التاريخ : 26/03/2025 م

إعادة طرح عطاء رقم – RFQ-H-11760

السادة / الشركات المختصة الراغبة بالمشاركة بالعطاء – المحترمين .

الموضوع : UPS لمشروع العلاج الإشعاعي ، حسب المواصفات المرفقة .

بالاشارة إلى الموضوع أعلاه, يرجى الاطلاع على جداول المواصفات المرفقة مع مراعاة الشروط التالية :-

1. تكتب الاسعار بالدولار الأمريكي وبشكل واضح في المكان المخصص حسب الجدول المرفق وتشمل قيمة الضريبة المضافة, في حال وجود تعارض بين سعر الوحدة ومجموع سعر الوحدة المشتق، فإن سعر الوحدة هو الذي سيعتمد .
2. ثمن نسخة العطاء (250) شيكل إسرائيلي غير مستردة تدفع في الدائرة المالية مبنى الإدارة – الطابق الأول .
3. كفالة دخول عطاء بقيمة (1000) ألف دولار امريكي او ما يعادلها سارية المفعول لمدة ثلاثة شهور تأميناً نقدياً او كفالةً بنكيةً او شيكاً مصدقاً **وفي حالة عدم تقديم المطلوب لا ينظر في عرض سعركم .**
4. كفالة حسن تنفيذ بقيمة 10% من قيمة العطاء في حالة الترسية تامينا نقديا او كفالة بنكية اوشيكا مصدقاً سارية المفعول لمدة ثلاثة اشهر.
5. **أن يكون المتقدم للعطاء وكيلاً حصرياً للماركة التجارية التي سيتم تسعيرها .**
6. **أن يكون السعر المقدم شاملاً للفحص لجميع أجزاء الجهاز ويشمل البطاريات في بلد المنشأ .**
7. رسوم الاعلان على من يرسو عليه العطاء .
8. ضرورة أن تكون الأجهزة المعروضة جديدة وليست مجددة .
9. **ضرورة الالتزام بالتسعير على النموذج المرفق بالعطاء .**
10. يتم تقديم شهادة خصم مصدر في حالة تجاوز المبلغ قيمة 2500 شيكل او ما يعادلها.
11. غرامة تأخير 2% عن كل اسبوع وتبدأ من اليوم الذي يلي موعد التسليم المحدد من قبلكم، وفي حال تأخير التوريد مدة تزيد عن اسبوعين يحق للمستشفى إلغاء أمر الشراء والاحالة على مورد آخر مع تحميلكم فروق الأسعار .
12. الدفع خلال 90 يوماً من تاريخ الاستلام والفحص ومطابقة المواصفات الفنية المطلوبة .
13. تحديد فترة التسليم في عرض سعركم وايضاً فترة الضمان وأن تكون صلاحية العرض المقدم من طرفكم مدة لا تقل عن ثلاثة أشهر .
14. تسلم عروض الاسعار في مكتب مدير دائرة اللوازم والمشتريات رقم (6400) مبنى الإدارة في مستشفى النجاح الوطني الجامعي **بالظرف المختوم فقط** وتوضع في صندوق العطاءات ، على أن يكون عرض السعر يحوي فصلاً بين العرض المالي والعرض الفني أي أن العرض المالي منفصل عن العرض الفني مع ضرورة كتابة رقم العطاء على المغلفين وتوضيح اي منهما العرض الفني والعرض المالي.
15. على كل من يرغب بالمشاركة بتقديم عرض سعر تقديم ما لديه من مواد او اجهزة او ماركات لما جاء اعلاه او البديل له والرد على العطاء سلباً او ايجاباً .
16. يحق للمستشفى تجزئة العطاء وهي غير ملزمة بأقل الأسعار .
17. يحق للمستشفى إلغاء العطاء دون ابداء السبب ودون تحمل اية تكاليف مع اعادة رسوم نسخة العطاء للمشاركين في العطاء ان وجدت، ولا تتحمل المستشفى تكاليف النقل والتحميل والتنزيل .
18. ضرورة ارفاق الرخصة التجارية والسيرة الذاتية للشركة مع عرض السعر .
19. **اخر موعد لتقديم عرض السعر هو يوم الخميس الموافق 17-04-2025 م الساعة الواحدة ظهراً 01:00 pm .**
20. لأية إستفسارات متعلقة بالعطاء المذكور اعلاه , يرجى الاتصال بالسيد مدير دائرة اللوازم والمشتريات هاتف رقم (+97092389687) داخلي (6400) أو من خلال البريد الالكتروني tender3@najah.edu .

مدير دائرة اللوازم والمشتريات

إيـــاد المكـــاوي

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إعادة طرح عطاء رقم – RFQ-H-11760

جدول الأسعار والكميات :

Item No.	DESCRIPTION	UNIT	EST. QTY	CONTRACT AMOUNTS RATE (USD)	CONTRACT AMOUNTS AMOUNT (USD)
	SECTION 16261 **STATIC UNINTERRUPTIBLE POWER SUPPLY** **Supply, install, test and connect the following uninterrupted power supply (UPS) the price shall include enclosures, ventilation, internal connections, visual displays, system mimic diagram, rectifier/charger, inverter, display and controls, internal maintenance by-pass switch, harmonic filters, batteries and batteries racks and all needed accessories to complete the job as specified and as shown on the drawings, specifications and Engineer's instructions, Price shall include factory acceptance test**				
A	100 KVA three phase online UPS, MODULAR (Including 30 minutes batteris at full load)	No.	1		
B	15 KVA three phase online UPS, (Including 30 minutes batteris at full load)	No.	2		
TOTAL					

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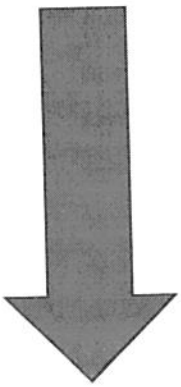
1	إسم الشركة	
2	الختم	
3	التوقيع والإسم	
4	معلومات الإتصال	
5	مدة التوريد	
6	مدة الكفالة إن وجدت	

المواصفات الفنية كما في المرفقات أدناه :



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إعادة طرح – عطاء مدفوع

يعلن مستشفى النجاح الوطني الجامعي عن إعادة طرح عطاء رقم RFQ-H-11760 والخاص ب UPS لزوم مشروع العلاج الإشعاعي ، على الشركات المتخصصة والراغبة بالمشاركة بالعطاء تقديم عروض اسعارها في موعد اقصاه يوم الخميس الموافق 2025/04/17 م الساعة الواحدة ظهراً PM 13:00 :

#	رقم العطاء	موضوع العطاء	ثمن نسخة العطاء	موعد الطرح	وقت الإغلاق	
					التاريخ	الساعة
1	RFQ-H-11760	UPS لزوم مشروع العلاج الإشعاعي	250 شيكل غير مستردة	2025/03/26	2025/04/17	P.M 13 :00

ب الشروط التالية:

1. ضرورة إرفاق الرخصة التجارية والسيرة الذاتية للشركة مع عرض السعر .
2. رسوم الاعلان على من يرسو عليه العطاء .
3. ثمن نسخة العطاء **250** شيكل غير مستردة .
4. كفالة دخول عطاء بقيمة (**1000**) دولار أمريكي .

الراغبين بالحصول على نسخة العطاء مراجعة دائرة اللوازم والمشتريات مكتب رقم6400 / مبنى الإدارة أو عبر الإيميل Tender3@najah.edu وذلك خلال ساعات الدوام الرسمية .

تفسار يرجى الاتصال على :

ستفسارات أخرى يرجى مراجعة دائرة اللوازم والمشتريات هاتف رقم 2331471 -09-970+ تحويلة 6400 / فاكس: 2389685-9-970+ .

SECTION 16261 -- UNINTERRUPTIBLE POWER SUPPLY (BATTERY BACKUP)-MODULAR TYPE

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SECTION 16261 -- UNINTERRUPTIBLE POWER SUPPLY (BATTERY BACKUP) - MODULAR TYPE

PART 1 GENERAL

1.1 SUMMARY

A. General

1. Read this Section in conjunction with other related Sections, the General Requirements, the Design Drawings and the Contract Conditions.

B. Performance Specified Work

1. Refer to the Contractor's Responsibilities in the General Requirements for specific requirements.

2. Supply, deliver, install and warrant the work in strict compliance with the materials and workmanship requirements of the Specification.

3. Where required to prepare Shop Drawings, these shall be limited to final detailing of components, systems indicated on the Design Drawings, necessary to demonstrate their safe installation.

4. Where products are offered by the Contractor for acceptance by the Engineer, provide full supporting documentation in respect of the complete system or installation.

C. Included Systems/ Products

1. Static Uninterruptible Power supply (UPS).

D. Definition

1. MTTR: Mean-time-to-repair.
2. UPS: Uninterruptible Power System.
3. NO: Normally Open.
4. NC: Normally Close.

1.2 SUBMITTALS

A. General: Comply with the requirements of the General Requirements and submit the following.

B. Post Contract Submittals

1. Shop Drawings.
2. Product Data on materials and components for use.
3. Supplementary Product Literature: Include a statement from the manufacturer for the design life of the system.
4. List of tests included.
5. Certified test data.
6. Outline technical specifications reflecting proposed materials and systems.
7. A list of proposed suppliers and Subcontractors intended to be used.
8. Preliminary Method Statement.
9. Preliminary Quality Plan.
10. Summary of deviations from the Specification.

C. Sustainable Design Submittals

1. Refer to General Requirements.

1.3 CLOSEOUT SUBMITTALS

A. General: Comply with the requirements of the General Requirements and submit the following.

1. Warranties.
   a) The manufacturer shall warrant the equipment against defect in workmanship and materials for 1 year from date of installation to the initial end user.
   b) The hardware shall be guaranteed (parts and labor) on site for a period of 12 months after Taking-Over.
   c) UPS Module: The UPS module warranty and maintenance shall include:

1. 1 Year(7 days, 24 hours) Corrective Maintenance.
2. 1 Year(7 days, 24 hours) Annual Performance Check.
3. 1 Year(7 days, 24 hours) Remote Monitoring AdvanceResponse Service.
4. Web access to account information and Site service activity.
5. 1 Annual Power Protection Audit.
6. On Site service response time during first year shall be guaranteed for 4-hour on Site response.

d) Battery: The UPS manufacturer shall warrant their battery cabinets on a prorated basis for 10 years to deliver no less than 80% of its rated capacity, provided the prevailing ambient temperature of the battery area does not exceed 30°C. For external battery systems, the battery manufacturers' warranty shall apply.

2. Operation Manual: 1 No. copy of the operation manual shall be furnished. It shall possess sufficient detail and clarity to enable the Employer's technicians to understand and operate the UPS equipment. The manual shall describe the UPS in full by including the following major items:

a) Operating Procedures.
b) Performance and Technical Specifications.
c) General Description.
d) UPS Module Description.
e) Communications Capability.
f) Battery Description.
g) Accessory Description.

3. Installation and Maintenance Manual: 3 copies of the installation manual shall be furnished. It shall possess sufficient detail and clarity to enable the Employer's technicians to maintain the UPS equipment. 1 set of the following drawings and data sheets shall be supplied:

a) Receiving and Installation Instructions.
b) UPS One-Line Drawings.
c) Equipment Outline Drawings.
d) Interconnection Drawings.
e) Battery Wiring Diagram.
f) Accessory Wiring Diagrams.
g) Mounting details.
h) UPS shall be equipped with a documentation pocket for storage of manuals.

1.4 QUALITY ASSURANCE

A. Standards: In addition to the requirements indicated on the Design Drawings, or specified in the General Requirements and Specification, the Work shall be in accordance with the following standards, codes and relevant statutory requirements.

1. International Electrical Testing Association, NETA Standards.
2. National Fire Protection Association, NFPA Standards.
3. European Committee for Electrotechnical Standardizations, CENELEC Standards:
   a) 2006/ 95/ EC Low voltage directive.
   b) 98/ 37/ EC Machine directive.
4. Institute of Electrical and Electronics Engineers, IEEE Standards:
   a) IEEE C62.41 IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
5. National Electrical Manufacturers Association, NEMA Standards:
   a) NEMA PE 1-1983, UPS Standard.
6. International Electro-technical Commission, IEC Standards:
   a) IEC 61000-4-2 Electromagnetic compatibility (EMC).
   b) IEC 61439-1 Low-voltage switchgear and control gear assemblies - Part 1: type-tested and partially type-tested assemblies.
   c) IEC 62040-2 Uninterruptible power systems (UPS). Electromagnetic compatibility (EMC)

requirements.

7. BSI Group, (BS) British Standards:

   a) BS EN IEC 62485-2 Safety requirements for secondary batteries and battery installations - Part 2: Stationary batteries.

   b) BS EN 60896-11 Stationary lead-acid batteries - Part 11: Vented types - General requirements and methods of tests.

   c) BS EN 60896-21 Lead acid stationary batteries, Part 21: valve-regulated types - Test methods.

   d) BS EN 60896-22 Stationary lead-acid batteries. Valve regulated types. Requirements.

   e) BS EN 60146-1-1 Semiconductor converters. General requirements and line commutated converters. Specification of basic requirements.

   f) BS EN 61000-6-1 Electromagnetic compatibility (EMC). Generic standards. Immunity for residential, commercial and light-industrial environments.

   g) BS EN 61000-6-2 Electromagnetic compatibility (EMC). Generic standards. Immunity for industrial environments.

   h) BS EN 61000-6-4 Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments.

   i) BS EN 60204-1 Safety of machinery. Electrical equipment of machines. General requirements.

   j) BS EN 62040-1-1 Uninterruptible power systems (UPS). General and safety requirements for UPS used in operator access areas.

   k) BS EN 62040-3 Method of specifying the performance and test requirements.

B. Source Quality Control

1. The UPS manufacturer shall have a minimum of 15 years experience in the design, manufacture and testing of solid-state UPS. A list of installed UPS of the same type as the manufacturer proposes to furnish for this application shall be supplied with the proposal.

2. The UPS manufacturer shall have ISO 9001 certification for engineering/ R&D, manufacturing facilities and an efficient field service organization.

3. The UPS manufacturer shall supply Certification of Origin stating the UPS has been designed, produced and tested in a country of the European Community.

C. Preconstruction Testing/ Reports

1. Submit reports of independent tests demonstrating that the products and systems comply with the specified performance requirements.

2. Where test results for a material or product are not available, undertake testing to show compliance with the Specification at an independent testing laboratory acceptable to the Engineer.

3. The provision of testing data or the carrying-out of tests does not relieve the Contractor of his responsibilities regarding the performance requirements, durability or service life requirements.

D. Safety: The UPS shall carry the CE mark, indicating the equipment complies with European Community standards IEC 62040-1 and 2 (Electromagnetic Compliance).

1.5 RELIABILITY AND MAINTAINABILITY

A. Reliability

1. The calculated UPS module mean-time-between-failure, which would result in an unsuccessful emergency transfer to internal bypass and subsequent load loss, shall be no less than 2,250,000 hours.

2. The calculated mean-time-between-failure for the UPS module, which would result in a successful emergency transfer to internal bypass, shall be no less than 62,000 hours.

3. The calculated mean-time-between-failure for any UPS module component shall be no less than 43,000 hours.

4. The UPS module shall feature redundant power supplies. Power to the control power supplies shall originate from the Rectifier/ Charger input, Bypass input and UPS module output. In the event one of the power supplies shall fail, the UPS module shall continue to operate in Normal mode without load de-rating. A failed power supply condition shall be enunciated on the monitor panel and available remotely through the RS232 port. A failure alarm shall automatically clear when the failed power supply is replaced.

5. Each power module will have their own control unit independently to have multiple redundancy and avoid single point of failure.
6. The UPS module shall feature redundant cooling fans. In the event one of the fans shall fail, the UPS module shall continue to operate in Normal mode without load de-rating. A failed cooling fan condition shall be enunciated on the monitor panel and available remotely through the RS232 port. A failure alarm shall automatically clear when the failed fan is replaced.

7. The UPS module shall utilize high-reliability wiring and connectors. The UPS module shall not feature ribbon cables.

8. The inverter controls, rectifier/ charger controls, bypass controls and monitoring/ communication controls in the UPS module shall be contained, in their totality, on a maximum of four control printed circuit boards.

9. All power cable connections to power transformers and chokes shall be secured with permanent cold weld crimps which require no maintenance or periodic re-torque. These cold weld crimps shall be Underwriters Laboratories recognized components.

B. Maintainability: Calculated and demonstrated mean-time-to-repair (MTTR) shall not exceed 30 minutes,
including time to diagnose the problem and replace the subassembly.

PART 2 PRODUCTS

2.1 SYSTEMS/ PRODUCTS

A. Uninterruptible Power Supply (UPS)

1. Description: This Section includes three-phase Modular UPS systems with hot swappable power modules , utilizing true online double-conversion technology .The UPS is to be static-type, transformer less UPS installations complete with , power factor corrected rectifier-charger, high efficiency three level IGBT converter architecture, battery disconnect device, static bypass transfer switch with sufficient Icc ratings , built in factory fitted back feed protection devices for rectifier and bypass , network connectivity and remote UPS monitoring provisions, and advanced battery management capabilities .

2. Normal Conditions: Supply the load with ac power flowing from the normal ac power input terminals, through the rectifier-charger and inverter, with the battery connected in parallel with the rectifier-charger output.

3. Abnormal Supply Conditions: If normal ac supply deviates from specified and adjustable voltage, voltage waveform, or frequency limits, the battery supplies energy to maintain constant, regulated inverter ac power output to the load without switching or disturbance.

4. If normal power fails, energy supplied by the battery through the inverter continues supply-regulated ac power to the load without switching or disturbance.

5. When power is restored at the normal supply terminals of the system, controls automatically synchronize the inverter with the external source before transferring the load. The rectifier-charger then supplies power to the load through the inverter and simultaneously recharges the battery.

6. If the battery becomes discharged and normal supply is available, the rectifier-charger charges the battery. On reaching full charge, the rectifier-charger automatically shifts to float-charge mode.

7. If any element of the UPS system fails and power is available at the normal supply terminals of the system, the static bypass transfer switch switches the load to the normal ac supply circuit without disturbance or interruption.

8. If a fault occurs in the system supplied by the UPS, and current flows in excess of the overload rating of the Inverter, the static bypass transfer switch operates to bypass the fault current to the normal ac supply circuit for fault clearing.

9. When the fault has cleared, the static bypass transfer switch returns the load to the Inverter.

10. If the battery is disconnected, the UPS continues to supply power to the load with no degradation of its regulation of voltage and frequency of the output bus.

11. Manual operation includes the following:

a) Turning the inverter off causes the static bypass transfer switch to transfer the load directly to the normal ac supply circuit without disturbance or interruption when the bypass supply is in the specified limits and synchronized.

b) Turning the inverter on causes the static bypass transfer switch to transfer the load to the inverter.

c) Maintenance Bypass/Isolation Switch Operation: Device provides manual selection between the following conditions without interrupting supply to the load during switching: The maintenance bypass may be either integrated within the UPS cabinet or an external maintenance bypass can be provided.

d) Maintenance Bypass: Load is supplied, bypassing the UPS. UPS ac supply terminals are energized to permit operational checking, but system load terminals are isolated from the load.

e) Normal: Normal UPS ac supply terminals are energized and the load is supplied through either the static bypass transfer switch and the UPS rectifier-charger and inverter, or the battery and the inverter.

B. SERVICE CONDITIONS

1. Environmental Conditions: The UPS shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage or degradation of operating capability, except battery performance.

   a) Ambient Temperature for UPS System: Rated for operation in double conversion from 0 to 35 degree C for continuous operation as per IEC 62040-3.
   b) UPS manufacturer shall submit a derating chart for operation at 40 to 55C .
   c) Ambient Temperature for Battery: 25 to 30 deg C.
   d) Recommended : 25deg C .
   e) Relative Humidity: 0 to 95 percent, non-condensing

C. PERFORMANCE REQUIREMENTS

1. The UPS shall perform as specified while supplying rated full-load current, composed of any combination of linear and nonlinear load, up to 100 percent nonlinear load under the following conditions or combinations of the following conditions:

a) Inverter is switched to battery source.

b) Steady-state ac input voltage deviates up to plus 10 or minus 15 percent from nominal voltage without battery discharge for 100% load.

c) Steady-state input frequency deviates up to plus or minus 5 percent from nominal frequency.

d) Load is 100 percent unbalanced continuously.

2. Minimum Duration of Supply: If battery is sole energy source supplying rated full UPS power size the batteries for 30 minutes at specified kW .

3. Input Voltage Tolerance: System steady-state and transient output performance remains within specified tolerances when steady-state ac input voltage varies plus 10, minus 15 percent from nominal voltage.

4. Overall UPS Efficiency: Minimum efficiency 96% at 100 percent load in online double conversion mode. At 50% load the efficiency should be greater than 96% in double conversion mode. The declared efficiency must be measured as per IEC 62040-3. Accredited national laboratory certificate shall be submitted for efficiency .

5. High Efficiency Mode : >99% efficiency with return capability to double conversion mode in less than 2mS. When high efficiency mode is utilized, the UPS must attenuate ANSI C62.41-type line transients to within IEC and ITIC limits. In the high efficiency mode the UPS System shall be able to distinguish between upstream (utility) faults and downstream (load) faults, and react appropriately to protect and support the critical load, without interruption.

6. While in High efficiency mode , the UPS should be able to transfer to double conversion mode in less than 2mS. The UPS should have the ability to enable the high efficiency mode for parallel configurations of UPS systems also.

7. Maximum Energizing Inrush Current for UPS: 100% of the rated full-load current.

8. Maximum AC Output-Voltage Regulation for Loads up to 50 Percent Unbalanced: Plus or minus 2 percent over the full range of battery voltage.

9. Output Frequency: 60 Hz, plus or minus 0.5 percent over the full range of input voltage, load, and battery voltage.

10. Limitation of harmonic distortion of input current to the UPS shall be as follows:

a) The rectifier-charger circuits should be IGBT Rectifier with PFC. The input THDi shall be limited to 3 percent, maximum, at rated full UPS load current.

11. Maximum Output-Voltage Transient Excursions from Rated Value: For the following instantaneous load changes, stated as percentages of rated full UPS load, voltage shall remain within stated percentages of rated value and recover to, the IEC and ITIC limits , plus or minus 1 percent of that value within 140 ms:

a) 50 Percent: Plus or minus 4 percent .
b) 100 Percent: Plus or minus 4 percent.
c) Loss of AC Input Power: Plus or minus 1 percent.
d) Restoration of AC Input Power: Plus or minus 1 percent.

12. Input Power Factor: A minimum of 0.99 when supply voltage and current are at nominal rated values and the UPS is supplying rated full-load current.

13. Minimum Overload Capacity of UPS at Rated Voltage
    a) Overload current capability: The unit shall operate with up to 110% of resistive/inductive load for 10 minutes, up to 125% for 60 seconds, and up to 150% for 10 seconds.
    b) Fault clearing current capability: 1000% RMS for 10ms static bypass,
    c) Inverter output current limit -Short circuit 250% for 300mS;

14. EMI Emissions: Comply with FCC Rules and Regulations, and with 47 CFR 15 for Class A equipment or IEC 62040-2 C3 UPS

15. EMC Suppression: The UPS shall meet IEC 62040-2 requirements,

16. Electrostatic discharge (ESD): The UPS shall meet EN61000-4-2 level 3

17. Enclosure: Protection & Construction: IP20 as per IEC 60529 , in compliance to IEC62040 unless otherwise indicated.

18. Control Assemblies: Mount on modular plug-ins, readily accessible for maintenance.

19. Surge Suppression: Protect internal UPS components from surges that enter at each ac power input connection including main disconnect switch, static bypass transfer switch, and maintenance bypass/isolation switch. Protect rectifier-charger, inverter, controls, and output components.

20. Maintainability Features: The power modules shall be hot swappable draw out type modular sections. The power modules should have the ability to autoconfigure when inserted into a frame and adapt to the frame environment with appropriate firmware.

21. UPS Cabinet Ventilation: Redundant fans draw in ambient air from the front of cabinet and discharge it through the rear. There should be a provision available for top air exhaust if the site conditions require a top air exhaust solution.

22. Cable entry: Standard cable entry for the UPS cabinet shall be through the enclosure top. A dedicated wireway shall be provided within the UPS cabinet for routing user input and output wiring . There should be sufficient space allowing appropriate cable bending without causing excessive stress on cables and UPS terminals.

23. Output Circuit Neutral Bus, Conductor, and Terminal Ampacity: Neutral conductor Should be able to handle the nonlinear current , for which the UPS system is rated for.

2.2 DESIGN CRITERIA

A. UPS Module Components: The UPS module shall consist of the following main components:

1. Rectifier/ Charger.

2. Static Inverter.
3. Bypass.
4. Output Isolation Transformer.
5. Control Panel.
6. Monitor Panel.
7. Communication Panel.
8. Load bus synchronizer.
9. Slimline output Distribution Panels. Panel arrangement indicated on the Design Drawings.

B. UPS Module Modes of Operation: The UPS Module shall operate as a dual conversion, on-line, fully automatic system as defined in accordance with IEC 62040-3. System operation shall be in the following modes.

1. Normal: The critical load shall be continuously supplied by the Inverter. The Rectifier/ Charger shall derive power from the commercial AC source and shall supply DC power to the Inverter while simultaneously float- charging the battery. Under normal mode operation, with input power present and available, the UPS shall have the ability to operate on a varying input frequency source (± 3Hz) without relying on battery. During this operational condition, the input frequency variation shall not affect the 60Hz output frequency of the UPS.

2. Battery: Upon failure of the commercial AC power, the critical load shall continue to be supplied by the Inverter, which shall obtain power from the batteries without any operator intervention. There shall be no interruption to the critical load upon failure or restoration of the commercial AC source.

3. Recharge: Upon restoration of the AC source, the Rectifier/ Charger shall recharge the batteries and simultaneously shall provide power to the Inverter. This shall be an automatic function and shall cause no interruption to the critical load.

4. Bypass: If the UPS module shall be taken out of the Normal mode for overload, load fault, or internal failures, the static bypass switch shall automatically transfer the critical load to the commercial AC power. Return from Bypass mode to Normal mode of operation shall be automatic. No-break transfer to and from Bypass mode shall be capable of being initiated manually, without operation of the static switch.

C. Internal manual maintenance bypass and external maintenance by pass facilities shall be provided for UPS in addition to the static bypass switch.

2.3 MATERIALS

A. RECTIFIER-CHARGER

1. Capacity: Adequate to supply the inverter during rated full output load conditions and simultaneously recharge the battery from fully discharged condition to 95 percent of full charge within 10 times the rated discharge time for duration of supply under battery power at full load. The recharge time may vary depending on the battery technology and chemistry (VRLA/ Ni Cd/ Li Ion etc)

2. DC Output Ripple: Limited by output filtration to less than 1 percent of rated voltage, peak to peak .

3. Rectifier-Charger Control Circuits: Immune to frequency variations within rated frequency ranges of normal and emergency power sources.

4. Response Time: Field adjustable for maximum compatibility with local generator-set power source.

5. The UPS shall have the following programmable input current limit settings while operating in normal mode on generator:

   a) Rectifier/charger input current limit shall be adjustable from 100% to 115% of full-load input current.

   b) Battery recharge input current limit shall be adjustable from 10% to 15% of the UPS full load input current regardless of the actual load on the UPS

6. Battery Float-Charging Conditions: Comply with battery manufacturer's written instructions for battery terminal voltage and charging current required for maximum battery life.

7. Battery Management : The UPS rectifier- charger should have built in advanced battery management system with the following features to enhance the life of batteries .

   a) The battery management system shall provide battery time remaining while operating in normal mode and battery mode. Battery time available information shall be displayed real-time, even under changing load conditions. Upon commissioning, battery runtime information shall be available.

   b) The battery management system shall charge the batteries using an intermittent charging cycle. The active battery charger states are constant-current (charge mode), constant-voltage (float mode) and no-charge (rest mode). The charge mode shall equalize and charge the batteries to near full capacity before entering into float mode. In float mode a constant voltage float charge shall charge the batteries for a minimum of 48 hours or until the batteries are fully charged. The batteries are then put into rest mode. The battery shall be monitored whilst in rest mode and the charge cycle shall automatically re-start should the battery voltage drop below pre-determined levels. The charging control system shall activate an alarm should the battery capacity drop below the pre-determined levels. The charge cycle will automatically restart after a utility disturbance. The batteries shall not be physically disconnected from the UPS DC bus during the charge cycle and shall be available at all times to supply the inverter.

   c) Annunciation of Alarms: At UPS control panel.

B. INVERTER

1. Description: Pulse-width modulated, with sinusoidal output high efficiency with latest three level inverter technology. Include a bypass phase synchronization window adjustment to optimize compatibility with local engine-generator-set power source.

2. The inverter shall also have the following features:
   a) The inverter shall be capable of providing the specified quality output power while operating from any DC source voltage (rectifier or battery) within the specified DC operating range.

   b) The design of the UPS shall permit safe and fast removal and replacement of the inverter module. Mean time to repair (MTTR) for the module shall be no more than 10 minutes in order to return UPS to normal mode.

   c) The inverter shall feature protection circuitry that prevents the IGBTs from sourcing current in excess of their published ratings.

   d) The inverter should have a fast acting built in mechanism to prevent DC voltage flowing into the output circuit in the event of inverter component failure.

   e) UPS SYSTEM Parallel Operation.

3. For parallel systems provide redundant communication between individual UPS systems to mitigate risk of loss of communication. The redundant communication link should be wire free..

   a) The redundant UPS system configuration must be fault tolerant without single point of failure.

   b) The load sharing between the UPS systems in the parallel configuration should not be dependent on the parallel communication link.

   c) Even in case of failure of the parallel communication cables or parallel communication interfaces, the UPS modules should continue to share the load equally, even if the output load conditions change or loss of input mains power occur.

   d) The load must be shared between the power modules within a UPS System and between UPS Systems in a parallel configuration.

   e) In the event of a parallel system communication error, when the UPS systems are healthy , it must be possible to reinstate the parallel communication and bring the installation to " NORMAL OPERATION" without shutting down the UPS systems forming the parallel configuration.

   f) Simulate the parallel communication error during commissioning and demonstrate the parallel operation and load sharing.

C. STATIC BYPASS TRANSFER SWITCH

1. Description: Solid-state switching device providing uninterrupted transfer. A contactor or electrically operated circuit breaker automatically provides electrical isolation for the switch.

2. Switch Rating: The bypass shall consist of a fully rated for the UPS capacity , with 115% Continuous overload capacity , naturally commutated static switch for high speed transfers. The bypass shall feature the following transfer and operational characteristic.

   1. Transfers to bypass shall be automatically initiated for the following conditions

      a) Output overload period expired.

      b) Critical bus voltage out of limits.

      c) Internal over temperature period expired.

      d) Total battery discharge.

      e) UPS failure

   2. Uninterrupted automatic re-transfer shall take place whenever the inverter is capable of assuming the critical load.

   3. Uninterrupted automatic re-transfers shall be inhibited for the following conditions:

      a) When transfer to bypass is activated manually or remotely.

      b) In the event of multiple transfers/re-transfer operations the control circuitry shall limit "cycling" to three (3) operations in any ten-minute period. The fourth transfer shall lock the critical load on the bypass source.

      c) UPS failure.

   4. All transfers to bypass shall be inhibited for the following conditions:

      a) Bypass voltage out of limits (+/- 10% of nominal)

      b) Bypass frequency out of limits (+/- 3 Hz, adjustable, factory set)

c) Bypass out of synchronization

d) Bypass phase rotation / installation error

D. UPS System Electrical Safety

1. The UPS should have built in integrated semiconductor failure detection and back feed protection mechanism as per IEC 62040-1 within the UPS system .
2. Back-feed protection device must be factory fitted for static bypass and rectifier input circuits and part of the standard UPS equipment. UPS systems requiring external protection contactor and site specific control wiring shall not be considered.
3. The UPS manufacturer must declare the Icc (Rated conditional short circuit current) or Icw (Rated short circuit withstand current). This must be compliant with the IEC 62040-1 - Amendment 2013 for Installation Safety. A UPS system certified by third party accredited test laboratories are recommended .
4. The UPS system should have a declared prospective short circuit current in kA equal to or greater than the prospective short circuit current estimated at the UPS input terminals as part of the short circuit study of the building electrical installation (Icw rating of upstream switchgear panel shall be considered for reference) . The UPS system manufacturer shall submit a third party type test certificate stating the Icc or Icw rating of the proposed UPS systems . The UPS system shall be independently tested for the stated Icc or Icw .

E. BATTERY

1. Description: VRLA batteries as per IEC60896-21/22. The battery shall be UL94 V0 compliant for the battery casing as flame retardant. The battery shall be of long design life (10-12YEARS) as per Euro bat classification. ISO certificates for design , manufacturing and support for the manufacturer and production facility shall be submitted by the manufacturer.
2. Nickel Cadmium batteries : Nickel cadmium batteries shall be compliant with IEC 60623 , IEC 62259 , IEC 62485-2 and EN50272-2 for electrical performance and safety requirements
3. The battery sizing shall be submitted based on IEEE 485 constant power discharge method. The lowest end of discharge voltage to be considered is 1.67V/ cell. Battery discharge table for constant power discharge from the battery manufacturer shall be submitted . The rated power for sizing the battery shall be considered as below
4. Battery power (kW) = {UPS output power (kVA) x output pf }/ inverter efficiency
5. For Ni Cd batteries the sizing shall be done as per IEEE1115 and lowest end cell voltage to be considered is 1.0V /cell.

F. CONTROLS AND INDICATORS

1. DSP based controlled circuitry: The UPS controls shall have the following design and operating characteristics:

a) Fully automatic operation of the UPS shall be provided through the use Digital Signal Processing. DSP shall eliminate variances from component tolerance or drift, and provide consistent operational responses.

b) All operating and protection parameters shall be firmware controlled, thus eliminating a need for manual adjustments. The logic shall include system test capability to facilitate

maintenance and troubleshooting. Printed circuit board replacement shall be possible without requiring calibration.

c) Start-up and transfers shall be automatic functions.

2. Digital Front Panel Display: The UPS control panel shall be a digital front panel display (Color Touch Screen).The LCD shall display UPS status, metering, battery status, alarm/event queue, active alarms and UPS configurations. The front panel display shall show a system mimic diagram with an outlined power path, current operating mode and event logs.

3. Touch screen LCD interface built into the front of the UPS should be able to provide the essential information onsite like power quality, energy consumption and efficiency trends – both as data and graphics

4. Control Panel Indicators: The UPS control panel shall provide the following monitoring functions with indicator LED's visible from a long distance:

   a) NORMAL: This shall indicate that the commercial AC utility or generator source is supplying power to the rectifier and the inverter is supporting the critical load. A text message shall indicate if the bypass line is not within tolerance.

   b) BYPASS: This shall indicate that the UPS has transferred the load to the bypass circuit.

   c) BATTERY: This shall indicate that the commercial AC utility or generator source has failed and the battery is supplying power to the inverter, which is supporting the load. A text message shall indicate if the battery charge is low or if the battery is installed but disconnected.

   d) ALARM: This shall indicate that the UPS detects an alarm condition, outlined in detail in the operator's manual.

5. Control Panel Controls: The UPS control panel shall provide the following functions from front panel push buttons:

   a) EVENTS: Displays the list of Active System Events and a historical log of system events. Historical logs shall include a detailed time stamped list of the latest events.

   b) METERS: Displays performance meters for the system or critical load. When selected, the front display shall show individual screens of input parameters, output parameters or bypass parameters including; voltage, current and frequency. In addition, the battery display shall show runtime remaining.

   c) Measurement of the following parameters on UPS display

      1. Battery: Battery voltage , Battery current, Charge level and Estimated time remaining
      2. Utility, inverter output, and load AC voltage.
      3. Inverter output and utility frequency.
      4. UPS output and Input : Total Current , kVA ,kW and load pf .
      5. UPS Output and Input : Per phase Current ,kVA ,kW and pf
      6. Energy Measurement : kWh with Energy log
      7. UPS System Efficiency : Real time efficiency and efficiency log .
      8. UPS System output load profiling (Kw consumption) for daily, weekly , monthly ,yearly and since UPS start up.

   d) CONTROLS: Displays a System Controls screen. Allows selection of operating mode, normal, bypass, charger on/off and Power Module on/off.

e) SETUP: Allows display contrast, date and time information serial communication port configuration and display of firmware revision numbers.

f) RETURN: Confirms selection or returns to previous screen.

6. Interface panel: The UPS shall be equipped with an interface panel, which provides the following signals and communication features in a Class 2 environment:

a) Alarm contact: A dry contact for annunciating a summary alarm shall be provided for customer use. This contact shall be Form "C" capable of supplying both N/O and N/C contacts. Contact ratings shall be 5A max at a voltage not to exceed 28VDC or 30VAC.

b) RS232 (EIA / TIA-232) communications interface: Circuitry shall be provided for one RS232 (EIA / TIA-232) communication port for connection to automated service department diagnostic tools. This port may be used with simple ("dumb") terminals to gain remote access to all unit operation information.

c) Building alarms: Two inputs shall be provided for monitoring the status of external dry contacts. Building alarms shall be set up through the UPS configuration mode function on the RS232 (EIA / TIA-232) port. ModBUS TCP also should be available .

d) External EPO contacts: Shall be provided to connect an external remote emergency power off switch to shut down the UPS and de-energize the critical load.

e) Battery control contacts: Contacts shall be provided to connect the battery shunt trip and auxiliary signals from a battery breaker or battery disconnect switch depending on the control mechanism deployed by UPS.

f) External bypass indicator connection: A connection point shall be provided to acknowledge that an external maintenance bypass has been closed around the UPS, placing the critical load on utility power.

G. UPS System Configuration Features & Architecture

1. UPS Configurations for Capacity and Redundancy: UPS shall be constructed such that multiple internal modules can be combined for redundancy or capacity. Internal modules shall be capable of being paralleled to increase system power levels or to provide redundant power. The UPS shall utilize autonomous internal modules that do not rely on any control interconnections for synchronized operation. The internal modules shall operate in a peer-to-peer manner to provide automatic load sharing, synchronization, and selective tripping capabilities. "Master-slave" configurations are not acceptable.

2. The UPS shall utilize a communications network to provide system information and status, such as operating mode and meter data. This network shall provide individual internal module information as well as total UPS information, and shall be available from the UPS front panel display. The loss of this system information network shall not cause the UPS to transfer to bypass or drop the critical load.

3. UPS's with more than one internal modules should have the option to be inherently redundant when the load is less than total amount of module power minus one module power of the UPS rated capacity.

4. Concurrent maintenance: Any redundant internal UPS Modules can be concurrently isolated and serviced (by factory-trained service engineers) while the other internal modules continues to provide protected power to the load.

5. Auto Adaptive Capacity Management System : The UPS system should have the dynamic module management system capability to optimally employ the uninterruptible power modules in the UPS to achieve higher efficiencies in double conversion mode so that UPS will run at all

load levels with maximum efficiency. The UPS should have the intelligence to selectively place unnecessary power modules in "ready state" based on output load level.

6. In Parallel Systems , Dynamic Module Management Mode shall support both distributed bypass and centralized bypass parallel configurations.

7. The system shall be capable to periodically cycle the working modules automatically to balance the ageing effects.

H. COMMUNICATION INTERFACES & UPS POWER MANAGEMENT TOOLS

1. Communications Bay: The UPS shall be equipped with field configurable communications bays that will accommodate communication devices.

2. Remote Monitoring:

   a) WEB/SNMP communication capabilities will be available for all systems.

   b) The UPS shall be able to be monitored remotely via communications devices. UPS manufacturer shall provide optional communications devices capable of communicating via various industry standard protocols such as RS232 and ModBUS RTU/ TCP.

   c) The UPS should be able to integrate into any industry standard Building

   d) Management System (BMS).

   e) The UPS must also be able to be monitored via any standard Internet browser.

   f) All optional hardware interfaces shall be "Hot-swappable" (UPS maintains power to critical applications while changing interfaces).

3. Cyber Security compliance : The network connectivity , remote monitoring and UPS system interface connectivity solutions shall be certified as per cyber security standards UL2900-1 and IEC 62443-2

4. Notification:

   a) There shall be a mechanism to send alerts to key personnel via email or SNMP traps. An alarm notification may also be sent by a network message

   b) Dry-form "C" contacts shall be available for remote indication of the following conditions:

      1. UPS on battery.
      2. UPS on-line.
      3. UPS load-on bypass.
      4. UPS in alarm condition.
      5. UPS off (maintenance bypass closed).

   c) Emergency Power Off Switch: Capable of local operation and operation by means of activation by external dry contacts. External EPO is preferred for safety reasons.

I. MAINTENANCE BYPASS/ISOLATION SWITCH

1. Description: Manually operated switch or arrangement of switching devices with mechanically actuated contact mechanism arranged to route the flow of power to the load around the rectifier-charger, inverter, and static bypass transfer switch. The maintenance bypass Switch can be either internal or external to the UPS System , depending on the configuration.

2. Switch shall be electrically and mechanically interlocked to prevent interrupting power to the load when switching to bypass mode.
3. Switch shall electrically isolate other UPS components to permit safe servicing.
4. Comply with relevant IEC or BS standard.
5. Switch Rating: Continuous duty at rated full UPS load current.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:Examine areas for compliance with requirements for installation and conditions affecting performance of the Work. Identify conditions detrimental to a proper and timely completion. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install UPS system in accordance with the manufacturer'srecommendations.

3.3 SITE QUALITY CONTROL

A. The following general and visual inspections shall be performed on Site at the time the equipment is commissioned.

1. Inspect equipment for signs of damage.
2. Inspect equipment for cleanliness and foreign objects. Advise installing Subcontractor if condition is not satisfactory.
3. Observe the type of ventilation, the cleanliness of the room, the use of proper signs, and any other safety related factors.
4. Verify sizing and connection of neutral and ground conductors.
5. Verify that the equipment is level and that properly anchored.
6. Verify that all circuit boards are configured and mounted correctly.
7. Verify the installation conforms to manufacturer's drawings and installation requirements.
8. Verify that all optional hardware is installed.

B. Perform the following mechanical inspections:
1. Check all power wiring connections for tightness.
2. Check all the control wiring terminations and plugs for tightness or proper seating.

C. The following electrical inspections and tests shall be performed on Site at the time of commissioning:
1. Verify all fuse continuity.
2. Check the DC bus for a possible short circuit.
3. Check input and Bypass power for proper voltages and phase rotation.
4. Check all lamp test functions.
5. Verify input voltage and bypass voltages correspond to the equipment rating.
6. Verify phase rotation of inputs and bypass.
7. Verify connection of current transformers and control power transformers.

D. Initial UPS Startup
1. Verify that all the alarms are in a "go" condition.
2. Energize the UPS module and verify the proper DC, walkup, and AC phase on.
3. Check the DC link holding voltage, AC output voltages, and output wave forms.
4. Check the final DC link voltage and Inverter AC output. Adjust if required.
5. Check for the proper synchronization.
6. Check for the voltage difference between the Inverter output and the Bypass source.

E. These services are on a "best effort" basis and shall not absolve the installing Subcontractor or responsibility for properly installing the equipment.

F. System Verification Testing

1. After UPS start-up has been completed by the factory service engineer, the UPS supplier shall conduct a series of verification tests and checks that shall include, but not be limited to the following:

a) Verify and confirm that the physical location and placement of the UPS is acceptable.

b) Verify and confirm that the electrical installation of the UPS and Maintenance Bypass is correct and acceptable.

c) Confirm proper voltage and phase rotation as it applies to the UPS and Maintenance Bypass (all inputs and all outputs).

d) Test correct operation of the Maintenance Bypass including verification of the UPS-to-Maintenance Bypass interlock.

e) Perform a battery discharge test by interrupting incoming power to the UPS rectifier input. Confirm proper battery operation.

f) For sites that are fed by an emergency generator, perform a full transfer to emergency generator power, run on generator for 5 minutes, and transfer back to normal utility power. Verify that UPS operates and interfaces with Emergency generator and ATS without problems.

g) Confirm that the UPS O+M Manual has been left with the UPS equipment inside of the O&M Manual pocket.

h) Level of training for on Site personnel to be agreed with the Engineer, but this shall be not less than 2 No. 1 hour sessions (assume on different days and outside normal working hours).

G. Live testing for all circuits fed by the UPS shall be performed while the UPS is in bypass mode.

3.4 MANUFACTURER'S FIELD SERVICE

A. Field Engineering Support: The UPS manufacturer shall directly employ a nationwide field service department staffed by factory-trained field service engineers dedicated to startup, maintenance, and repair of UPS equipment. The organization shall consist of local offices managed from a central location. Field engineers shall be deployed in key population areas to provide on Site emergency response within 4 hours 80% of the time. Third-party maintenance shall not be accepted.

B. Spare Parts Support: Parts supplies shall be located in the field to provide 80% of all emergency needs. The factory shall serve as the central stocking facility where a dedicated supply of all parts shall be available within 24 hours.

C. Maintenance Contracts: A complete range of preventative and corrective maintenance contracts shall be provided and offered with the proposal. Under these contracts, the manufacturer shall maintain the user's equipment to the latest engineering levels as they are developed.

D. Product Enhancement Program: The UPS manufacturer shall make available feature upgrade service offerings to all users as they are developed. These products shall be proposed as a field-installable, optional kit.

3.5 DEMONSTRATION AND TRAINING

A. General: Refer to the General Requirements for additional demonstration and training requirements.

B. Demonstration

1. Demonstrate to the Engineer, the features and functions of the system and subsystems including labeling process.

2. Furnish the necessary trained personnel to perform the demonstration and instructions and arrange to have the manufacturer's representatives present to assist with the demonstrations.

3. Arrange with the Engineer the date and times for performing the demonstrations.
   a) The Engineer shall select date and time for demonstration.

C. Training

1. Instruct the Employer and designated representatives in the proper operation and maintenance of the system.

2. Conduct a training course for members of the operating and maintenance staff as designated by the Engineer.

3. The training course shall be given at the installation during normal working hours and shall start after the system is functionally complete but prior to final acceptance tests.

4. The field instructions shall cover all of the items contained in the accepted operating and maintenance manuals, as well as demonstrations of routine maintenance operations.

END OF SECTION