 32" Samsung **LED Monitor** and Mouse and keyboard	**ACP-4000MB**	2	pcs
5	**PRN_1**	**A4 COLOR LASER PRINTER**	**Color Laser hp 150a**	1	pcs
6	**PRN_2**	**LASER LAN PRINTER FOR OPERATOR WORKSTATIONS INCLUDING CABLES AND ACCESSORIES**	**hp M12w**	2	pcs
7	**Desk**	**Office Desk** for Workstations and Printers	-	7	pcs
8	**Armchair**	Nilper **Armchair** for workstations	-	7	pcs
9	**Network Switch**	Moxa **Network Switch**	-	2	pcs
10	**Laptop**	**Engineering Laptop** Asus N580GD-I7	-	1	pcs
11	**LCD SCREEN DISPLY**	**64" LCD SCREEN DISPLY**	-	1	pcs

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) DCS
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*