

PREPARED BY EPT FOR

Company -   
Site Name

REPORT AND EXECUTIVE SUMMARY

May 2024

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Attachment A

Attachment A: XXXX

Quotation Details:

|  |  |  |
| --- | --- | --- |
| Quotation Number: XXX | Quotation Date: XXX | Rev: 1.1 |
| Quotation for: Supply/Install/Service of UPS for XXX | | |
| Pricing Validity: 30 Days from Quotation Date above, and is then subject to confirmation | | |

1. EXECUTIVE SUMMARY
   1. Inspection Details

Company engaged EPT for a major maintenance service at your XXXXXX site. The EPT technical team evaluated the technician's notes, measurements and findings and created this report to provide an overview of the asset conditions.

This report provides an evaluation of all the power equipment systems and batteries as specified in customer Job card # XXXXXX.

The following table contains the details of the inspection carried out by the EPT Technician at your site.

|  |  |
| --- | --- |
| Inspection Details | |
| Company: | Company |
| Company Contact: | XXXXXX |
| Site/s: | XXXXXX |
| Inspection Date(s): | Company |
| EPT Technician(s): | XXXXXX |
| Inspection Context: | This report provides an evaluation of all the current Uninterruptable Power Supply System (UPS) power systems and batteries as specified in customer Job card # XXXXXX.  Areas of analysis include security based, safety based, standards based, best electrical practice, monitoring analysis and resilience of the building’s electrical infrastructure in the event of power loss to the building.   * Results of these findings show that in general the UPS fleet ranges from 5-6 years old to 14+ years * Most systems are very lightly loaded with very small IT loads and long run times for the UPS units. * Some older/existing units are now starting to age and are requiring life cycle maintenance and replacement of internal parts and batteries in the very near future to ensure continuity of service. * With several systems due to size of loads it may be worth considering downsizing of systems to provide better overall efficiency of the systems and utilizing newer/under warranty equipment which may provide a more economical option for the long term. * We would suggest you have a budget for the power equipment and batteries that have reached 80% of design life for a smooth transition and take necessary action subject to the recommendations. * We were unable to test the Internal bypass functionality as most of the system bypass was unavailable due to the site running off a generator. |

The scope of works, recommendations and overview of asset condition contained in this document has been determined by the EPT Technical Team based on this inspection.

1. MAIN COMPONENTS OF AN ASSET

To simplify our approach to asset condition assessment, we divided asset components into two main categories: **Equipment – Power Electronics** and **Battery Systems**.

Whilst these two classifications are valid for a typical AC or DC Uninterruptable Power Supply System (UPS) system only, other power electronic assets that are serviceable by EPT, such as Inverter, Static Transfer Switch (STS), Automatic Transfer Switch (ATS) are assessed under the Equipment – Power Electronics section.

* 1. Equipment – Power Electronics

This is the main enclosure(s) that provides any of the below functions.

* AC UPS with or without a *bypass switch\**
* Power Conditioner
* Battery Charger
* DC Power Supply
* Inverter
* STS (Static Transfer Switch)
* ATS (Automatic Transfer Switch)

*It is important to note that bypass switches are a key component of a UPS application that provide operational safety and continuity.*

The enclosers of such products house the below-listed components:

* Printed circuit boards (PCBs) which carry processors, power supply, switching, battery charger and display circuits
* Active components such as contactors, transistors, and breakers
* Passive components such as capacitors, inductors, and fans.
  1. Battery Systems

After the equipment power electronics (described above), batteries are the second most important component of an UPS.

Backup energy storage is required to cover mains outages or provide a backup power supply if issues are detected with the mains signal. A healthy battery system stores energy for the minimum required duration to cover these outages or whilst the issues with the mains signal are being rectified.

A typical battery system can be mounted internally in a UPS system or externally in a secondary battery cabinet with adequate breakers, switches, and cabling to provide protection and serviceability.

1. VISUAL SUMMARIES
   1. Quick Health Status

This is a visual summary only; details of each asset condition can be found below and further details on the supplied job cards can be accessed via the link below.

A: Equipment / Electronics Status

n POOR CONDITION

n AVERAGE CONDITION

n GOOD CONDITION

n EXCELLENT CONDITION

B: Battery Systems Status

n POOR CONDITION

n AVERAGE CONDITION

n GOOD CONDITION

n EXCELLENT CONDITION

C: Overall Status

n URGENT/CRITICAL

n NON-URGENT

n IMPROVEMENT REQUIRED

n NO ACTION REQUIRED

The following table summarises the outputs of the inspection:

|  |  |  |  |
| --- | --- | --- | --- |
| EPT Asset ID | Asset Location | Asset Serial Number | C: Overall Status |
|  |  |  | n Urgent/ Critical |
|  |  |  | n Improvement Required |
|  |  |  | n Non-Urgent |
|  |  |  | n No action required |
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1. OUR APPROACH TO ASSET CONDITION ASSESSMENT

EPT’s technical team consists of highly skilled individuals with up-to-date specialist power conversion knowledge. We not only make sure that your assets are operating as designed, but also complete an in-depth analysis of the installations so we can provide recommendations to improve the operation, redundancies, safety and finally to assure compliance to Australian standards.

Our areas of analysis include security, safety, standards, best electrical practice, and resilience of the power systems’ electrical infrastructure in the event of power loss to the building.

* 1. Overall Status
     1. Urgent/Critical n

This category requires the highest level of attention. The fault types in this category have either already interrupted the connected critical loads or are likely to cause an interruption soon. This interruption may be triggered by the passing of time, or by one or more of the following external factors:

* + A fluctuation in the grid signal
  + A blackout condition
  + Change in ambient temperature
  + Slight load increase.

Furthermore, any battery system connected to a power conversion system (such as UPS systems) has a high potential to cause hazardous situations when not maintained or charged properly. This would be either by the release of flammable gas (Hydrogen) or the thermal runaway of batteries in advanced stages.

Some of the failure examples in this category include:

* + The UPS system is off and isolated
  + The UPS system is operating on static bypass
  + The UPS system is not able to work on inverter
  + The UPS is at the end of life
  + PCB damaged and is irreplaceable
  + Internal cards damaged
  + Display is off
  + Battery breaker tripped
  + Batteries are warm/hot
  + Batteries have bulged
  + Battery charger voltage is too high
  + Battery charger voltage is too low
  + Battery charging current too high.
    1. Non-Urgent n

This category is where immediate action is recommended to ensure continuity of power to critical infrastructure. The assets noted in this category are the ones that either would be able to provide limited backup supply to the connected critical loads or likely to cause an interruption right away. However, these do not pose as many direct safety risks as the assets listed in the higher category. Interruptions may be triggered by the passing of time, or by one or more of the following external factors:

* + A fluctuation in the grid signal
  + A blackout condition
  + Change in ambient temperature
  + Slight load increase.

Inadequate runtime of the systems or the risk of failing to feed critical loads would still pose a great risk for industrial and mission critical operations, therefore we recommend these actions are re-evaluated by the users for recategorization and to potentially be listed as Critical action items.

Failure examples in this category include:

* + The UPS system is online, inverter alarm is registered in the event logs
  + The UPS system is online, battery test failed alarm is registered in the event logs
  + Display is undecipherable
  + Batteries have corroded terminals
  + Battery impedances are too high
  + Battery discharge test failed
  + Battery charger voltage is slightly low
  + Battery charging current too low.
    1. Improvement Required n

This category is where our team of experts analyses the existing system designs and recommends corrective actions to ensure the safety of people interacting with the assets or to achieve compliance with the site-specific regulations and Australian standards.

Some of these recommendations include:

* + Installation of an external bypass switch to enable safe and uninterrupted servicing of the power conversion equipment
  + Installation of Extra Low Voltage (ELV) isolation kits on battery circuits
  + Replacement of battery enclosure to comply with Australian standards
  + Replacement of top terminal batteries with front terminal batteries to comply with design requirements and/or to provide safety
  + Installation of a communication card for UPS monitoring
  + Replacement of the UPS system with a modular UPS system to provide higher availabilities
  + Addition of new power modules to increase capacity and/or to provide redundancies
  + Installation of a battery monitoring system for battery system management and monitoring.
  1. Detailed list of EPT findings and Recommendations

The table below contains specific issues and recommendations on individual assets.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| EPT Asset  ID | Asset Location | A: Equipment / Electronics Status | B: Battery Status (If available) | C: Overall Status | Recommendation |
|  |  | n POOR CONDITION | n POOR CONDITION | n URGENT/CRITICAL |  |
|  |  | n AVERAGE CONDITION | n AVERAGE CONDITION | n NON-URGENT |  |
|  |  | n GOOD CONDITION | n GOOD CONDITION | n IMPROVEMENT REQUIRED |  |
|  |  | n EXCELLENT CONDITION | n EXCELLENT CONDITION | n NO ACTION REQUIRED |  |
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1. WHY EPT?

EPT is a Western Australian owned and operated power systems specialist who has been in business for 35 years. EPT undertakes a wholistic and lifecycle approach of our supplied UPS and power Conditioner systems.

As Company’s preferred supplier for UPS and Maintenance services for over 10 years, EPT have a true appreciation of the PTA’s requirements and through our site knowledge we supply systems that deliver to our client’s unique requirements.

EPT is a true system integrator. We specify and supply world class leading dedicated power systems, backed with local support as Western Australia’s largest service team dedicated to power protection. We have more than 40 people in our specialist local Western Australian power protection team, including 25 dedicated field staff, backed with National and International manufacturer support.

This combination of international name branded, global supply chain, solutions and local specialist support gives Company the peace of mind that no matter what happens, system support and spare parts are always available.

Our projects are delivered seamlessly with a customer-centric project management philosophy.

**KEY EPT SAFETY AND DELIVERY RECORDS**

**Lost Time Injury Frequency Rate (LTIFR) = 0 lost time injuries in past 10 years**

**Current power protection (UPS) maintained by EPT in Western Australia is over 125MVA**

**Our Energy Saving Projects have delivered a reduction of 1,600 Tonnes of Carbon Dioxide in the last 12 months - equivalent to the energy to power 320 Australian homes**

An important life cycle requirement of systems selected by EPT is they have no software lockouts for standard maintenance tasks. This ensures that Company will never be locked into a single service agent to reset minor alarms.

EPT's approach to power protection systems is **Safety, Simplicity, Redundancy and Modularity**. A single main spare part for each system ensures that on the go site repairs become as easy as swapping a module, not hours of specialised staff being mobilised to site to repair a unit at further downtime costs. Site staff can replace failed modules with hot swap ability. EPT has built this same approach to our battery cabinet design. Easy to maintain and redundancy in strings ensures that batteries are always available, and backup is still available in a failure. This is achieved with standard "off the shelf" front terminal batteries, providing the safest, and easiest way for maintenance, with the ability to build greater redundancy over any other cell type.

EPT offers Company a solution from a single, specialist, integrator with 10+ years knowledge and experience in the industry. The Company can rely on EPT for all their specialist power systems.