**UNINTERRUPTIBLE POWER SUPPLY**

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Approved/Issued by: Jeff Morgan, Product Certification Manager

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| REV. | DATE | DESCRIPTION | AUTHORED  BY | REV MORE STRINGENT? |
| --- | --- | --- | --- | --- |
| 1.0 | 07/01/2015 | New matrix for SSRBC (FA 1-13-15). | David Bremer | No |
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|  | FDOT Traffic Engineering Research Laboratory (TERL)  Uninterruptible Power Supply (UPS) Compliance Matrix | By signing this form, the applicant declares that he/she has read and understands the provisions of Section 685 of the FDOT *Standard Specifications for Road and Bridge Construction* and all implemented modifications. The requirements listed on this matrix are derived from Section 685, and are the basis for determining a product’s compliance and its acceptability for use on Florida’s roads. |

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| --- | --- | --- | --- |
| Date: | Click here to enter a date. | Applicant’s  Name (print): |  |
| Manufacturer: |  |  |  |
| Item, Model No.: |  | Signature: |  |

| **ID No** | **Section** | **Requirement** | **Item Comply? (Yes/No)** | **Comments (Applicant must provide information as indicated)** | **TERL Evaluation Method** |
| --- | --- | --- | --- | --- | --- |
| The following compliance matrix criteria are for all UPS | | | | | |
| 1 | 685-2.2 | UPS is line interactive or online/double-conversion. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 2 |  | UPS assembly is designed for installation in a roadside NEMA 3R enclosure to provide battery backup functionality for traffic control systems, including traffic signal and intelligent transportation system (ITS) devices. |  | *Provide a statement of conformance in this field.* | Compliance Matrix Review |
| 3 |  | UPS assembly includes batteries. |  | *Provide a statement of conformance in this field.* | Compliance Matrix Review |
| 4 |  | Loss of utility power, transfer from utility power to battery power, and transfer back to utility power does not interfere with normal operation of connected equipment. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 5 |  | In the event of UPS failure or battery depletion, connected equipment is energized automatically upon restoration of utility power. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 6 |  | UPS operates in hot standby mode with power transfer being accomplished in 40 milliseconds or less. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 7 |  | Removal and replacement of the UPS does not disrupt the operation of the equipment being protected. |  | *Applicant may provide comments in this field.* | Functional Inspection |
| 8 |  | All harnesses necessary to connect and operate the system are included. All connectors are keyed to prevent improper connection. |  | *Provide a statement of conformance in this field.* | Compliance Matrix Review |
| 9 | 685-2.2.1 | UPS supports local and remote configuration and management, including access to all user-programmable features as well as alarm monitoring, event logging, and diagnostic utilities. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 10 |  | Configuration and management functions are password protected. |  | *Applicant may provide comments in this field.* | Functional Inspection |
| 11 |  | Alarm function monitoring includes: loss of utility power, inverter failure, low battery, battery temperature, and inverter active/utility fail. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| 12 |  | The UPS includes an event log that indicates the date and time of the following events: AC high, AC low, AC frequency high, AC frequency low, AC fail/blackout, overload, over temperature, battery voltage high, battery voltage low, battery disconnected, battery temperature high, temperature probe disconnected, and short circuit. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 13 |  | The UPS event log can store a minimum of 200 events. |  | *Applicant may provide comments in this field.* | Functional Inspection |
| 14 |  | UPS includes a front panel display and controls that allow programming of configurable parameters, features, and functions without the need for another input device. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| 15 |  | The UPS has visual indications for Power-On, Mode of Operation (utility power or inverter), Battery Status, Alarm Status, Load Levels, and AC Output Voltage. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| 16 | 685-2.2.2 | UPS includes a serial data connection port and an Ethernet port (RJ45) for local control using a laptop PC and remote control via a network connection. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| 17 | 685-2.2.3 | Battery is AGM or Gel external type that is sealed and requires no maintenance, causes no corrosion, and is capable of maintaining 80% of original capacity and performance for a minimum of five years. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| 18 |  | UPS includes a wiring harness for battery connections. The battery wiring harness allows 6 feet of separation between the UPS and its battery bank. |  | *Applicant may provide comments in this field.* | Physical Inspection |
| 19 |  | Battery terminals include a protective covering to prevent accidental spark or shorting. |  | *Applicant may provide comments in this field.* | Physical Inspection |
| 20 |  | UPS has battery management functions that include active or equalized balancing; monitoring of temperature, voltage, and amperage of charge and discharge; and temperature compensated automatic charging to maximize the life of the batteries. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 21 | 685-2.2.4 | UPS used to provide backup power in an ITS cabinet provides a minimum of 350 watts (at 120VAC) of continuous backup power for a minimum of two hours and UPS assemblies used to provide backup power in a traffic signal controller cabinet provides a minimum 400 watts (at 120VAC) of continuous power for a minimum of 6.5 hours. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 22 |  | Frequency is regulated to 60 Hz, plus or minus 0.5 Hz, while the UPS is supplying power. The UPS operates on 85 to 154 VAC without requiring assistance from the batteries. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| The following compliance matrix criteria are for double-conversion UPS | | | | | |
| 23 |  | Double-conversion UPS is capable of simultaneously producing fully regenerated and regulated, conditioned, True Sine Wave power and hot standby AC output, and has a minimum operating efficiency of 90%. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 24 |  | UPS is listed to the requirements of UL 1778. Upstream back-feed voltage from the UPS is less than 1 VAC. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| The following compliance matrix criteria are for Traffic Signal UPS Cabinet | | | | | |
| 25 | 685-2.2.5 | Cabinet is designed to be mounted to the side of a traffic cabinet or base mounted. |  | *Applicant may provide comments in this field.* | Physical Inspection |
| 26 |  | Cabinet meets the requirements of Section 676 and includes shelves and rack rails to house all UPS system components including the UPS, batteries, harnesses, switches, surge protective device, power terminal block and a generator hookup with transfer switch. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement. Alternately, provide the Approved Product List (APL) number if the cabinet is APL listed.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| 27 |  | UPS cabinet allows a maintenance technician to safely insert power for traffic signal operation while the UPS or associated equipment is serviced or replaced. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Functional Inspection |
| *Indicate location of requested information in submittal.* |
| 28 |  | A surge protective device is installed where the supply circuit enters the cabinet in accordance with 620-2.7.1. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| 29 |  | Cabinet includes a 20 A, 120 volt, 60 Hz GFCI receptacle that is wired to utility power and not regulated by the UPS module. The cabinet includes a main breaker and a breaker for the technician GFCI outlet. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| 30 | 685-2.2.5.1 | Cabinet includes a manual transfer switch and generator access panel in accordance with 676-2.6.3. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| 31 |  | Generator access door does not protrude more than 1 inch when closed. |  | *Provide product literature, specifications, user manual, or similar information that shows the product meets this requirement.* | Document Review and Physical Inspection |
| *Indicate location of requested information in submittal.* |
| The following compliance matrix criteria are for all UPS | | | | | |
| 32 | 685-2.2.6 | All parts are made of corrosion-resistant materials such as plastic, stainless steel, anodized aluminum, brass, or gold-plated metal. All fasteners exposed to the elements are Type 304 or 316 passivated stainless steel. |  | *Provide statement of conformance from hardware supplier that shows the product meets this requirement.* | Document Review |
| *Indicate location of requested information in submittal.* |
| 33 | 685-2.2.7 | UPS assemblies, including batteries, provide continuous power with specified wattage and operate properly during and after being subjected to the environmental testing procedures described in NEMA TS 2, Sections 2.2.7, 2.2.8, and 2.2.9. |  | *Provide a first or third party test report that demonstrates compliance with this requirement. The test report must meet the requirements of FDOT Product Certification Handbook, section 7.2.* | Document Review |
| *Indicate location of requested information in submittal.* |