

EXTERNAL UNINTERRUPTIBLE POWER SUPPLY UNITS - Item No.

Special Provision No. 682F34

May 2019

**REQUIREMENTS FOR INTEGRATED EXTERNAL UNINTERRUPTIBLE
POWER SUPPLY (UPS) UNITS**

1. SCOPE

This Special Provision covers the requirements for the installation and testing of an integrated external uninterruptible power supply (UPS) and cabinet.

2. REFERENCES

This Special Provision refers to the following standards, specifications or publications:

CSA Standards

C22.2 No. 107.1-01 General Use Power Supplies
C22.2 No. 107.3-05 Uninterruptible Power Systems

Electronic Industries Alliance / Telecommunications Industry Association:

EIA/TIA-232-E Interface Between Data Terminal Equipment and Data Circuit-Terminating
Equipment Employing Binary Data Interchange EIA-RS-310-D Cabinets, Racks,
Panels and Associated Equipment

American National Standards Institute (ANSI):

ICES-003, Issue 6 Interference-Causing Equipment Standard – Information Technology Equipment
(Including Digital Apparatus), Limits and Methods of Measurement

ANSI C62.41-1991 Guide on Surge Voltages in AC Power Circuits Rated up to 600V (formerly known
as IEEE 587)

Other:

Canadian Electrical Code (CEC) Section 10 Grounding and Bonding

3. DEFINITIONS

For the purpose of this Special Provision, the following definitions apply:

Battery Run Time means the amount of time that fully charged batteries will be able to provide power for the UPS at a given load level. Run time indicates how long the UPS can operate in autonomy before the battery is completely discharged.

UPS Capacity means the nominal load connected to the UPS that it can safely operate without overloading and shutting down.

4. DESIGN AND SUBMISSION REQUIREMENTS

4.1 Submission Requirements

Specification sheets for the UPS cabinet, UPS controller, wiring schematic, batteries and battery heating mats shall be submitted to the Contract Administrator for review prior to ordering.

5. MATERIALS

5.1 UPS Controller

5.1.1 Functional Requirements

5.1.1.1 The UPS controller shall provide uninterruptible power and conditioning of the utility power required for operation of sensitive electronic equipment in the event of main utility power supply failure and voltage or frequency fluctuations.

5.1.1.2 The UPS controller shall be ruggedized “online” type with wide range automatic voltage regulation, 120 VAC, 60 Hz, single phase.

5.1.1.3 The UPS unit shall include automatic restart option. Upon restoration of utility AC power and complete battery discharge, the UPS shall automatically restart and assume function. The battery shall automatically recharge.

5.1.1.4 The UPS controller shall be EIA 480 mm rack mountable or be supplied with rack shelf suited for the EIA RS-310-D standard.

5.1.1.5 The UPS controller shall include a communication module to support remote management and monitoring capabilities including alarm contacts, inverter contacts, remote shutdown and battery status monitoring. This communication module shall have an RJ-45 port for Ethernet connection. The remote monitoring software and shall be included. The UPS controller shall be able to monitor the internal temperature of the battery cabinet.

5.1.1.6 All power supply cable, battery cables, fuses and control cables including any cables necessary for connection to controller cabinets shall be supplied by the Contractor in accordance to manufacturer requirements.

5.1.2 Environmental

The UPS controller shall be fully operational in external ambient temperatures ranging from -40 to 60 °C and relative humidity of 10 to 95% non-condensing.

5.1.3 Electrical

5.1.3.1 The UPS controller shall provide voltage regulation of $\pm 10\%$ over input voltage range under any line, load or battery conditions and frequency regulation of $\pm 5\%$ synchronized to utility main.

5.1.3.2 The UPS controller shall accept AC input voltage range of 90 to 150 VAC, single phase, 2-wire plus ground.

5.1.3.3 The UPS controller shall have a minimum power rating as specified in the Contract Documents.

- 5.1.3.4 The UPS controller shall provide sine-wave, computer-grade power compatible with all computer loads, power factor corrected. It shall meet or exceed CSA C22.2 No. 107.1 for total harmonic distortion (THD).
- 5.1.3.5 The UPS controller shall include full-time protection from sudden voltage increase with inrush protection, battery backup, and AC line filtering.
- 5.1.3.6 The UPS controller shall provide complete isolation from the line operating as a separately derived power source under Canadian Electrical Code (CEC) Section 10.
- 5.1.3.7 The UPS controller shall provide an overload alarm and circuit breaker designed to operate at an overload of 200% surge.
- 5.1.3.8 Nominal voltage frequency shall be 60 Hz and include tracking of output voltage frequency to input frequency within adjustable limits.
- 5.1.3.9 The UPS controller shall include transfer switches to ensure continuous operation of the protected system either with conditioned line power, battery backup power or power direct from the line should the UPS require maintenance.

5.2 Batteries

- 5.2.1 The UPS batteries shall be self-contained, sealed Valve Regulated Lead Acid (VRLA), maintenance-free gelled electrolyte batteries with a minimum lifetime of 5 years.
- 5.2.2 The UPS batteries shall each have 12 VDC open circuit voltage.
- 5.2.3 The UPS battery configuration shall have minimum [* Designer Fill-In, See Notes to Designer] hours of run time at an ambient temperature of 25 °C with the typical load connected. Typical loads shall be:
 - a) Ethernet switch rated at 50W maximum power output;
 - b) Traffic controller rated at approximately 200W maximum power output;
 - c) [** Designer Fill-In, See Notes to Designer]
- 5.2.4 The battery terminals shall be maintenance-free threaded inserts, no periodic re-torquing required.
- 5.2.5 The batteries shall be fully operational in both charging and discharging states with external ambient temperatures ranging from -40 to 60 °C.
- 5.2.6 The weight of each battery shall not exceed 36 kg.

5.3 UPS Battery Cabinet

- 5.3.1 The cabinet shall be single door, weatherproof enclosure constructed from 3 mm thick aluminum-alloy with open bottom suitable for mounting on a 1200 mm diameter concrete base.

- 5.3.2 The cabinet shall be sized to accommodate the controller unit, transfer switches and the battery strings required for the UPS and shall have a minimum of 15 cm void clearance between the bottom of the batteries to the top of the concrete pad.
- 5.3.3 The cabinet shall include a thermostat connected to the UPS controller.
- 5.3.4 The cabinet shall include battery voltage balancer and battery heater mat for each battery. The heater mat function shall be controlled by the UPS controller.
- 5.3.5 The cabinet shall include thermostatically controlled fans and ventilation openings protected with replaceable air filters.
- 5.3.6 The cabinet shall have a lockable door handle with three-point latch mechanism, sealed with closed-cell neoprene gasket and continuous hinge.
- 5.3.7 The cabinet shall have provision for mounting the rack-mount controller unit.
- 5.3.8 The cabinet shall have metal shelves mounted on slide rails for easy access to the batteries designed to accommodate the size and weight of the batteries. Each shelf shall have two 3 cm holes with grommets for cable routing at each inside corner and battery mats or protection.
- 5.3.9 The cabinet shall be painted ASA Grey polyester powder coating
- 5.3.10 All cabinet mounting hardware shall be provided for installation on concrete pad.

5.4 Power Strip

- 5.4.1 A rackmount 15 amp - 120 volt AC/60Hz power strip shall be supplied.
- 5.4.2 The power strip shall be circuit breaker protected and have a minimum of six (6) CSA 5-15 R outlets configured for easy access.
- 5.4.3 The rackmount power strip shall EIA-310 rack mountable and occupy one rack space (1U) and be constructed of 18-gauge phosphate pre-treated steel with black powder coat finish.
- 5.4.4 The rackmount power strip shall have differential and common mode surge and spike protection and EMI filtering.
- 5.4.5 The power strip shall be EIA compliant and CSA approved.
- 5.4.6 The power strip shall be connected to the UPS power output with power cables.

6. EQUIPMENT - Not Used

7. CONSTRUCTION

7.1 UPS Cabinet

The UPS cabinet shall come as one integrated unit with all internal components securely mounted and internally wired and connected as a complete system according to the manufacturer's recommended installation procedure.

7.2 Installation of the UPS Cabinet

- 7.2.1 The UPS cabinet shall be placed on the concrete footing at the locations shown in the Contract Drawings and installed according to manufacturer's installation procedure.
- 7.2.2 The UPS cabinet shall be positioned in such a way that it is at the same orientation as the controller cabinet and the door opens freely and does not interfere with the controller cabinet door or any physical obstructions in the area.
- 7.2.3 The AC power to the UPS cabinet shall be connected to the power supply according to the manufacturer's recommendations.
- 7.2.4 The UPS unit shall be activated according to the manufacturer's recommendations, including the Ethernet communications and remote monitoring. The remote monitoring software and documentation shall be delivered to the Contract Administrator as part of the system documentation.
- 7.2.5 All cables shall be neatly trained and organized.

7.3 Power and Grounding

- 7.3.1 The UPS controller shall be powered from the controller cabinet PDA.
- 7.3.2 The UPS ground shall be bonded to the power supply ground bus.

7.4 Installation of the Power Strip to the Controller Cabinet

- 7.4.1 The power strip shall be mounted to the existing controller cabinet's rack.
- 7.4.2 The supply end of the power strip shall be connected to the protected AC output of the UPS.
- 7.4.3 The traffic controller, communications equipment components and other protected equipment in the controller cabinet shall be connected to the receptacles at the power strip.

7.5 Quality Control

The Contractor is responsible for all testing and documentation required to establish approval and acceptance of installation and operation of this equipment. The framework of the approval process shall be as specified in the Contract Documents.

The following table details the clauses within this Special Provision, which are to be validated through the PIT, POP, and SIT processes as indicated:

CLAUSE	PIT	POP	SIT
5.1.1.3	√		
5.1.1.4	√	√	
5.1.3.1	√		
5.1.3.2	√		
5.2.2	√	√	
5.2.3	√	√	
7.3.1		√	
7.3.2		√	
7.4.3		√	

8. QUALITY ASSURANCE - Not Used

9. MEASUREMENT FOR PAYMENT

Measurement of the number of uninterruptible power supply units is by Plan Quantity.

The unit of measurement is each.

10. BASIS OF PAYMENT

10.1 External Uninterruptible Power Supply Units - Item

Payment at the Contract price for the above tender item shall be full compensation for all labour, Equipment and Material required to do the work.

The concrete footing and connecting conduits for the external UPS shall be as specified under separate tender items.