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TECHNICAL SPECIFICATION

HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

UNINTERRUPTIBLE POWER SUPPLY SYSTEM

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Table of Contents

1 INTRODUCTION

2 SCOPE AND OBJECTIVES

This Specification covers the minimum requirements for the design, supply and installation for an Uninterruptible Power Supply (UPS) System for the buildings of the stations and pipelines of the natural gas transmission system.

3 REFERENCES

3.1 Reference Documents

DSF-SPC-ELE-011:	D.C. Power Supply System and Batteries

3.2 Reference Codes and Standards

2014/34/EU	Equipment Explosive Atmospheres Directive
2014/35/EU	Low Voltage Directive
2014/30/EU	Electromagnetic Compatibility Directive
MINISTERIAL DECISION 50/12081/642/2006 F A – GG B / 1222/5.9.2006	Security Home Electrical Installations (E.I.E.). Introduction of a Differential Current Installation of Construction and Fundamental Grounding
ELOT EN 1594 E3	Gas Supply Systems. Pipelines for Maximum Operating Pressure over 16 bar. Functional Requirements
ELOT EN 14161+A1	Petroleum and Natural Gas Industries. Pipeline Transportation Systems
BS EN 62561-1:2017	Lightning protection system components (LPSC). Requirements for connection components
BS EN 62561-2:2012	Lightning Protection System Components (LPSC). Requirements for conductors and earth electrodes

BS EN 62561-3:2017	Lightning protection system components (LPSC). Requirements for isolating spark gaps (ISG)
BS EN 62561-4:2017	Lightning protection system components (LPSC). Requirements for conductor fasteners
BS EN 62561-5:2017	Lightning protection system components (LPSC). Requirements for earth electrode inspection housings and earth electrode seals
BS EN IEC 62561-6:2018	Lightning protection system components (LPSC). Requirements for lightning strike counters (LSC)
BS EN IEC 62561-7:2018	Lightning protection system components (LPSC). Requirements for earthing enhancing compounds
ELOT EN IEC 60079-0 E5	Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements
ELOT EN 60079-7 E3	Electrical Apparatus for Explosive Gas Atmospheres - Part 7: Increased safety e
ELOT EN 60079-10-1 E2	Electrical Apparatus for Explosive Gas Atmospheres – Part 10: Classification of Hazardous Areas
ELOT EN 60099-4 E3	Surge Arresters - Metal Oxide Surge Arresters without Gaps for A.C. Systems
ELOT EN IEC 60099-5 E3	Surge Arresters - Selection & Application Recommendations
ELOT EN 62305-1 E2	Protection against Lightning, Part 1: General Principles
ELOT EN 62305-2 E2	Protection against Lightning, Part 2: Risk Management
ELOT EN 62305-3 E3	Protection against Lightning, Physical Damage to Structures and Life Hazard
ELOT EN 62305-4 E4	Protection against Lightning, Part 4: Electrical and Electronic Systems within Structures
ELOT EN ISO 9001 E4	Quality Management Systems
ELOT EN ISO/IEC 17025 E3	General Requirements for the Competence of Testing and Calibration Laboratories
ELOT HD 384	Requirements for Electrical Installations

ELOT HD 60364	Electrical Installations of Buildings
EN 61000	Electromagnetic compatibility (EMC)
EN 61643-11	Low Voltage Surge Protective Devices – Part 11: SPDs Connected to Low Voltage Power Distribution Systems – Performance Requirements and Testing Methods
EN 61643-21	Low Voltage Surge Protective Devices – Part 22: SPDs Connected to Telecommunication and Signaling Networks – Performance Requirements and Testing Methods
IEC 60664	Insulation Coordination for Equipment within Low-Voltage Systems
IEC 61643-12	Low Voltage Surge Protective Devices – Part 12: SPDs Connected to Low Voltage Power Distribution Systems – Selection and Application Principles
IEC 61643-22	Low Voltage Surge Protective Devices – Part 22: SPDs Connected to Telecommunication and Signaling Networks – Selection and Application Principles
IEC 62548	Design Requirements for Photovoltaic (PV) Arrays
IEC 62561-1	Lightning Protection Components (LPC), Part 1: Requirements for Connection Components
IEC 62561-2	Lightning Protection Components (LPC), Part 2: Requirements for Conductors and Earth Electrodes
IEC 62561-3	Lightning Protection Components (LPC), Part 3: Requirements for Isolating Spark Gaps
IEC 62561-4	Lightning Protection Components (LPC), Part 4: Requirements for Conductor Fasteners
IEC 62561-5	Lightning Protection Components (LPC), Part 5: Requirements for Earth Electrode Inspection Housings and Earth Electrode Seals
IEC 62561-6	Lightning Protection Components (LPC), Part 6: Requirements for Lightning Strike Counters

IEC 62561-7	Lightning Protection Components (LPC), Part 7: Requirements for Earthing Enhancing Compounds
ELOT EN 60071-1	Insulation Coordination – Definitions, Principles & Rules
ELOT EN 60071-2	Insulation Coordination – Application Guide
EN 60664-1	Insulation Coordination for equipment within Low Voltage Systems
IEC 61643-11	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power distribution systems - Requirements and tests
EN 62040	Uninterruptible Power Systems (UPS)
EN 62040-1	Uninterruptible Power Systems (UPS) – Part 1: General and Safety Requirements for UPS
EN 62040-2	Uninterruptible Power Systems (UPS) – Part 2: Electromagnetic Compatibility (EMC) Requirements
EN 62040-3	Uninterruptible Power Systems (UPS) – Part 3: Method of Specifying the Performance and Test Requirements
IEC 61439	Low-voltage switchgear and control gear assemblies

4 ACRONYMS

AC	Alternating Current
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ATEX	ATmosphères EXplosibles (Explosive Atmospheres)
ATS	Automatic Transfer System
BMS	Building Management System
BVS	Block Valve Station
BCC	Back-up Control Centre at Nea Messimvria
CCTV	Closed Circuit Television System
CPR	Construction Products Regulation
CP	Cathodic Protection

CPU	Central Processor Unit
CS	Compressor Station
DB	Distribution Board
DC	Direct current
DCS	Distributed Control System
DEG	Detailed Engineering
DIN	Deutsches Institut für Normung (German Institute of Standardization)
DVA	Digital Voice Announcer
DVD	Digital Video Disc
EDG	Emergency Diesel Generator
ELOT	Hellenic Organization for Standardization
ELV	Extra Low Voltage (nominal voltage not exceeding 50 V AC or 120 V DC (ripple-free) between conductors or to earth, as defined by the Standard EN 61558)
EN	European Norms
EPC	Engineering, Procurement and Construction
EU	European Union
ESD	Emergency Shut Down
F&G	Fire and Gas
FACP	Fire Alarm Central Control Panel
FARP	Fire Alarm Repeater Control Panel
FAT	Factory Acceptance Test
FEG	Field Engineering
FC	Floe Computer
FOC	Fibre Optic Cable
GCC	Gas Control Centre at Patima
HEDNO	Hellenic Electricity Distribution Network Operator
HDPE	High Density Polyethylene
HMI	Human Machine Interface
HVAC	Heating Ventilation Air Conditioning

I/O	Input / Output
IEC	International Electrotechnical Commission
ISO	International Organization for Standarization
ITU	International Telecommunication Union
LAN	Local Area Network
LCS	Local Control System
LED	Light Emitting Diode
LFEP	Local Fire Detection & Fire Extinguishing Panel
LV	Low Voltage
LSP	Load Share Panel
MSC/MCS/SMC	Main Station Controller
MV	Medium Voltage
MPS	Master Project Schedule
MPR	Monthly Progress Report
NFPA	National Fire Protection Association
NNGTS	National Natural Gas Transmission System
NTSC	National Television System Committee
O&M	Operation and Maintenance
PID	Piping and Instrumentation Diagram
PA/GA	Public Address / General Alarm
PCS	Process Control System
PED	Pressure Equipment Directive
PEP	Project Execution Plan
PFD	Process Flow Diagram
PLC	Programmable Logic Controller
PMS	Power Management System
POC	Project Organization Chart
PAL	Phase Alternate Line
PPC	Public Power Corporation
PTZ	Pan, Tilt, Zoom
PVC	Poly Vinyl Chloride

QA	Quality Assurance
RCC	Remote Communications and Controls
RFI	Radio Frequency Interference
RTD	Resistance Temperature Detectors
RTU	Remote terminal Unit
S/S	Scraper Station
SAT	Site Acceptance Test
SCADA	Supervisory Control and Data Acquisition (including Telemetry)
SCS	Station Control System
SFP	Small Form-factor Pluggable
SPD	Surge Protection Device
SPL	Sound Pressure Level
UDP	User Datagram Protocol
UPS	Uninterruptible Power Supply
UV	Ultraviolet
VGA	Video Graphics Array
VMS	Video Management Software

5 UPS SYSTEM DESIGN

5.1 UPS System Selection and Sizing

During detail engineering design, UPS for each station shall be sized in order to have the capacity to feed the following loads (unless otherwise specified):

- Socket outlets.
- ESD System.
- All instrumentation.
- Communication Nodes.
- Fire Detection System.
- Gas Detection System.
- Security Alarm System.

- SCADA RTU.
- 24 VDC loads.
- Station Control Panel (SCP) (two separate feeders (different phases) from 400/230V AC UPS).
- SVC System.
- PLC System.
- Flow Computer (FC) System.
- HVAC System.
- Other loads.

The autonomy time for essential loads shall be eight (8) hours. Calculations for Battery Back-Up Sizing for the station shall be provided, at the detailed design stage, in order to fulfil the autonomy requirements. The adequacy of the Batteries and UPS Room concerning the dimensions and the space requirements shall be also checked and verified at the detailed design stage.

Calculations for the AC UPS System Sizing shall be provided, at the detailed design stage, so as that the UPS System should have the capacity to supply all essential loads.
Estimation for UPS system is shown in respective Technical Reports for Power Supply requirements and relevant Single Line Diagrams.

The UPS shall feed a main UPS low voltage switchboard, which shall supply critical electrical users and UPS sub-distribution switchboards, if required, for the Station.
All the information from each UPS database (status, measurements, alarms, as well as event log) shall be transmitted to local PLC/RTU via RS232, RS485 serial port using MODBUS TCP/IP protocol.

UPS system and batteries shall comply with this Job Specification.
Concerning essential loads related to DC power supply system with battery back-up, if any, Job Specifications for D.C. Power Supply System and Batteries shall be taken into consideration (DSF-SPC-ELE-011).

5.2 Documentation

During detail design, the following drawings and documents shall be developed and submitted to the Client for review, but not limited to:

- Calculations for UPS Sizing.
- Calculations for Battery Back-Up Sizing.
- One Line diagrams for UPS.
- UPS Layout drawings.
- Material Requisition for UPS and Batteries.

5.2.1 Calculations for UPS Sizing

Calculations for UPS sizing shall be provided, so as that UPS should have the capacity to supply all existing and new essential loads that have been mentioned.

5.2.2 Calculations for Battery Back-Up Sizing

Calculations for Battery Back-Up Sizing for station shall be provided, in order to fulfil the autonomy requirements that have been mentioned.

5.2.3 One Line Diagrams for UPS

The one Line Diagram for UPS shall include the following information, as a minimum:

- Symmetrical short circuit current on which design is based.
- Types, quantities and rated current of fuses and switches.
- Battery Charger voltage and power output.
- Batteries voltage and capacity.
- Inverter voltage, power output and power factor.
- Types and cross-sections of cables feeding UPS system.

5.2.4 UPS Layout Drawings

Regarding UPS layout drawings, the following information shall be provided, as a minimum:

- Location of UPS and Batteries.
- Information about types and cross-sections of feeding cables and their routing.

5.2.5 Material Requisition for UPS and Batteries

Material Requisition for UPS and Batteries shall provide the whole information about technical characteristics, special requirements, quantity of UPS and Batteries Systems etc., is needed for the supply of UPS and Batteries.

6 SUPPLY OF UPS SYSTEM

6.1 General

This paragraph describes a continuous duty three phases, solid state, transistorized Uninterruptible Power Supply (UPS) System, as shown in figure 1. The UPS shall utilize a true "online" topology with a microprocessor based, pulse width modulation (PWM) inverter or technology IGBT rectifier.

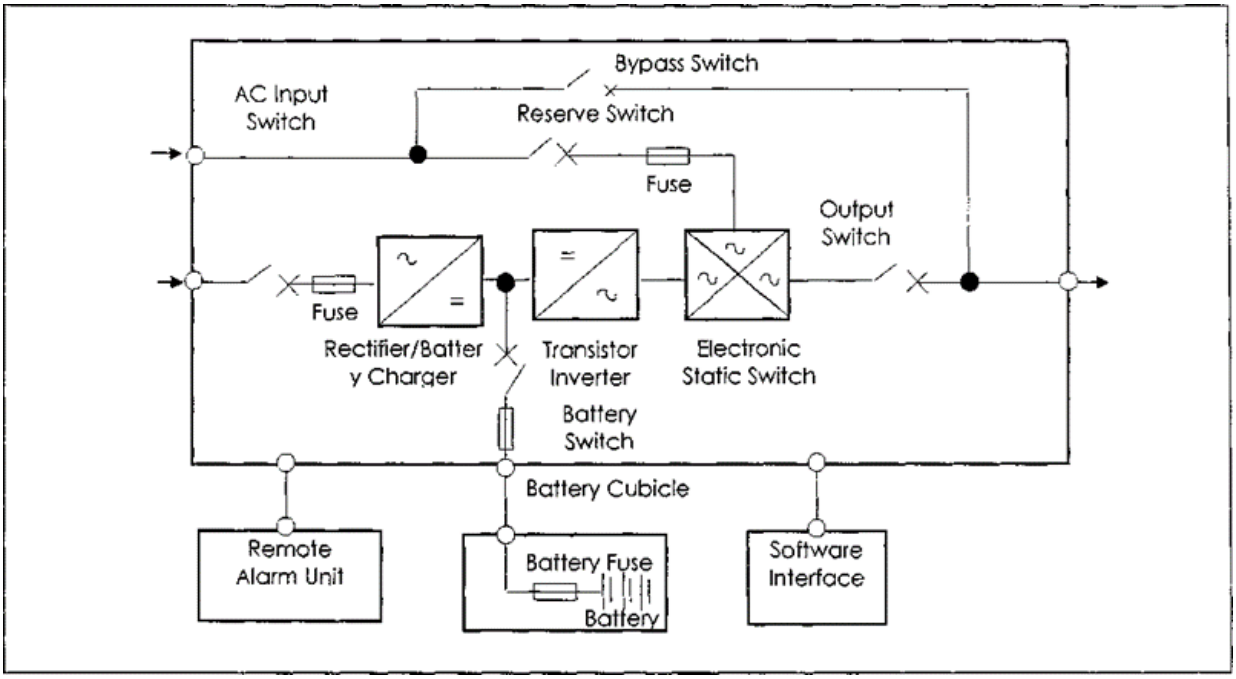

Figure 1:"Single Line Diagram for UPS"

Supply of each UPS System shall include, but not limited to, procurement planning, purchasing, expediting, inspection and testing, spare parts procurement, packaging, shipment, transportation and delivery at site.

Each UPS System shall be selected to comply with the latest editions of relevant EU Directives, Greek Legislation, European Standards and International Codes or Standards, as well as relevant project job specifications or requirements specified in other project documents or drawings.

Therefore, all latest approval revisions of relevant project documents and drawings shall be forwarded to Supplier(s).

Apart from UPS System, Supplier(s) shall submit to the Client their documentation package consisting of necessary drawings and data to cover project requirements.

6.2 Shop Inspection and Testing

Electrical Examination and/or testing shall be as per applicable Codes and Specifications, including EN 50091-3 and EN 62040-3.

During fabrication and testing, Manufacturer's Quality Department must perform all the required inspection activities.

After final inspection at Manufacturer's Workshops, the Manufacturer shall release copies of test certificates as imposed by the applicable codes or specifications to the Client and/or the Contractor.

7 UPS SYSTEM INSTALLATION

7.1 Responsibility

Contractor shall provide labour, supervision, appropriate tools, equipment, consumables, services and all materials and accessories necessary for each UPS installation and connections. It is Contractor’s responsibility to execute each UPS installation and

connections according to approved detail design drawings and documents, as well as all relevant specifications and applicable codes and standards.

Contractor's engineers are responsible for:

- Receipt and visual check for damages or omissions of each UPS.
- Visual inspection of the execution of each UPS installation and connections with reference to the applicable Project's Specifications.
- Performing all works according to the safety requirements set by the Supplier and the Local Authorities.
- Keeping the corresponding quality records for erection works and examination procedures.
- Ensuring the quality of any remedial works that are essential to take place.

7.2 General Notes for UPS Installation and Connections

Cables and cable routing material installation, as well as cable installation accessories and connections related to UPS shall be in accordance with job specification for Cables and Cable Routing.

Earthing and lightning protection of each UPS system shall be in accordance with job specification for Earthing and Lightning Protection System and applicable codes and standards.

Each UPS shall be installed in full compliance with the relevant drawings.

7.3 General Characteristics

The online UPS system shall provide an interruption - free, high - quality AC power supply to the critical loads.

Each UPS system shall be of solid-state modular construction. It shall be connected to three-phase mains and shall provide three-phase output voltage.

Each UPS system shall consist of the following items:

- Three-phase rectifier / batteries charger.
- DC / AC inverter.

- Voltage stabilizer units.
- Lead acid batteries, sealed type, maintenance free dimensioned to provide 8-hour autonomy time to the critical loads.
- Automatic circuit breakers and control switches.
- Static Bypass Switch (SBS).

All the information from each UPS database (status, measurements, alarms, as well as event log) shall be transmitted to RTU via RS232, RS485 serial port using MODBUS TCP/IP protocol.

There shall be the following signals to RTU, but not limited to:

- UPS in Batteries Backup Mode.
- UPS Batteries Level Low.
- UPS System Common Fault.

7.4 Operation

All critical loads of the station shall be permanently connected to the respective UPS system and they shall be supplied with AC power from the inverter output.

This permanent connection means that:

- With the mains supply healthy, the power is supplied continuously to the critical loads, through the rectifier, and the inverter, while the charger performs the float charging of the batteries.
- On failure of the mains supply, the power is supplied to the critical loads, through the batteries and the inverter, without a break and without any switching operation.
- On restoration of the mains supply, the power is supplied to the critical loads, through the rectifier and the inverter, without a break and without any switching operation, while the charger performs the recharging of the batteries.
- On failure or overload of the UPS system, the power is supplied to the critical loads, through the static bypass line, that is directly from the mains supply. This transfer is executed automatically by the Static Bypass Switch, as described below.

- For services and maintenance purposes, the power is supplied to the critical loads directly from the mains supply through a maintenance bypass line.
- A voltage stabilizer shall be provided for the static bypass line and the maintenance bypass line.

It is necessary for each UPS system to provide an output voltage, which remains within the permitted static and dynamic voltage tolerance. UPS system shall be synchronized to the mains supply, as long as the mains frequency remains within the range of 50 Hz ± 1%.

7.5 Rectifier / Charger

Each rectifier / charger shall be solid state and shall convert the AC power to DC.
The three-phase, six – pulse or technology IGBT rectifier, fully controlled rectifier / charger shall perform the following three operation modes:

- The DC power supply to the inverter, charging simultaneously the batteries with Float Charging.
- The DC power supply to the inverter, charging simultaneously the batteries with Boost Charging. The duration of the boost charging can be programmed manually by the Control Panel of the UPS.
- Manual charging of the batteries, required as initial charging etc.

The UPS control system is arranged to allow charging with absolute current limitation and also limitation to a constant charging current. The battery can then be charged at Boost or Float Charging. In other case, once the battery is charged it is kept at full capacity by Float Charging.

7.6 Inverter

The inverter generates a three-phase system with controlled voltage and frequency. It is supplied with DC power by the rectifier or the battery.
Each inverter shall be designed on the pulse - width control principle.
By virtue of pulse - width control the inverter shall be able to provide a constant output voltage despite variable battery voltage and fluctuating load.

A filter, consisting of LC series - resonant circuits, shall modify the output voltage waveform to bring it within the required distortion factor, and to some extent compensates for the effects of non-linear loads.

In case of failure or overloading of each inverter, it shall be shut down almost instantaneously by the electronic control system and the critical loads shall be supplied directly from the mains, through the static bypass line.

7.7 Static Bypass

The static bypass switch is an electronically controlled switching circuit, which enables the critical loads to be connected either to the inverter output or to the mains power supply, through the static bypass line.

Under normal conditions, the critical loads are supplied by the inverter, but on UPS overload or failure it is automatically transferred to the static by pass line.

This transfer shall be taken place in one of the following cases:

- The inverter is overloaded.
- Short circuits occur in the load circuit.
- Excessive inrush currents are drawn by the transformers of the rectifier / charger or the inverter.
- Switch on peak currents occur.
- The inverter fails.
- Over temperature.

Each UPS enables the automatic retransfer of the critical loads supply to the inverter, after fault correction.

For servicing and maintenance purposes, the critical loads can be supplied directly, from the mains manually, through the maintenance bypass line. A voltage stabilizer shall be connected at the bypass line of UPS, in order to provide stabilized voltage to the loads, even if the main line of UPS has been disconnected.

7.8 Batteries

The batteries shall be lead acid, sealed type, with the same capacity, sized to provide a time of 8-hour autonomy to the critical loads.

The batteries are connected to each UPS via a battery circuit breaker (MCCB), which provides:

- Thermal overload protection.
- Short circuit protection.
- Emergency power off.

7.9 Voltage Stabilizer

Voltage stabilizer shall be of the constant voltage type (saturated - core and capacitor) or step voltage regulator (TCUL), or induction voltage regulator type.

They shall automatically regulate the output voltage without interrupting the load. Step regulators shall be continuous type without breaks between taps.

Performance characteristics shall be as follows for 0-100% load and expected power factor range, for input voltage variations of ±10% and for expected ambient temperature extremes.

- Voltage: 230V or 400V ±2% with input frequency stability within ±1 Hz.
- Wave shape: with less than 5% of total harmonic distortion.
- Transient: maximum voltage variation shall not exceed ±10% after sudden application or removal of full load. Recovery time to steady state shall be within 1 second.

8 OPERATOR CONTROL PANEL

Each operator control panel shall provide mimic indications, using LEDs showing the current UPS operational status. It shall also provide programming facilities, by accessible switches and LCD display. An emergency stop pushbutton shall be fitted, with a safety cover to prevent inadvertent operation.

The UPS shall incorporate the necessary controls, instruments and indicators to allow the operator to monitor the system status and performance, as well as take any appropriate action.
The UPS shall have a mimic panel with Light Emitting Diodes (LED's) to indicate the condition of the subassemblies.
A 40 character (2-line x 20 character) illuminated Liquid Crystal Display (LCD) shall be provided to enable the operating parameters, all the measurements and the help messages (HELP IN LINE) of the UPS to be monitored. The LCD messages shall be accessed by push buttons. The text shall be available at least in English, and Greek, delectable by the user.
An interface kit shall be available to communicate diagnostic information to a non-dedicated PC up to 30 meters away from the UPS. This shall include a software package with a menu screen, which shows the exact state of the UPS. Supply paths shall be boldly highlighted in red. The state of the main UPS modules shall be indicated in green for normal operating conditions, red for failure and blue for disconnected.
The menu screen shall be able to detail online information on the rectifier, battery, inverter, reserve and maintenance bypass source to be accessed as follows:

- Signals

  All alarm states and indications shall be monitored.
- Readings

  The system performance shall be monitored in real time with all voltages, currents, frequencies and temperature measurements displayed in the form of colour bar charts.
- Power History

  Selection of this file shall start data acquisition from the UPS power history file and shall give access to all the information stored 10 seconds before and 1 second after the last inverter fault. The user shall have the choice of displaying the contents as alarms or colour bar charts of the operating voltage, current and frequency. Exact values at every 0.1-second interval shall be displayed by means of a cursor control.
- Alarm Log

  In addition to the power history recorder, an alarm log shall be available to display date, time, type and duration of alarms.

A software package shall be available, for remote communications. This software package is aimed at the end user and will allow the monitoring of the UPS connected to a monitoring station using a telephone line.

Communication with the UPS will be bi-directional so that at any moment the end user may initiate an on-line connection to the UPS and gain access to the units' parameters and measurements. The monitoring station will be notified of any anomalous functioning of a UPS connected to the monitoring station.

This system shall be available to allow the monitoring of more than one unit, and shall include at least the following:

- CD-ROM with installation software and user manual.
- Hardware keys for protecting the use of this software package.

9 MECHANICAL SPECIFICATION - ENCLOSURE

The UPS shall be housed in a freestanding modular enclosure with removable panels and protection as standard to IP 22. The enclosure shall be fabricated from zinc coated sheet steel.

Ventilation

Forced redundant air-cooling shall be provided to ensure that all components are operated within specification with air entry in the base and exit at the top. The enclosure shall be installed with 400 mm of free space at the top for ventilation requirements.

Cable Entry

Cable entry shall be from the bottom or side of the cabinet. Top cable entry shall be available as an option.

Painted Surfaces

Painted surfaces shall be cleaned and finished with an electrostatic applied epoxy powder coat of a minimum of 60 microns' thickness of the manufacturer standard color, which shall be RAL 7035 light grey for the frame and RAL 7010 dark grey for the bottom panels

Access

All internal subassemblies shall be accessible from the front of the unit via hinged doors. Rear access shall not be required for installation or servicing. The UPS shall be fork lift able from the front after the removal of the bottom trim panels.

9.1 Marking and Tagging

Each AC UPS System and Batteries Bank shall be permanently fastened with a stainless-steel nameplate, having as minimum the following information:

- manufacturer's name.
- model, type and serial no.
- identification tag number.
- short description.

The nameplate shall be fixed on a visible, stable part of equipment, without hindering operational and maintenance works.

10 24VDC POWER SUPPLY SYSTEM

The 24V DC power supply system shall be supplied from UPS switchboard with two redundant 230 VAC lines (each one from different phase). Each line shall feed a dedicated 230 VAC / 24 VDC power supply unit (PSU). The output of each PSU shall be connected to common 24 VDC bus bars (via diodes), thus feeding the common bus bars in parallel connection, so that in case of failure of one PSU, the other shall continue to operate with no loss of power. All 24 VDC loads related to the panel shall be fed from these common bus bars. In case of failure of one PSU, an audible alarm shall be monitored by PLC/RTU to inform personnel for immediate actions. The signal shall be also able for remote communicating via the SCADA system in Owner premises.
Each one 230 VAC / 24 VDC PSU shall be sized for 100% of the total 24 VDC load of this panel plus a 30% over capacity. Each one 230 VAC / 24 VDC PSU shall be also supported by a dedicated battery pack able to supply the total 24 VDC load of this panel plus a 30% over capacity for eight (8) hours, in case that the line from UPS cannot provide supply to this PSU. The batteries shall be lead acid, sealed type and shall be located inside the relevant control panel.
For each redundant PSU a proper number of Digital Inputs shall be foreseen at PLC/RTU, thus enabling the monitoring of PSU status by the SCADA GCC/BCC (PSU loss of 230 VAC power, loss of 24 VCD power, operation from battery, battery status, etc.).

The fuses of the external 24 V DC power supply feeding the I/O circuits of each RTU/PLC I/O module shall provide a hardwired contact, which shall be fetched by a Digital Input module of the RTU/PLC in order to monitor the status (healthy/break) of the fuse. The status of each Digital Input module should be continuously monitored and in case of fault an alarm signal shall be issued to the SCADA GCC/BCC.

11 PERFORMANCE DATA

GENERAL	
MANUFACTURER	*
TYPE	*
UPS Safety	EN 62040-1
Design & Manufacture	ELOT EN ISO 9001, ELOT EN ISO 14001, EN 60146
Perfomance & Topology	EN 62040-3, EN 50091-3
Limitation of emission of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16 A	EN 61000
E.M.C. Standards	EN 62040-2, EN 50091-2 Level B ELOT EN 55011/022 Level B, EN 61000
Immunity	EN 61000

Harmonic Disturbances	EN 61000
Low-voltage switchgear and controlgear assemblies	IEC 61439
Sound power levels	ELOT EN ISO 3746
C.E. Marking	In accordance with European directives for: (2006/95/EEC LVD), EMC (2004/108/EEC EMC)
System Configuration on Line	Yes
Location	Indoor / Safe area
IP Rating	IEC 60529: IP32 *
Language	English
Supply Earthing	Yes (TN-S)
UPS Rated Output	kVA at 0.8 PF lag *
Input Voltage	V ph ±10% *
Input Frequency	50 Hz ±5% *
Phase / Output Voltage	ph / V ±1% *
Frequency	50 Hz ± 0.5 Hz *
Cable Entry	Bottom *
Cable Size, Incoming	x mm^2
Cable Size, Outgoing	x mm^2
Battery Cable Size and Type	*
Rating of AC Supply MCB	A *
Maximum Rating of Battery Output MCB	A *
Heat Losses	W *
Ventilation	m^3/h *
Noise Limit	50 dbA at 1 m
Work Test	Yes / Witnessed
Type Test	Yes
Dimensions of UPS (w x h x d) in mm	____ x ____ x ____ *
Weight of UPS	Kg *

RECTIFIER / BATTERY CHARGER	
Output Voltage DC	V ±1% *
Output Current DC	A *
Float Range	*
Ripple	5% *
Input Current	*
Efficiency at Full Load, ½ Load	%, % *
Overload Capacity	120 % *
Input Circuit Breaker	Yes *
Input Circuit Breaker Rating	A *

INVERTER	
Output Rating	kVA *
Output Voltage	V *
Out./Volt. Adjust.	Manuf. Standard *
Regulation	2% *
Frequency	50 Hz *
Out./Freq. Adjust.	Manuf. Standard *
Efficiency at Full Load, ½ Load	%, % *
Total Harmonic	3 % *
Overload Setting	150 % for 1 min *

BY – PASS TRANSFER SWITCH	
Static by-pass switch	Yes *
Operation Counter	Yes *
Transfer Voltage Level	V to V *
Sensing & Tsf. Time	sec *
Incomer Breaker	Yes *
Incomer Breaker Rating	A *

BATTERIES	
MANUFACTURER	*
TYPE	*
Battery Type	Sealed (VRLA) *
Quantity	*
AH Rating	AH at 25^{o}C *
Voltage	V *
Life Expectancy	10 Y *
Autonomy	8 hours *
Recharging Time	*
Charge Operation	Rapid / Float *
Banks	% *
Enclosure	Rack
Dimensions (w x h x d) in mm	____ x ____ x ____ *
Weight	Kg *

GENERAL NOTES: * These data must be filled in by the Supplier in his Technical Offer.

11.1 Field Inspection and Testing

Field and testing of UPS and batteries shall be carried out by properly qualified and experienced personnel with calibrated test equipment provided by the Contractor.

Field inspection and testing shall also be witnessed by Client Representative.

Inspection and testing shall be according to project documentation or / and applicable codes and standards. Minimum test requirements are described below.

Correct operation for each UPS shall be tested.

All alarms and safety trips shall be tested for correct operation.

Charge and discharge tests on each battery and on each battery and charger unit shall be performed.

A complete record of all tests that shall be carried out and their results shall be retained.

11.2 As-Built Documentation

At the completion of the works, a copy of all related project drawings, where all modifications and variations marked in red, shall be provided to Client Representative and as-built drawings shall be issued.