

GENERAL SPECIFICATION

ELECTRICAL

GS EP ELE 151

DC Uninterruptible Power Systems (UPS)

08	10/2012	General revision
07	01/2012	Data sheet as Annex and minor modifications
06	01/2011	Obsolescence requirements
05	10/2009	Precisions regarding harmonic requirements
00	03/2001	First issue
Rev.	Date	Purpose of the revision

Owning entity: DEV/TEC	Managing entity: DEV/TEC/ELE
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1. Scope

This specification covers basic requirements for design, manufacture, operation and testing of stationary batteries, battery chargers and DC distribution panels.

The batteries and chargers will supply DC control power for switch gear, instrumentation and telecommunication systems, and/or emergency or essential services.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

Stationary batteries, battery chargers and DC distribution panels shall conform in design, material and performance with the appropriate sections of the latest editions (with amendments) of the relevant IEC, CENELEC standards and codes.

The following order of precedence applies specifically to electrical equipment:

- Applicable laws and regulations of the country in which the system will be operated. In cases where no "local" regulations exist, the French laws and regulations shall be used.
- Company Particular Specifications and data-sheets (if any)
- Company General Specifications
- Applicable International Electro-technical Commission (IEC) Standards
- Applicable recognised standards and codes (UTE-NFC, BS, VDE, etc.) when IEC publications have not yet been issued.

Any conflict or inconsistency between the above set of documents (standards, specification, codes and local regulation or laws) shall be raised to Company attention for resolution at tender stage.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
IEC 61439 (Parts 1; 3)	Low-voltage switchgear and controlgear assemblies - Parts 1; 3
IEC 61892-3	Mobile and fixed offshore units - Electrical installations - Part 3: Equipment
IEC 62402	Obsolescence management - Application guide
IEC 60076-11	Power transformers - Part 11: Dry type transformers
IEC 60079 (Parts 1; 7)	Explosive atmospheres - Parts 1; 7
IEC 60146 (All parts)	Semiconductor converters - All parts
IEC 60529	Degrees of protection provided by enclosures (IP Code)

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Reference	Title
IEC 60622	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Sealed nickel-cadmium prismatic rechargeable single cells
IEC 60623	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Vented nickel-cadmium prismatic rechargeable single cells
IEC 60993	Electrolyte for vented nickel-cadmium cells
IEC 61000 (All parts)	Electromagnetic compatibility (EMC) - All Parts
IEC 62040 (All Parts)	Uninterruptible power systems (UPS) - All Parts
IEC 62259	Secondary cells and batteries containing alkaline or other non-acid electrolytes-Nickel cadmium prismatic secondary single cells with partial gas recombination
IEEE 519	IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems
94/9/EC (ATEX 100a ¹ / ATEX 95 ²)	European Directive 94/09/EC (23/03/94) on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP ELE 001	Electrical design criteria
GS EP ELE 021	Electrical design criteria for floating units
GS EP TEC 007	Obsolescence and Lifetime Cycle Management

3. General

3.1 Environmental data

The equipment shall be installed inside an air conditioned technical room, with an average ambient air temperature of 25°C but shall be able to operate on unusual condition such as specified in the project data sheets.

¹ Reference to Articles 100 of the Treaty of Rome.

² Reference to Articles 95 of the Treaty of Amsterdam.

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If the equipment is installed in an offshore unit, special requirement of [IEC 61892-3](#) shall be applied.

In case H₂S might be present in the technical room, as specified in the project data sheet, special provision shall be taken by the Manufacturer to avoid equipment/material corrosion. The Manufacturer shall indicate the proposed protection measures in his offer.

3.2 Reliability

Reliability of equipment to perform continuously is essential. Prototype or unproven equipment not having a well established operating record will not be considered.

The Manufacturer shall state in his offer the availability, reliability and Mean Time Between Failure (MTBF) data for similar units in service.

3.3 Deviations to specification

The Manufacturer shall advise the Company of any deviations made in respect of this Specification at the time of tendering. Should this Specification conflict with requirements of the listed standards the Manufacturer shall request clarification from the Company.

4. Construction requirements

4.1 General

Battery chargers shall be completely assembled and wired in free standing sheet steel cabinets suitable for indoor operation as per [GS EP ELE 001](#) and [GS EP ELE 021](#).

For redundant DC UPS, separate cabinets shall be provided for each battery charger (and associated batteries when installed in cubicle).

The equipment shall be arranged such that internal access can be made without shutting down. The cabinet shall be arranged for front operation and maintenance. Removable side panels may be provided, but rear access shall not be required. Warning labels shall be fitted in prominent positions advising care to be taken when gaining access to live equipment.

Access doors shall be lockable with a provided common key. They shall be fitted with an internal pocket suitable for a complete drawing set.

Cabinets shall have at least IP21 protection degree and IP20 when doors are open as defined in [IEC 60529](#).

Unless otherwise specified, the cabinets shall be cleaned, primed and painted according to Manufacturer's standard.

The cubicles shall be designed to be lifted by use of detachable eye bolts.

Adequate ventilation shall be provided in order to guarantee the proper operation of the equipment at rated conditions, whatever the mode of operation and the battery autonomy. Where natural air convection is not practical, redundant forced air cooling shall be considered provided that air intakes are fitted with large air filters to allow for long operation without cleaning. Fan motor shall be individually protected (multi-pole switching) and controlled. Local and remote alarm shall be provided.

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The maximum voltage drop in main power cables between remotely located batteries and main equipment cubicles shall be limited to 1% unless otherwise specified.

4.2 Internal wiring

Internal wiring shall be PVC insulated 1000 V grade, flame retardant, stranded copper conductors, except for connection on printed circuits.

Cabling between components shall be continuous, joining of cables is not permitted.

Internal wiring within the board shall be securely held in position (either loomed or run in trunking).

Wiring identification shall be by numbered and/or lettered ferrules, of insulating material and located adjacent to the terminals.

Wiring connections for external connections shall be brought out to individual terminals on a readily accessible terminal block. Wires shall be terminated using compression type lugs or crimp sleeves.

Wiring penetrations through compartment or cubicle sections shall be fitted with protecting strips or alternative means to prevent insulation damage.

Wiring installed across hinged doors shall be protected by the use of flexible conduit or sleeving.

4.3 Cable termination

External cable terminating facilities and terminals shall be suitable for the specified cable type and conductor size. Cable supports shall be provided by the Manufacturer to avoid undue strain on the cable termination. The number of conductors connected to each terminal shall not exceed two for internal cabling and one for external cabling.

Power and control external cabling and relevant terminals shall be fully segregated and separated. Protection covers shall be split in order to provide independent access to power and control terminals.

4.4 Earthing

An earthing copper busbar shall be provided along the full length of the equipment structure with provision for earth cable connections at each end.

All metallic non-current carrying parts of the equipment shall be bonded together and connected to the earth busbar. All doors shall be bonded to the main structure by means of a flexible copper connection arranged so that it cannot be trapped as the door is opened or closed.

4.5 Electromagnetic Compatibility (EMC)

The Manufacturer shall ensure that effects of induced voltages, electromagnetic interference and "noise" are carefully considered, and means taken to prevent any miss-operation, erratic performance or failure due to these effects. Compliance with the [IEC 61000](#) is mandatory.

The equipment EMC requirements shall be as a minimum per Category C3 as defined in the [IEC 62040-2](#).

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5. Batteries

5.1 IEC definitions

Ni-Cd sealed cell type - [IEC 60622](#):

Cell which remains closed and does not release either gas or liquid when operated within the limits of charge and temperature specified by the manufacturer. The cell is equipped with a safety device to prevent dangerously high internal pressure. The cell does not require addition to the electrolyte and is designed to operate during its life in its original sealed state.

Ni-Cd vented cell type - [IEC 60623](#):

A secondary cell having a cover provided with an opening through which gaseous products may escape.

Note: The opening may be fitted with a venting system.

Ni-Cd partial recombination cell type - [IEC 62259](#):

Ability of a cell to recombine most of the gases evolved during charging under the conditions specified in chapter 7.9. (Chapter 7.9: Gas recombination shall not be less than 70%).

5.2 Battery type

The batteries shall be of one of the following types in accordance with IEC standards. The final cell type selection shall be indicated in the "Project" particular specification or data-sheet.

Manufacturer shall provide cell type certification by a recognised Certifying Authority with his offer.

5.2.1 Vented type nickel-cadmium cells as per [IEC 60623](#)

When used for the second type of DC source each of the two batteries shall have a capacity of 50%. End of discharge voltage shall not be lower than 1.0 V per cell at 20°C.

The composition, purity and properties of electrolytes used in these vented nickel-cadmium cells shall be as per [IEC 60993](#) in the absence of specific recommendations from the battery manufacturer.

5.2.2 Sealed or partial recombination type nickel-cadmium cells as per [IEC 60622](#) or [IEC 62259](#)

These types of cell shall have a gas recombination rate equal to or greater than 90% in any charge mode. When used for the second type of DC source each of the two batteries shall have a capacity of 50%. End of discharge voltage shall not be lower than 1.0 V per cell at 20°C.

Manufacturer shall provide recombination rate measurement test certificate issued by independent third party with his offer.

5.3 Battery construction

Vented and partial recombination battery cells containers shall be assembled in flame retardant heat resistant, shock-absorbing plastic containers with covers attached to form a permanent

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leak-proof seal. Each container shall provide visual indication of electrolyte level with level lines marked on front side.

For all batteries type, covers shall be sealed against leakage of electrolyte and shall be fitted with spray-proof vent plugs.

5.4 Battery installation

The battery installation shall be as indicated in the data sheet.

5.4.1 Outdoor Installation in hazardous area

Batteries shall be installed in suitable certified battery boxes and the battery shall comply with the requirements of the [IEC 60079-7](#) and [ATEX 94/9/EC](#).

5.4.2 Battery stands

The stands shall be supplied by the battery manufacturer and made of electrolyte resistant steel or suitably treated wood. An electrolyte resistant retention basin shall be provided by the Manufacturer and installed under the stands.

5.4.3 Battery cabinet

The battery shall be installed in a free standing steel cabinet assembled and wired with the battery chargers.

Provision for exhaust duct connection shall be provided at the top of the cabinet in order to ensure proper forced ventilation (with redundant fan units), dilution and to avoid gas accumulation. Air inlet shall be at the bottom of the cabinet (side air inlet is not allowed).

The cabinet shall consist in electrolyte resistant sliding drawers, with electrolyte retention capability, provided with stoppers. Mechanical interlock shall be provided to prohibit withdrawal of more than one cell drawers at a time.

Each sliding rack shall be securely connected to the main earth busbar by means of flexible copper connections.

Easy access shall be provided for topping up batteries in position.

5.5 Operating duty

During normal operation, the battery will be "floating" on line with the battery charger maintaining the battery in the fully charged condition, and at the same time supplying the normal steady state loads.

The batteries shall have the capacity to supply loads according to the provided load profile and relevant autonomy defined in the data-sheet with the battery charger being off, without discharging the battery below the cell end of discharge voltage defined in section 5.2.

The isolation of the batteries at the end of discharge must be made on threshold of voltage.

5.6 Battery terminals

All cell terminals shall have adequate current carrying capacity. Cell terminal posts shall be equipped with connector bolts. Cell terminal posts, bolts, interconnecting links and associated

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hardware shall be of electrolyte-resisting material and protected by insulating screens to prevent risk of contact with live parts.

5.7 Battery capacity

A load curve versus time shall be provided by Engineer/Contractor to allow definition of battery rating. Also minimum voltage at the end of discharge shall be defined.

An appropriate de-rating factor for ageing (20% minimum) shall be considered for battery sizing.

The Manufacturer shall provide at the tender stage a calculation note justifying:

- The type and reference of the battery selected
- The number of elements
- The ageing factor taken into account.

6. Battery chargers/rectifiers

6.1 Electrical service conditions

All equipment shall be rated for continuous operation, with variations of voltage and frequency as stated hereafter:

- AC supply voltage: +10% -10%
- Frequency: +5% - 5%.

The performance of the equipment shall not be affected by:

- Transient voltage depressions down to 80% of rated voltage
- Harmonic voltage THD up to 10% and each IHD within the limits of class 3, tables 3 and 4 of IEC 61000-2-4.

Unless otherwise stated in the data-sheet, the chargers shall be fed from two different three phase AC supplies with highly impedant neutral and insulation monitoring by low frequency current injection.

6.2 Battery charger operations

a) Normal operation modes

Chargers shall have two automatic modes of operation: "boost charge", "float charge".

Automatic pre-set parameters shall be easily adjustable. Nevertheless, access to such parameters shall be limited to authorised operator via key and/or password.

Facilities shall also be provided to manually initiate all modes of operation but the return to safe operation for the battery shall always be automatic.

The rectifiers shall be protected from over temperature by thermal switches which will de-energise the charger and initiate an alarm.

A loss of control caused by a failure shall block the rectifier bridge.

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The charger shall be capable of limiting the output current at its rated value and of limiting the battery charging current to the safe value corresponding to the mode of operation and battery manufacturer's requirements.

Facilities shall be provided to inhibit the boost charge mode in case of failure of the battery room ventilation system. If the ventilation failure occurs during the boost charge mode the chargers shall revert to float charge mode. Upon restoration of ventilation (external fault signal cleared), charge mode shall be automatically restored to its previous status.

Boost charge mode shall be automatically initiated upon restoration of AC power after an outage. An adjustable timer started when the battery reaches the second stage of charge shall automatically reset the charger to the float charge mode to prevent the battery from being overcharged. A voltage free contact for remote indication or charge mode status shall be provided.

Float voltage shall be adjusted automatically depending on the battery temperature monitored by a probe. Battery temperature shall be displayed.

When required in project data-sheet, an automatic "battery test" function shall be provided.

Battery test shall be automatically initiated every week or, such as specified in the Project data sheet, to check battery condition and stored energy. During this test, the charger's voltage reference will be reduced and the voltage of both batteries will be monitored. If the battery voltage falls too low, an alarm is generated. In all cases at the end of the test, the chargers return to float charge or boost charge mode.

b) Parallel operation

In case of parallel operation, blocking diodes in the positive lead shall be provided as well as automatic load sharing circuitry to proportion the load within 10%.

In case of Type 2 schematic with 50% of battery autonomy, a manually controlled isolating switch with interlocking contacts shall be provided to allow, in case of failure of one charger and after manual operation, charging of both batteries in float or charge mode from the remaining charger. In this last mode it is acceptable that the recharge time be extended.

c) Off line full discharge test

A switch shall be provided to permit an annual off-line full discharge battery test of each battery on an external load bank connected to extra terminals located in the charger cabinet close to the battery connection terminals.

During this annual test the two chargers and the remaining battery shall continue to supply the load. An auxiliary contact shall be provided for local and remote indication of battery isolated condition.

d) Emergency shut down (ESD) trip

Unless otherwise stated in the project documentation, a circuit breaker with overcurrent protection only and an undervoltage tripping coil shall be provided for ESD purpose in an Ex "d" or "de" IIC or IIB+H2 T3 enclosure (as per [IEC 60079-1](#) and [IEC 60079-7](#)) located close to each battery.

All power supplies and control circuits shall be arranged such that upon isolation of the battery circuit breaker the connections remaining energised shall be within the Ex'd' circuit breaker enclosure or at the battery terminals which shall be shrouded."

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“Reset” of this breaker shall be possible by an “externally accessible” operating handle. The terminals for the external load bank connection described above shall be arranged so that the “Ex” circuit breaker is in use during the full discharge test.

6.3 Battery charger characteristics

The charger rating shall be adequate for the normal operating duty, and for charging the battery from "Discharged" to a state of charge which will provide for execution of discharge at full load while respecting the autonomy required after eight hours of charging.

The charger shall be capable of maintaining the output voltage within $\pm 2\%$ of the rated voltage during steady state operation in float charge mode with the maximum supply voltage and frequency variations defined in paragraph 6.1 and a permanent load of 0 to 100%. The maximum transient voltage fluctuations as determined by the load changes shall be limited to $\pm 10\%$ of the rated value.

The maximum allowable voltage fluctuations ($\pm 10\%$ of the rated value) shall apply during charging of the battery and during discharge. If the charger and the battery are not able to provide such a voltage regulation a DC/DC converter would have to be provided in series with each charger upstream of the blocking diodes to improve the efficiency of the DC source and minimise the heat dissipated.

Each charger shall be fed through an isolating three phase transformer and designed in order to minimise the harmonic current rejected to the network. Rectifier shall consist in a three phase rectifying bridge, and load upstream of the isolating transformer shall be equally split on the three phases. When system is not redundant, isolating transformer shall be removable without requiring the dismantling of other components within the cubicle.

The isolating transformer shall be built in accordance with the requirement of the [IEC 60076-11](#) and [IEC 60146-1-3](#).

The peak magnetising current of primary winding of the isolating transformer shall be less than 15 times the rated current.

Current harmonic rejection shall remain between the limits defined in [IEEE 519](#) Table 10-3, with I_{sc}/I_L ratio of less than 50, as a minimum requirement (i.e. ratio even less than 50 could be considered in particular project conditions).

Ripple in the battery charger output voltage shall not exceed 1% of rated rms voltage for all values of load within the charger rating with the battery not connected.

Chargers shall be able to supply the load with batteries removed.

6.4 Minimum features to be provided

Each charger shall be equipped with the following as a minimum:

6.4.1 Protection

- AC supply three pole ON/OFF switch
- Miniature Circuit Breakers for auxiliary circuits

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- Output voltage monitoring relay providing:
 - High DC voltage alarm tripping the charger
 - Low DC voltage alarm
 - Imminent battery shutdown remote alarm
 - End of discharge remote alarm for ESD trip. Contact shall be open to alarm
- Battery over current alarm and trip of the charger.

6.4.2 Control and monitoring

Control and monitoring shall be provided by a microprocessor based controller.

Local control and monitoring shall be given on the front of equipment and shall include as minimum:

- One alpha-numeric display with pushbuttons for operator interface
- Two LED's normal and fault
- On/off charger switch
- A buzzer providing audible alarm
- Display and recording of elapsed time, voltage reached and Ah during the last 10 discharges.

The display shall provide the following indications as a minimum:

- Measurements:
 - AC supply voltage
 - AC supply current
 - DC output voltage
 - DC output current
 - Battery current (+ or -)
- Status of operating modes
- Alarms and faults.

Local and remote alarms and faults shall be provided.

When required in the data sheet, remote alarms and faults shall be provided through a serial link with a protocol which shall be defined in the Project particular specification. The Manufacturer shall ensure the serial link compatibility with the ECS or ICSS of the plant and if required, provide the necessary interfaces.

A mimic (graphic display) shall be provided on the front of the cubicle, with appropriate LED's.

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6.5 Marking

Permanent nameplates shall be provided identifying each component. Labels shall also be provided for each individual cell to facilitate test, operation and maintenance.

Nameplates shall be laminated engraved plastic with black letters on a white background.

Rating plates shall be provided as per [IEC 62040](#) and riveted or screwed on the front panel.

7. DC Distribution panels

Each source shall be provided with a distribution panel within or adjacent to the battery charger cabinet, as indicated in the "project" particular specification. This distribution panel shall be designed as per [IEC 61439-1](#) and [IEC 61439-3](#) and an incoming two pole switch shall be provided.

In case of redundant DC UPS, the distribution panel shall include two incoming switches. The distribution shall be split into 2 buses "A" and "B" by means of a bus-tie switch. This would allow replacement or installation of additional outgoing CB without complete UPS distribution shutdown.

Addition of CBs (rating up to 40 A) shall be possible via specific bus connection system and/or spare termination block whose conception allows performing this operation safely while the whole equipment remains energized.

Each outgoing circuit shall be protected by a two pole circuit breaker with overcurrent protection plus a tripping fault contact and, if specified in the Project particular Specification, also a tripping coil to facilitate isolation. The circuit breaker shall be sized for the specific circuit requirements and shall be fully selective with other devices in the circuit. The Manufacturer shall state in his offer the maximum rated circuit breaker that can be fitted.

All circuit breaker tripping fault contacts shall be gathered on a signalling loop and brought to control terminals for remote indication.

A minimum of 10% equipped spare outgoing CBs shall be fitted, plus 20% additional space including the clip-on bus ready for use.

DC distribution shall be unearthed except where specified otherwise. An earth fault detector relay to provide local and remote alarm shall be installed.

This protection shall be based on the detection of a low frequency AC current circulating between DC network and earth.

This shall allow troubleshooting of the system with all circuits in operation by tracing the faulty circuit with a portable tester to be supplied with the equipment. A front panel mounted indicator shall permanently indicate the value of the network insulation impedance.

Internal wiring shall be 1000 V insulated, at least flame retardant and fitted at both ends with lugs and ferrules. All external cables shall be connected on terminal blocks for connection at bottom.

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8. Accessories

A complete set of tools required for maintaining the equipment shall be provided.

A tin of finish paint shall be provided to permit final "touch up" following installation.

9. Inspection and testing

The Manufacturer shall carry out tests upon completion of construction to demonstrate to Company, or his representative, that the requirements of this Specification and any subsequent amendments have been fulfilled in accordance with the applicable standards and regulations.

The minimum tests required are those specified in [IEC 60146-1-1](#) and [IEC 62040-3](#), plus tests required in the Project data sheet.

9.1 Factory Acceptance Tests (FAT)

Factory acceptance tests shall be as defined in the data sheet and contractual technical documentation.

9.2 Site tests

Site tests shall be carried out as defined in the Project particular specification.

9.3 Test reports

A pro-forma of test procedures and reports shall be presented to Company for approval before placing the order.

The test reports shall detail as a minimum:

- The expected theoretical values
- The permissible tolerances values
- The results of the measurements, including if applicable, any intermediate values which have caused a temporary rejection.

The test reports shall be included into the contractual technical documents, and shall be considered as an integral part of them.

10. Design Life & Obsolescence ([IEC 62402](#))

Equipment and component obsolescence management shall be as per [GS EP TEC 007](#).

Facilities are typically designed with an expected design life in the order of 20 to 25 years.

The UPS design shall therefore take into account the requirement that the equipment will most probably require to be upgraded during the design life of the facilities in particular for all the electronic based components. These requirements shall be incorporated from Basic Engineering stage.

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The design will include provisions to allow an upgrade of the UPS to be performed with minimal disturbance to the power generation and distribution systems, fixed cabling infrastructure and infrastructure.

All hardware and software that may be developed by the Manufacturer further to the UPS delivery shall ensure full ascending compatibility to allow for easy replacement of equipment that became obsolete with limited reconfiguration.

At the Tender stage, the UPS manufacturer shall detail his lifecycle management strategy focusing on product obsolescence, support options and further migration alternatives. The lifecycle/obsolescence management plan and associated cost shall be part of the Tender process evaluation.

The UPS Manufacturer shall complete an inventory of all provided equipment (hardware and software) matching to different lifecycles phases, including all Sub-Vendors equipment (e.g. electronic cards and associated software, switches, HMI (Human Machine Interface)...).

UPS Manufacturer shall guarantee that:

- UPS components (including software and hardware) shall remain in the “active products” range (i.e. supporting developments and releases) over a period of at least 10 years after the SAT
- An announcement to Customer is provided 5 years prior the end of the commercial phase
- UPS components (including software and hardware) shall be fully supported and available over a period of at least 20 years after the SAT
- Maintenance services including availability of engineering services shall be available to support the UPS during the plant life time.

11. Documentation

As a minimum, the following documents shall be provided for Company's review at the tender stage:

- Overall arrangement drawing
- One line diagram
- Schematic diagram
- Battery sizing calculation note
- Heat dissipation values for 50%, 75% and 100% load depending on operating mode
- Availability, reliability, Mean Time Between Failure (MTBF) and Mean Time To Repair (MTTR) data for each system. The Manufacturer shall also include this data for similar units currently in service with their offer documentation
- Type test reports (in particular battery and battery charger gas recombination type test by a recognised certifying authority)
- Gas release calculation depending on battery charging mode

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- Battery cabinet ventilation calculation note (when applicable)
- Component/equipment obsolescence plan.

Unless otherwise specified in project particular specification, Manufacturer shall at least provide the following documents:

- Overall arrangement drawing
- Civil works drawings
- One line diagram
- Wiring diagram
- Schematic diagram
- Battery cable calculation note
- Battery short circuit capacity calculation note
- DC breaking capacity for all breakers in the DC circuits
- Maintenance and operation instructions
- Spare part list
- Detailed equipment information (technical documentation)
- Type test reports
- FAT reports
- Obsolescence management dossier.

12. Transport/packing

In all cases, vented batteries shall be delivered electrically formed by the Manufacturer. They shall be shipped preferably filled and charged, but this choice is left to the Manufacturer and/or Engineer/Contractor based on site delivery and storage, schedule and conditions.

Sealed batteries shall be delivered charged.



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Appendix 1

Appendix 1 Data Sheet

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Appendix 1

Exploration & Production

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Project:	
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Rev. Date						
Written						
Verified						
Approved						

1	Repère de l'équipement :	Nombre de redresseurs :	Nombre de batteries :
2	Equipment Tag N°	Number of Rectifiers	Number of batteries
3			
4			
5	CONDITIONS GENERALES D'INSTALLATION		
6	INSTALLATION CONDITIONS		
7			
8	Température ambiante :	Normale °C	Maximum °C
9	Ambiant temperature	Normal	Minimum °C
10			
11	Hygrométrie relative :	Normale %	Maximum %
12	Relative humidity		
13			
14	Altitude : > 1000 m m	Intérieur ☐	A terre ☐
15	Altitude: > 1000 m	Indoor	Onshore
16			En mer ☐
17	Salle ventilée : ☐	Salle climatisée : ☐	Salle surpressée : ☐
18	Ventilated room	Air conditioned room	Pressurized room
19			Présence H ₂ S : ☐
20	Mise en place	Sol béton/planéité 2 mm/1000 : ☐	Faux plancher : ☐
21	Installed on	Concreted floor/flatness	Châssis : ☐
22			Caniveau : ☐
23			
24			
25			
26			
27			
28	CARACTERISTIQUES TECHNIQUES DE L'EQUIPEMENT		
29	TECHNICAL DATA		
30			
31	Tension de sortie V	Polarités isolées ☐	+ à la terre ☐
32	Out put voltage	Unearthed Polarities	+ earthed
33			- à la terre ☐
34			- earthed
35	Intensité d'utilisation en régime permanent	Secteur présent A	
36	Output current, continuous operation	Incoming Supply On	
37		Secteur absent A	Autonomie Min
38		Incoming Supply Off	Autonomy
39			
40			
41			
42	Charge alimentée en permanence par batterie	Oui ☐	Non ☐
43	Load permanently fed from battery	Yes	No
44			
45	Temps de recharge requis pour obtenir la capacité	h	
46	Battery charging time for capacity recovery		
47			
48	Variation de tension admissible en régime permanent	+ %	- %
49	Maximum frequency variation, continuous operation		
50			
51	Variation de tension admissible en régime transitoire	+ %	- %
52	Maximum voltage variation, transient operation		
53			
54	Taux d'ondulation résiduel inférieur à %		
55	Ripple inferior to		
56			

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1	
2	Fonctionnement possible en parallèle ☐
3	Parallel operation possible
4	
5	Régulation de la charge des batteries en fonction de la température ☐
6	Battery charging current regulated on battery temperature
7	
8	Régulation de la charge des batteries par manque ventilation local ☐
9	Float Charge from when room ventilation failed
10	
11	Isolément automatique de la batterie en fin d'autonomie ☐
12	Battery automatically switched off at end of discharge
13	
14	Distribution aval ☐
15	Output distribution
16	
17	Contrôleur permanent d'isolement : ☐
18	Continuous insulation monitoring
19	
20	Batteries d'accumulateurs/Accumulator battery:
21	
22	Plomb ouvert ☐
23	Vented lead-acid
24	
25	En armoire ☐
26	In cabinet
27	
28	Accessoires entretien batterie ☐
29	Battery maintenance accessories
30	
31	Diodes anti retour ☐
32	Blocking diodes
33	
34	CARACTERISTIQUES DE L'ALIMENTATION DU REDRESSEUR (réseau amont 1)
35	RECTIFIER SUPPLY SPECIFICATIONS (mains input 1)
36	Tension : V + % - % Mono ☐
37	Voltage
38	
39	Schéma : TT ☐
40	System
41	
42	Loc au point de raccordement de l'alimentation ☐
43	Loc at supply connection point
44	
45	CARACTERISTIQUES DE L'ALIMENTATION DU REDRESSEUR (réseau amont 2)
46	RECTIFIER SUPPLY SPECIFICATIONS (MAINS INPUT 2)
47	
48	Tension : V + % - % Mono ☐
49	Voltage
50	
51	Schéma : TT ☐
52	System
53	
54	Loc au point de raccordement de l'alimentation ☐
55	Loc at supply connection point
56	
57	
58	
59	

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CONTROLE COMMANDE CONTROL AND MONITORING						
Fonction/Function	Sur appareil On cabinet	Pour report à distance/Remote				
		Impulsion/Pulse	Maintenu/Maintained			
		Contact sec Volt free contact		Transmission Transmission		
		NO	NC	4-20 mA	Autre/Other	
Marche/Arrêt/On/Off	☐	☐	☐	☐		
Arrêt urgence/Emergency stop	☐	☐	☐	☐		
Défaut redresseur/Rectifier fault	☐	☐	☐	☐		
Manque tension alim redresseur/Input rectifier no voltage	☐	☐	☐	☐		
Alarme tension basse batterie/Battery low voltage alarm	☐	☐	☐	☐		
Surcharge/Overload	☐	☐	☐	☐		
Défaut d'isolement/Insulation fault	☐	☐	☐	☐		
Défaut ventilateur/Fan fault	☐	☐	☐	☐		
Défaut général/General fault	☐	☐	☐	☐		
Alarme surcharge batterie/Battery overcurrent alarm	☒	☒	☒	☒		
High DC Voltage Alarm tripping the Charger	☒	☒	☒	☒		
Imminent Battery Shutdown Alarm	☒	☒	☒	☒		
Alarme fin de décharge / end of discharge alarm for ESD	☒	☒	☒	☒		
Batterie isolée / battery isolated	☐	☐	☐	☐		
Défaut groupé distribution / Grouped fault	☐	☐	☐	☐		
Tension utilisation/Load voltage	☐	☐	☐	☐	☐	
Courant utilisation/Load current	☐	☐	☐	☐	☐	
Tension batterie/Battery voltage	☐	☐	☐	☐	☐	
Courant batterie/Battery current	☐	☐	☐	☐	☐	
Liaison série/Serial Link	☐	☐	☐	☐	☐	
Signaux analogiques pour report à distance (4-20 mA ou autre) obligatoirement isolés galvaniquement Analogical remote signals (4-20 mA or other) must be electrically isolated						
Tous signaux de contrôle disponibles sur bornier/All monitoring signals available on terminal blocks						
Au minimum toutes les données câblées pour report à distance (contacts et/ou valeurs) doivent être mises à disposition via la liaison série As a minimum all wired remote data (contact and/or values) shall be made available via the serial link						
CARACTERISTIQUES DE L'ENVELOPPE CABINET SPECIFICATIONS						
IP 21	☐	Autre	☐	Accès arrière: Rear access	Oui Yes	Non No
IP 21	☐	Other	☐			
Entrée des câbles: Cable entry	Par le haut Top	☐	Par le bas Bottom	☐	Tôle de fond : Backplate	Avec With
						Sans Without
			Par PE Via cable gland	☐	Nature PE Gland type	☐
Raccordement des câbles puissance et protection sur le bornier Power and protection cables connected to terminal blocks	☐				Résistance de réchauffage Space Heaters	Oui Yes
						Non No
Visserie Screws and bolts		Zinguée bichromatée bichromate zinc plated	☐		Inox 316 316 stainless steel	☐
Anneaux de levage Lifting rings	☐	Plaque signalétique inox 316 Rating plate 316 stainless steel	☐		Autre Other	☐
Etiquettes de repérage rivées ou vissées sur support fixe (collage exclus) Identifying labels riveted or screwed to fixed support (no adhesive bonding)	☐					
Peinture standard constructeur Standard paint finish constructor	☐	Autre Other	☐		Couleur Color	RAL

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2		
3	ESSAIS/TESTS	
4	IEC 60146	
5	Essai d'isolement	☐
6	Insulation test	
7		
8	Essai au courant assigné	☐
9	Rated current test	
10		
11	Essai d'échauffement	☐
12	Temperature rise test	
13		
14	Vérification des dispositifs auxiliaires	☐
15	Checking and testing of auxiliary devices	
16		
17	Vérification des circuits de commande	☐
18	Checking of the control equipment	
19		
20	Essai d'immunité	☐
21	Immunity test	
22		
23	Mesure de Bruit audible	☐
24	Audible noise measurement	
25		
26	Essai autonomie batterie	☐
27	Battery autonomy test	
28		
29	Test défaut isolement / terre	☐
30	Insulation/Earth Fault Test	
31		
32	OTHER SPECIAL TESTS	
33	SCHEMAS DE PRINCIPE	
34	SCHEMATIC DIAGRAM	
35		
36	SCHEMA 1	☐
37		
38	Chaque batterie dimensionnée pour	
39	Each battery set sized for	
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
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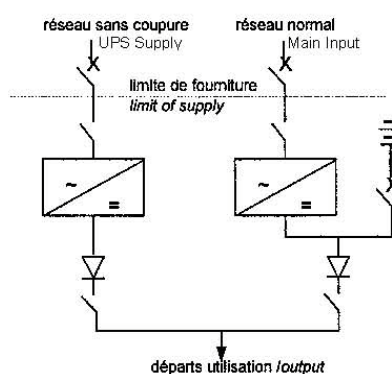
Appendix 1



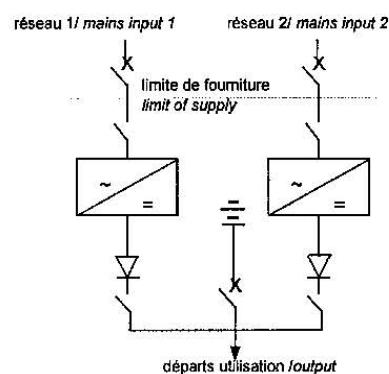
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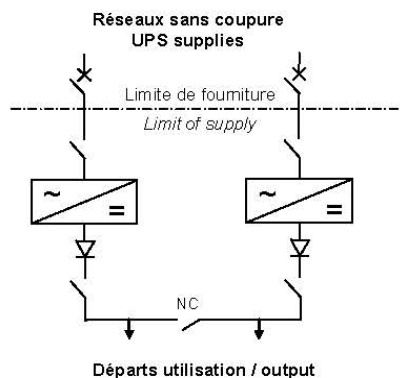
SCHEMA 3



SCHEMA 4



SCHEMA 5



Nota : La symbolisation des appareils de coupure matérialise leur existence et non leur nature exacte qui est déterminée avec le constructeur
The circuit device symbols indicate their presence and not their specific type which is to be decided in consultation with the constructor

DISTRIBUTION

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Intensité/Current (A)						
Disjoncteur/Circuit breaker						
Calibre/Rating						
Sectionneur/Isolator						
Fusibles/Fuses						
Contacteur/Contactor						
Relais thermique/Thermal relay						
Nombre de départs identiques Number of identical outgoers						

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CARACTERISTIQUES A FOURNIR PAR LE CONSTRUCTEUR SPECIFICATIONS TO BE SUPPLIED BY CONSTRUCTOR									
1	Type:				Intensité nominale				A
2	Type				Nominal current				
3									
4									
5	Intensité absorbée à 4/4 de charge sur le réseau 1 :		En floating		A		En charge batterie		A
6	Mains input 1 current at 4/4 load		Floating				Battery charging		
7									
8	Protection réseau amont 1 :		Calibre		A		Type de déclencheur		
9	Mains input 1 protection		Rating				Protection Device		
10									
11	Intensité absorbée à 4/4 de charge sur le réseau 2 :		En floating		A		En charge batterie		A
12	Mains input 2 current at 4/4 load		Floating				Battery charging		
13									
14	Protection réseau amont 2 :		Calibre		A		Type de déclencheur		
15	Mains input 2 protection		Rating				Protection Device		
16									
17	Pertes maximum		W		Rendement à 4/4		Niveau sonore		DBA à 1m
18	Maximum losses				Efficiency at 4/4 load		Maximum SPL		
19									
20	Dispositif prévu contre les perturbations harmoniques								
21	Harmonic Distortion protection								
22									
23									
24	Type de pont redresseur				Alimentation :		Mono		☐
25	Rectifier type				Supply		S P		☐
26							Tri		☐
27							3-P		
28	Batterie :		Marque		Nombre éléments		Capacité		Ah
29	Battery		Constructor		Number of cells		Capacity		
30									
31									
32									
33									
34									
35									
36	Température extrême de stockage de l'équipement :		Minimum		°C		Maximum		°C
37	Equipment storage temperature limit		Minimum				Maximum		
38									
39	Température extrême d'utilisation de l'équipement :		Minimum		°C		Maximum		°C
40	Equipment operation temperature limit		Minimum				Maximum		
41									
42	Dispositif de ventilation de l'équipement		Rejet d'air chaud par le haut		☐		Par le bas		☐
43	Equipment cooling		Hot air exhaust at top				At bottom		
44							Filtres à l'entrée d'air		☐
45	Nombre de ventilateurs installés :				Nombre nécessaire au fonctionnement normal :				
46	Number of fans installed				Required number of fans for normal operation				
47									
48	Alimentation électrique différente de celle du redresseur :		Oui		☐		Non		☐
49	Power supply separate from rectifier		Yes				No		
50							Depuis la batterie		☐
51							From battery		
52	Dimensions (mm) Armoire redresseur		L/W		P/D		H		Masse (kg)
53	Dimensions (mm) Rectifier cabinet								Weight
54									
55	Armoire batterie ou chantier		L/W		P/D		H		Masse (kg)
56	Battery cabinet or rack								Weight
57									
58	Armoire distribution		L/W		P/D		H		Masse (kg)
59	Distribution cabinet								Weight
60									
61	Distance minimales par rapport aux parois (mm) :								
62	Minimum distances from walls								