

(September 2021)

**PERFORMANCE CRITERIA  
FOR**

**SECTION 26 33 00**

**BATTERY EQUIPMENT  
09/21**

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**GENERAL**

This Performance Criteria (PC) specifies the installation and quality of voice communication terminal equipment.

**1.1 REFERENCES**

**1.1.1 Unified Facilities Criteria (UFC)**

- A. Contractor must comply with the following:
  - 1. UFC 1-200-01 General Building Requirements
  - 2. UFC 3-501-01 Electrical Engineering
  - 3. UFC 3-580-01 Telecom Building Cabling Systems Planning and Design
  - 4. UFC 4-010-06 Cybersecurity
  - 5. UFC 4-510-01 Military Medical Facilities

**1.1.2 Military Standard**

- A. MIL-STD 1691 Construction and Material Schedule for Medical, Dental, Veterinary and Medical Research Laboratories

**1.1.3 National Fire Protection Association (NFPA)**

- A. NFPA 70 National Electric Code
- B. NFPA 99 Healthcare Facilities Code
- C. NFPA 101 Life Safety Code

**1.1.4 Military Health System Standards**

- A. Defense Health Agency Standards
  - 1. Building Control Systems Categorization Memorandum
  - 2. Cyber Security Controls for Physically Isolated Systems
  - 3. Cyber Security Controls for Medical Community of Interest (MEDCOI)
- B. Department of Defense Standards
  - 1. Department of Defense Instruction (DoDI) Number 8500.01
  - 2. Department of Defense Instruction (DoDI) Number 8510.01

### 3. Department of Defense Instruction (DoDI) Number 8530.01

#### 1.1.5 Underwriters Laboratories (UL)

- A. UL 1778 Standard cUL Listing

#### 1.1.6 International Electrochemical Commission (IEC)

- A. IEC, Semiconductor Standards

#### 1.1.7 Other Standards

- A. ISO 9001 Quality Assurance program
- B. EMI compatibility: FCC Title 47, Part 15, Subpart B
- C. IEEE C62. 41-1991
- D. Reserved for future

### 2.1 DESCRIPTION & MATERIALS

All requirements within the MIL-STD-1691 JSN descriptions must be met, as well as the performance guidelines listed in the following descriptions. This criterion describes the requirements for a true on-line, double conversion single phase, solid-state, uninterruptible power system, hereafter known as the UPS. The UPS must provide a quality sinewave output waveform that will supply uninterruptible power to critical AC loads. The system must consist of a converter, system battery, inverter and automatic static bypass transfer switch.

#### 2.1.1 System Description

- A. The utility commercial line supplies alternating current (AC Power) to the UPS's input IGBT (Insulated Gate Bipolar Transistor) rectifier charger circuit and converts it into direct current (DC Power) required to maintain the system's battery in a constant fully charged state while simultaneously supplying the high frequency PWM (Pulse Width Modulation) inverter. The inverter, which uses IGBT's, then converts the DC power to AC power using a 15kHz switching frequency and produces a sinewave output via a conductor capacitor filter resulting in clean conditioned output power for critical AC loads.

#### 2.1.2 Components

- A. Solid-state static converter using IGBT's
- B. Solid-state static inverter using IGBT's
- C. CPU control circuit
- D. Static bypass transfer switch
- E. Sealed lead-acid battery system

#### 2.1.3 Features

- A. Microprocessor based fault memory and diagnostics
- B. Microprocessor based menu-controlled operation
- C. 3.8" Liquid Crystal Display (LCD) touch panel
- D. LED indicators
- E. Active mitigation of reflected input harmonics (no passive filters).
- F. Active control of output voltage distortion (no passive filters).
- G. Automatic input current walk-in
- H. Automatic UPS restart and load pick-up (after system battery depleted; AC restored)
- I. External customer contacts (A-type) dry contacts
- J. Remote Emergency Power Off (EPO)
- K. Internal Maintenance Bypass Switch (MBS)
- L. Battery system self-test
- M. System battery input fuses
- N. (Optional) Integrated UPS Communications Protocols (Lookups)

#### 2.1.4 Modes of Operation

The UPS must be designed to operate continuously at rated capacity as an on-line, double conversion, automatic system in the following modes:

##### 2.1.4.1 Normal

A. The inverter continuously supplies AC power to the critical load. The converter/rectifier converts commercial AC power to regulated DC power which then serves as the inverter input and, simultaneously, as a float charge to the battery system.

**2.1.4.2 Emergency**

A. In the event of a commercial AC power failure, the inverter must derive its input from the system battery, thus providing uninterrupted power to the critical load. This transition must be accomplished without any switching or coupling, and with no interruption of power to the critical load from either a failure or restoration of the commercial AC power.

**2.1.4.3 Recharge**

A. Subsequent to restoration of commercial AC power, the converter must automatically reactivate and provide DC power to the inverter, simultaneously recharging the system battery. This occurs automatically and without interruption to the critical load.

**2.1.4.4 Bypass**

A. In the event that the UPS must be taken off-line due to an overload condition or UPS failure, the critical load must be transferred to the bypass source via the static switch without interruption of power to the critical load. Re-transfer from the bypass source back to normal mode (inverter supplying load) is done automatically once the overload or UPS failure condition has been cleared.

**2.1.4.5 Remote**

A. The UPS logic must be capable of remote operation allowing activation of the following functions from a remote location:

1. Inverter stop.
2. Inverter start.
3. Emergency power off.

**2.2 SYSTEM RATINGS**

The UPS capacity must be sized to supply a load with a 0.7 pf lagging. Sizes of 6, 8,10 and 12kVA.

**2.2.1 Input (Converter / Rectifier)**

- a. Nominal input voltage: 208/120VAC or 240/120VAC  
2 phase, 3 wire or 1 phase, 3 wire
- b. Input voltage range: -30% to +10% (84-132VAC)
- c. Input frequency range: 50/60Hz auto-selectable +/-5%
- d. Total power factor: 0.98 lagging (at full load)
- e. Reflected current harmonic distortion: 4% (at full load)  
7% (at 50% load)

**2.2.2 Battery System**

- a. Nominal bus voltage: 216VDC
- b. Battery type: Sealed lead-acid
- c. Back-up time:
 

<u>kVA</u>	<u>100% load</u>	<u>50% load</u>
6	10 minutes	22 minutes
8	18 minutes	35 minutes
10	18 minutes	25 minutes
12	10 minutes	25 minutes
- d. Recharge time: 8hrs to 90%, 24hrs to 100% (Internal battery)

**2.2.3 Output**

- a. Output capacity:
 

6kVA:	4.2kW
8kVA:	5.6kW
10kVA:	7.0kW
12kVA:	8.4kW
- b. Nominal output voltage: 208/120VAC or 240/120VAC
- c. Output voltage regulation: +/- 2%
- d. Output frequency regulation: +/- 0.05Hz
- e. Rated load power factor: 0.7 lagging
- f. Crest factor: 3:1
- g. Transient characteristics: +/- 5% for 100% load step change

- |                                       |                                   |
|---------------------------------------|-----------------------------------|
| h. Overload capacity:                 | 105-150% for 1 minute             |
| i. Total voltage harmonic distortion: | 2.5% maximum under linear load    |
| j. Efficiency (typical):              | 6kVA: >91%                        |
|                                       | 8kVA: >91%                        |
|                                       | 10kVA: >91%                       |
|                                       | 12kVA: >91%                       |
| k. Bypass:                            | Static switch < 1ms transfer time |

#### 2.2.4 Environment

The UPS must be capable of withstanding any combination of the following external environment conditions without mechanical damage, electrical failure or degradation of operating characteristics.

- |   |                              |
|---|------------------------------|
| a. Ambient operating temperature range: | 32°F to 104°F (0°C to 40°C)  |
| b. Recommended operating temperature:   | 59°F to 77°F (15°C to 25°C)  |
| c. Storage temperature:                 | 5°F to 104°F (-15°C to 40°C) |
| d. Relative humidity:                   | 30-90% (non-condensing)      |
| e. Audible noise:                       | < 55db at 3.3 feet (1 meter) |

#### 2.2.5 Battery Self-Test

For a short duration of time, a small power discharge from the battery is automatically carried out. From this small power discharge, the UPS evaluates the degradation of the battery. The following advantages are therefore achieved:

- a. The Battery Self-Test Function can be performed even when the load is on the inverter.
- b. Due to the short duration small power discharge there is no effect to the battery life expectancy.
- c. The small power discharge has negligible effect on the overall battery backup time. The small power that is discharged by the battery will quickly be replenished

#### 2.2.6 Reliability

The UPS equipment reliability must be represented in terms of theoretical Meantime-Between-Failures. The UPS manufacturer must, as a minimum, provide the following capability:

- a. Total UPS system output (includes reliability of bypass circuit): 250,000 MTBF hours.
- b. UPS operation only: 6kVA: 84,000 MTBF hours 8-12kVA: 69,000 MTBF hours

#### 2.2.7 Maintainability

MTTR of the UPS must not exceed 1 hour including time to replace components.

### 2.3 OPERATOR CONTROLS & STATUS DISPLAY

The UPS system must be equipped with a 3.8" Liquid Crystal Display (LCD) touch panel, control switches, status indicator LEDs and associated accessories which will allow the operator to perform functional commands, monitor the system status and allow for ease of installation.

#### 2.3.1 LCD touch panel:

The touch panel area is composed of one Main sheet and four MENU sheets: Main, Measure, Log, and Set up.

1. Main Sheet: The Main sheet indicates power flow and measured values. The LCD panel allows the user to verify the status and operation of the UPS components by the mimic display. The following information is available on the MAIN Sheet:

- a. Converter operation
- b. Battery operation
- c. Load on inverter
- d. Load on bypass
- e. Typical measurement values of Input, Battery and Load
- f. Alarm/Fault messages

**2. Measure Sheet:** The Measure sheet indicates measured values. The following information is available on the Measure sheet:

Display information:

- a. Input voltage and frequency
- b. Output voltage, frequency and current
- c. Output active power
- d. Output power factor
- e. Battery voltage and charging/discharging current
- f. Load trend for 24 hours

**3. Log Sheet:** The Log sheet indicates history of events and battery (date of replacement, number of battery operation, and operation time).

**4. Set up Sheet:** Clock adjustment, voltage adjustment, and updating battery information must be available on the Set-up sheets.

### 2.3.2 LED Indicator

1. Load on inverter [INV] (green); Illuminated when power is supplied from inverter to the critical load.
2. Load on bypass [BYP] (yellow); Illuminated when power is supplied to load devices by the bypass line.
3. Fault (red); Illuminated when UPS is in fault mode, input abnormal, or overload.
4. Light flashes for minor failure, stays illuminated for major failure.
5. LCD Error (yellow); Flashes when there is a display communication error
6. Conversion Module Error (red and green); Illuminated when there is a communication error between
7. Conversion modules.

### 2.3.3 Accessories

- a. Input/output terminal blocks
- b. External battery input terminal blocks
- c. Battery fuse
- d. External input/output communication connector port
- e. External RS232C communication connector port
- f. External communication port for Lookups (Optional)

## 2.4 COMMUNICATIONS

The UPS must be equipped with an external input/output signal port connector and an RS232C communication interface to enable the operator to receive and send remote communication signals.

### 2.4.1 External input/output signal

#### 2.4.1.1 AS400 Connector:

The UPS must have an external input/output signal port connector compatible with all AS400. A-type dry (male or female) contacts for input and output signals must be made available through a D-sub 25 pin connector.

Output signals must include:

- a. Fault
- b. On battery
- c. Battery low
- d. On bypass
- e. On inverter

Input signal must include:

- a. Remote stop

#### 2.4.1.2 Terminal blocks

The UPS must have an external input/output signal terminal.

Output signals must include:

- a. Fault

Input signal must include:

- a. Battery temperature high
- b. Emergency Power Off (EPO)
- c. Remote start
- d. Remote stop

#### 2.4.2 External RS232C connector:

An RS232C external communication port must be provided for management and shutdown software. Refer to optional equipment listed below.

#### 2.4.3 (Optional) Integrated UPS Communications Protocols (Lookups)

The UPS must have factory installed integral communications system capable of communicating real-time UPS data to a Building Management Systems (BMS) or other information/analytical systems. These communication protocols must be user selectable and comprised of MODBUS RTU (RS232/485/422); MODBUS TCP/IP (Ethernet); Simple Network Management Protocol (SNMP) Simple Mail Transfer Protocol (SMTP); and Web Browser.

### 2.5 OPTIONAL EQUIPMENT

#### 2.5.1 Extended battery cabinets:

Extended battery runtimes must be made available in external matching cabinets for applications requiring reserve times beyond the battery provided inside or externally of the respective UPS cabinet.

#### 2.5.2 Monitoring/shutdown software:

The UPS must be compatible with the other monitoring software. The software is an advanced user-customizable power monitoring management and shutdown software providing UPS status information thus allowing to perform unattended system shutdown when critical conditions occur. Software is designed to run on network servers or workstations in any office environment.

Software features must include:

- a. Monitoring of all intelligent UPS's.
- b. On-screen power history graphing
- c. Multilingual capabilities
- d. Customizable power event actions
- e. Customizable flex events
- f. Easy, menu driven installation
- g. Multiple server shutdown

### 2.6 PHYSICAL CHARACTERISTICS

#### a. Dimensions & Weights:

Unit	Dimensions	Packed Weight	Net Weight
6KVA	13.8" W x 29.9" D x 27.8" H	350lbs	298lbs
8KVA	13.8" W x 29.9" D x 40.6" H	550lbs	496lbs
10KVA	13.8" W x 29.9" D x 40.6" H	550lbs	496lbs
12KVA	13.8" W x 29.9" D x 40.6" H	550lbs	496lbs

- b. **Casters with locking points and leveling feet must be included as a standard feature.**
- c. **Minimum required clearance: 23.5" back, 23.5" top, and 39.2" front for ventilation and maintenance.**

## **.1 SUBMITTALS**

### **3.1.1 Submittals required for government review**

- A. Submittal requirements are outlined in [Division 01] [PWS SOW] [\_\_\_]
- B. [Product Information must include manufacturer's installation instructions, sizing (including required clearance for access and maintenance), utility requirements, isometric drawings, tagged floorplans showing placement for count accountability and accessories/options/consumables lists.]
- C. All submittals require Government approval prior to procurement. Submit all listed items herein, with information sufficient to show full compliance with the criteria. Submit all product selections for review and approval, including but not limited to: materials, finishes, colors, options, accessories, and complimentary products. Provide for review all warranties and service contracts and any available extended warranty or service options.
- D. Samples: Furnish material samples and full range of color selection options for all items that offer material and color selections.
- E. Submit and highlight all applicable options for Government review for all items which optional accessories are provided.
- F. [Joint Interoperability Test Command (JTIC) Approval Documentation.]

## **3.2 QUALITY ASSURANCE**

### **3.2.1 Materials and Equipment**

- A. Materials and equipment must be standard products of a manufacturer regularly engaged in the manufacture of products which are of a similar material, design, and workmanship and are offered for sale on the commercial market through advertisements, manufacturer's catalogs, or sales brochures. The products must have been in commercial or industrial use under similar circumstances and of similar size for 2 years prior to selection for approval/procurement. Products must be supportable for at least three years after government acceptance.

### **3.2.2 Alternative Service Record**

- A. Products having less than a 2-year field service record will be acceptable if a certified record of the manufacturer's factory or laboratory tests demonstrating performance compliance is provided to the Contracting Officer.

### **3.2.3 Service Support**

- A. Equipment items must be supported by service organizations located near the equipment installation, able to service the equipment on a regular basis and respond to emergency calls throughout the warranty period.

### **3.2.4 Manufacturer's Nameplate**

- A. Each item of equipment must have an attached nameplate that is securely affixed in a conspicuous space. A nameplate listing only the name of the distributing agent is not acceptable. The nameplate must contain the following fields in English:

1. Manufacturer's name and address
2. Model and Serial Number
3. Item's utility ranges and/or capacities
4. Voltage, amperage, and applicable Underwriters Laboratory (UL) or Conformité Européenne (CE) rating if electrically powered
5. Date of manufacture

### **3.2.5 Factory Inspection**

- A. Arrange and perform all quality control and quality assurance inspections required by the technical sections of the

criteria, unless otherwise specified. Report these inspections in the daily report to the Government inspector.

### **3.2.6 Product Qualifications**

A. The products specified in the technical sections of this criteria establish standards for each item.

### **3.2.7 Design Parameters**

A. It is not the intention of this Criteria to limit consideration to products of specific manufacturers. The product standards establish the characteristics for which submitted items of equipment will be reviewed and approved by the Government. Equipment furnished must meet each of the following parameters specified in the technical sections:

1. Size of equipment
2. Function of equipment
3. Standard and listed accessories and options
4. Equipment controls and performance of equipment
5. Construction of equipment
6. Finish

## **3.3 STANDARDS DEVIATIONS**

### **3.3.1 Reporting and Submission for Approval**

A. Submit for approval a record of deviations from the standards listed in section (3.2.7.A.) established for each specified product, before ordering equipment.

## **3.4 DELIVERY, STORAGE AND PROTECTION**

### **3.4.1 Packaging and Transporting**

A. Each unit of equipment must be placed in a substantial shipping container or crate for safe transportation to final destination. The shipping container or crate for heavy equipment must be on skid construction to facilitate handling by lift equipment.

### **3.4.2 Packing List**

A. Clearly and legibly indicate on exterior of each container or crate the shipping address and a brief description of contents. Fasten to outside of container a packing list and complete instructions for uncrating equipment and setting it in place. Protect such information in a weatherproof envelope.

### **3.4.3 Protection**

A. Properly protect all materials and equipment from injury and damage during storage, installation, and acceptance.

## **3.5 INSTALLATION, VERIFICATION AND ACCEPTANCE TESTING**

### **3.5.1 Qualifications of Installers and Inspectors**

- A. If required by product warranty, use installers that are approved and licensed by the manufacturer. When required to complete installation, all electricians and plumbers used must be bonded and licensed in the project's jurisdiction.
- B. [Company specializing in installing the products specified in this section must have a minimum 5 years of documented experience.]
- C. [Company specializing in installing the products specified in this section must be within 200 miles or 4 hours travel time.]

### **3.5.2 Installation, Operation, Testing and Certification**

- A. Products must be delivered in manufacturer's original packaging with manufacturer's installation instructions. Include clearly marked project reference.
- B. Prior to installation, thoroughly examine the equipment, materials, and components for both visual defects and conformance with criteria.
- C. Install all equipment in compliance with manufacturer's written instructions and installation procedures.
- D. After installation, the equipment must be inspected and tested under operating conditions. If the equipment fails an inspection or test, such defects/failures must be corrected. Upon correction of defects/failures, inspect and retest all



affected functions related directly and indirectly to the defect or failure. Corrections, replacement, and retesting must be made at no additional expense to the Government.

- E. Provide all items necessary to make equipment fully functional.
- F. Provide appropriately trained personnel to energize, commission, inspect, electrical safety check, calibrate, certify, and provide all required technical testing for equipment and systems. Contractor must provide documentation, test reports and certification documentation attesting that the equipment is properly installed, functional, safe, calibrated, and ready for its intended use.
- G. An equipment item will be considered defective if it cannot be made to meet all established criteria consistent with the activities listed in section (F).
- H. Provide two sets of special tools, software, and any other item/s for each equipment [item] [item type] if required for maintenance and/or future reconfiguration of the item.
- I. Contractor to supply all start-up supplies for medical equipment for a fully operational installation. Contractor must supply to the Government a listing of all needed supplies for ongoing equipment operation for each item of equipment requiring additional supplies for operation.
- J. Engage a factory-authorized service representative to train Government's staff and maintenance personnel to adjust, operate, and maintain medical equipment.
- K. [Confirm functionality of required interfaces to other systems and networks.]

### **3.6 WARRANTY**

#### **3.6.1 Minimum Requirements**

- A. Warranty requirements are outlined in [Division 01] [PWS SOW] [\_\_\_\_].
- B. [Provide manufacturer's written warranty for all items listed. Provide warranty for a minimum of (1) year against defects in materials and workmanship. Warranty must provide for material, labor and all associated replacement and/or repair costs required to provide for a fully operational equipment replacement or repair. Submit manufacturers and installers standard service contract beyond the warranty period for Government review. Warranty must be transferrable to the final owner without risk of being voided. All warranty certification and documentation must be provided to the final owner after date of acceptance.]
- C. Provide routine warranty service in accordance with manufacturer's warranty requirements, for a period of [12 months (minimum)] [\_\_\_\_] after the open for business date. Perform work during regular working hours. Perform service only by factory trained personnel. Maintain a maintenance log of all service orders performed during the warranty period.

### **3.7 OPERATIONS AND MAINTENANCE (O & M)**

#### **3.7.1 Provide the following to the final owner**

- A. Provide O & M data for all FFE-LVS as outlined in [Division 01] [PWS SOW] [\_\_\_\_].
- B. Upon completion of equipment installation, furnish [two (2)] copies of operators/service/maintenance manuals for each type of equipment which will require service or maintenance
- C. Each manual must contain operating instructions and information required for performing periodic maintenance on the equipment. Each service manual must include an illustrated parts breakdown which identifies each part of the unit with manufacturer's part number, wiring diagrams, and a list of necessary service parts, tools, and equipment needed to support maintenance requirements.
- D. Accessory Catalogs: Upon completion of the Project, furnish two copies of the manufacturer's catalogs containing optional accessory items available for all equipment relative to the procured equipment/system delivered herein.
- E. Provide instruction video for cleaning and maintenance, when available.
- F. Provide cleaning requirements for all items to prevent void of warranty.
- G. [Provide contact information for Repair Technician or Emergency Repair Company]
- H. Provide contact information to [Logistics, Pharmacy, Laboratory, and Biomedical Equipment Services.]
- I. Train designated staff in the operation and maintenance of the provided equipment/system. Provide two training sessions for equipment/system users and two training sessions for maintenance personnel scheduled to accommodate shift work. [Provide training certificates that can be executed up to eleven months after the system is installed, in order to provide a refresher course for each group of trainees.] Provide DVD copy of the training with the O & M data.

**--End of Section--**