
Part 1 General

1.1 RELATED SECTIONS

- .1 Section 26 05 00 - Common Work Results for Electrical.
- .2 Section 26 33 53 - Uninterruptible Power Systems Static (UPS).

1.2 REFERENCES

- .1 American National Standards Institute (ANSI)/Underwriters Laboratories (UL).
 - .1 ANSI/UL 94-96, Tests for Flammability of Plastic Materials for Parts in Devices and Appliances (ANSI Approved November 21, 2003).
- .2 Canadian Standards Association (CSA International).
 - .1 CAN3-Z299.3-85(R2002), Quality Assurance Program - Category 3.
 - .2 CAN/CSA-G40.20/G40.21-98(R2003), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .3 Department of Justice Canada (Jus).
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
- .5 Institute of Electrical and Electronic Engineers (IEEE).
 - .1 IEEE 484-2002, IEEE Recommended Practices for Installation Design and Implementation of Vented Lead-Acid Batteries for Stationary Applications.
 - .2 IEEE 485-1997(R2003), IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications.
 - .3 IEEE 450-2002, Recommended Practice for Maintenance, Testing and Replacement of Vented Lead-Acid Batteries for Stationary Applications.
- .6 Transport Canada (TC).
 - .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .3 Submit shop drawings and product data to include:
 - .1 Dimensioned sketch showing battery rack, individual battery cells, recommended aisle space, headroom, assembly and anchoring of rack.
 - .2 Shipping weights.

- .3 Individual battery cells, type, size, Ah capacity at 8 hours discharge rate, electrolyte, materials for container, cover, separators, retainers, posts and inter-cell connectors.
- .4 Specific gravity at full charge and 25°C.
- .5 Cell charge and discharge curves of voltage, current, time and capacity.
- .6 Derating factor for temperature range (minus 10°C to minus 30°C).
- .7 Maximum short circuit current.
- .8 Maximum charging current recommended for fully discharged condition.
- .9 Full charge voltage per cell.
- .10 Fully discharged voltage per cell.
- .11 Hydrogen generation and ventilation requirements.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for storage batteries and racks for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Operation and maintenance instructions concerning design elements, construction features, component functions and maintenance requirements to permit effective operation, maintenance and repair.
- .3 Installation details of battery rack, individual cells, inter-cell connectors.
- .4 Replacement instructions for individual cells.
- .5 Electrolyte handling.
- .6 Parts lists with catalogue numbers, and names and addresses of suppliers.
- .7 Factory test records.

1.5 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE, AND DISPOSAL

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .4 Place materials defined as hazardous or toxic waste in designated containers.
 - .5 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, and Regional and Municipal regulations.

- .6 Ensure emptied containers are sealed and stored safely.
- .7 Fold up banding, flatten and place in designated area for recycling.

1.7 WARRANTY

- .1 For storage batteries, 12 months warranty period prescribed in General Conditions is extended to 120 months.
 - .1 Warranty to be for 100% replacement for the first five years, and prorated replacement value in equal yearly decreasing amounts for remaining 60 months until expiration of warranty at end of 120 months after delivery of the battery.
 - .2 Cells to be warranted for 100% replacement for 60 months against electrolyte leakage and corrosion at post seals.

Part 2 Products

2.1 MATERIALS

- .1 Steel for battery racks: to CAN/CSA-G40.20.

2.2 BATTERY GENERAL CHARACTERISTICS

- .1 VRLA battery banks installed in cabinets.
 - .1 Number of banks equals number of UPS modules.
- .2 Nominal battery voltage, full charge, 2 x 192 V.
- .3 Designed to supply load current capable to discharge the UPS at full load for 10 minutes.
- .4 Minimum end voltage: 1.67 V per cell after discharge at rated load for period specified.
- .5 Capable of being recharged in period of 4 hours to not less than 95% full charge after supplying rated load for period specified, with no harmful effects on battery, including leaking or foaming of electrolyte.
- .6 Battery to deliver specified output at 25°C, in ambient temperature from 20°C to 40°C.

2.3 LEAD ACID BATTERIES

- .1 Type: Absorptive glass microfibre (AGM) valve regulated lead acid (VRLA).
- .2 Electrolyte: solution of sulphuric acid.
- .3 Cell Containers: transparent plastic, fire retardant.
- .4 Electrolyte Level Lines: high and low on container surfaces.
- .5 Cover: one piece molded plastic, flame retardant to ANSI/UL 94.
- .6 Plate Retainers: fibreglass.
- .7 Plate Separators: porous rubber.
- .8 Vents: plastic screw flame arrestor type.

- .9 Posts: bolted type with 2 lead covered brass nuts and bolts per cell.
- .10 Inter-cell Connectors: lead plated copper, bolted to battery posts.
 - .1 Bolt holes slightly oversized to facilitate cell replacement.
 - .2 Connectors, bolts and nuts: corrosion resistant.
- .11 Cells: of identical construction and from same production run.
- .12 Batteries: in clean state with no evidence of electrolyte on outside of cell containers.

2.4 BATTERY CABINETS

- .1 Freestanding cabinets, NEMA 1 with provision for ventilation, construction and finish similar to the UPS cabinet.
- .2 Maximum of eight tiers, size as indicated. Bottom tier minimum 120 mm above floor, top of battery cells on highest tier not more than 2 m above floor.
- .3 Frames: angle iron with welded joints ground smooth.
- .4 Rails: steel channels, bolted to frames.
- .5 Rubber strips to insulate rails from cells.
- .6 Insulated from ground and floor.
- .7 Primed and epoxy painted to prevent corrosion.
- .8 Corrosion resistant bolts and hardware.
- .9 Configuration permitting any one cell to be removed without removing any other cell.
- .10 Dimensions of space available as indicated.

2.5 ACCESSORIES

- .1 Thermometer.
- .2 Plastic topping-up bottle, 1000 cc.
- .3 Hydrometer.
- .4 Torque wrenches for connector bolts and nuts.
- .5 Self-adhesive numbers for cell identification.
- .6 Lifting straps.
- .7 No-oxide grease.
- .8 Hydrometer holder with wall mount brackets.
- .9 Heat sensing tape.
- .10 Two (2) spare intercell connectors, nuts and bolts.
- .11 Two (2) spare inter-tier connectors, nuts and bolts.

2.6 SOURCE QUALITY CONTROL

- .1 To CAN3-Z299.3.
- .2 Complete battery factory tested.
- .3 Connect load designed to fully discharge battery to rated end voltage in 20 min.
- .4 Install dc indicating voltmeter and ammeter.
- .5 Charge battery to ensure cells fully charged. When voltage reaches steady state, record: ambient temperature, voltage of each cell, voltage of battery, specific gravity of each cell (lead acid battery only).
- .6 Discharge battery by applying load for 20 min, and record at 85%, 90%, 95% and 100% of rated discharge time: voltage of battery, load current, voltage of each cell, ambient temperature, battery temperature, specific gravity of few random cells (lead acid only).
- .7 At completion of discharge test, recharge battery at maximum specified rate, and record at 2 min intervals: battery voltage, charging current.
- .8 At start and finish of charging cycle record ambient and battery temperatures, and specific gravity of each cell (lead acid only).
- .9 Submit copy of test results to Departmental Representative.

Part 3 Execution

3.1 INSTALLATION

- .1 Install battery cabinet as indicated.
- .2 Clean posts and connectors and apply no-oxide grease.
- .3 Install inter-cell and inter-tier connectors, and hand tighten nuts in accordance with manufacturer's instructions.
- .4 Using torque wrenches, tighten nuts in accordance with manufacturer's recommended value.
- .5 Connect battery to load circuit.

3.2 FIELD QUALITY CONTROL

- .1 Check battery voltage and specific gravity and voltage of each cell in accordance with manufacturer's instructions.
- .2 Float charge battery for 4 hours to ensure battery fully charged and in stable condition.
- .3 Discharge battery at rated load for specified time.
- .4 Check battery voltage at terminals and specific gravity and voltage of each cell.

- .5 Recharge battery to full charge.
- .6 Check battery voltage and specific gravity and voltage of each cell.
- .7 Leave battery in fully charged state.

END OF SECTION