



ENGINEERING SPECIFICATIONS FOR MEDIUM VOLTAGE OUTDOOR RESISTIVE LOAD BANK

1. SCOPE

- 1.1. This specification contains the minimum requirements for the design, manufacture and testing of outdoor weatherproof resistive load bank and an outdoor, dry-type step down transformer. Both the load bank and the transformer are to be factory mounted and interconnected on a common structural steel skid base.
- 1.2. The medium voltage load bank is required for periodic exercising and testing of the standby emergency power source.
- 1.3. This specification shall apply if the load bank is supplied to the purchaser or as a part of other equipment.
- 1.4. Should the vendor take exception to any part of this specification, it shall be stated in the bid and referenced to item number.

2. STANDARDS

- 2.1. The equipment covered by this specification shall be designed as it applies with the latest standard of NEMA, NEC, ISO and ANSI standards.

3. RATINGS

- 3.1. The total capacity of the load bank shall be _____ KW at _____ Volts, 3 Phase, 60 Hertz, _____ Amps per Phase at unity Power Factor and 50 KW minimum load step resolution.
- 3.2. The duty cycle shall be continuous and the load bank shall operate in an ambient temperature of -28°C to 49°C (-20°F to 120°F).

4. CONSTRUCTION

- 4.1. The load bank shall be constructed of heavy gauge aluminized steel per ASTM A463 or coated mild steel that meets or exceeds physical and chemical performance of polyurethane enamel coatings. Galvanized steel has a low corrosion threshold and shall not be used for exterior load bank construction.
- 4.2. The main input load bus, load step relays, fuses and blower/control relays shall be located within the load bank enclosure. A thermostatically controlled heater shall be located within the control section to protect control devices from the effects of moisture and condensation.
- 4.3. The load bank shall be outdoor weatherproof construction. All exterior fasteners shall be stainless steel. The load bank shall include forklift channels in the base for lifting.
- 4.4. Airflow throughout the load bank shall be vertical. Ambient intake air shall be drawn in from the sides/bottom of the unit and heated air exhausted out the top. Intake openings shall be designed to prevent objects greater than 0.50" diameter from entering the unit. A straight vertical exhaust hood is not acceptable in preventing rain/moisture from entering the unit. The load bank exhaust hood shall be angled and constructed of non-corrosive aluminized steel or aluminum. Unpainted galvanized steel is not acceptable.
- 4.5. The exterior of the load bank shall be painted with polyester powder coat paint finish.



4.6. Load elements shall be contained in multiple resistor cases or trays. Each can be removed in their entirety as a unit if service becomes necessary.

5. RESISTIVE LOAD ELEMENTS

5.1. Load elements shall be Avtron Helidyne™, helically wound chromium alloy de-rated to operate at approximately ½ of maximum continuous rating of wire. Elements must be fully supported across the entire length within the air stream by segmented ceramic insulators on a stainless steel support rods. Element supports will be designed that should a wire break, it will not short to adjacent conductors or to ground.

5.2. The change in resistance due to temperature shall be minimized by maintaining conservative watt densities. The overall tolerance of the load bank shall be -0% to +5% KW at rated voltage. A -5%, +5% rating allows the load bank to deliver less than rated KW and shall not be used. The load bank must deliver rated KW at rated voltage.

6. COOLING

6.1. The load bank shall be cooled by integral TEFC or TEAO motor(s) which is direct coupled to the cooling fan blade. The fan motor must be electrically protected against overload using a motor overload device and short circuit protected using three (3) current limiting fuses with an interrupting rating of 200K A.I.C.

6.2. The fan blade is to be an airfoil design constructed from aluminum or non-corroding material.

7. PROTECTIVE DEVICES

7.1. A differential pressure switch(s) shall be provided to detect air loss (one for each stack). The switch(s) shall be electrically interlocked with the load application controls to prevent load from being applied if cooling air is not present.

7.2. An over-temperature switch shall be provided to sense the load bank exhaust in each stack. The switch shall be electrically interlocked with the load application controls to prevent load from being applied.

7.3. To provide for major fault protection, branch fuses shall be provided on all three phases of switched load steps above 50KW. Branch fuses shall be current limiting type with an interrupting rating of 200K A.I.C.

7.4. The exterior of the load bank shall have appropriate warning/caution statements on access panels.

8. CONTROL PANEL

8.1. The control panel shall be a remote mounted in a Nema-4 type wall mount enclosure. It shall contain a power ON/OFF switch, a power ON indication light, blower START/STOP pushbuttons, Blower ON light, blower FAILURE light and OVERTEMP light. Load selection shall include a master load ON/OFF switch and individual load step switches.



9. STEP-DOWN TRANSFORMER

- 9.1. The outdoor rated, dry type step-down transformer shall be rated _____ KVA, three phase, 60 Hertz, with an _____ V primary and _____ VAC secondary. The transformer shall be fully rated for outdoor installation on a single skid with the load bank. Transformer and load bank shall include thermostatically controlled heater strip to minimize the effects of moisture and condensation.
- 9.2. The windings shall be aluminum; rated temperature rise shall be 150 degree C with 220 degree C insulation class.
- 9.3. Transformer Secondary Fusing provided. Transformer primary circuit breaker or disconnect device to be provided by others.

10. QUALITY CONTROL

- 10.1. The load bank shall be fully tested using a test specification written by the supplier. Tests shall include electrical functional testing, verifying conformance to assembly drawings and specifications. Each load step shall be cold resistance checked to verify proper calibration of resistive load steps and proper ohm value. Avtron Manufacturing, Inc. shall maintain this data on file for inspection purposes by the purchaser. Tests using high potential equipment shall be performed to ensure isolation of the load circuits from the control circuits and to determine isolation of the load circuits from the load bank frame. Tests of all safety circuits shall be performed to verify conformance to the specification
- 10.2. All electrical circuits shall have a hip pot test performed at twice rated voltage plus 1000 VAC.
- 10.3. The Company's Quality System shall be ISO9001 Certified.

11. QUALIFICATIONS OF MANUFACTURER

- 11.1. The load bank shall be manufactured by a firm regularly engaged in the manufacture of load banks and who can demonstrate at least twenty five (25) years experience with at least twenty five (25) installations of load banks similar or equal to the ones specified herein. The manufacturer shall have a written Quality Control procedure available for review by the purchaser, which will document all phases of operations. Manufacturer must have a service organization with service personnel having a minimum of an Associate Degree in Electrical Engineering.
- 11.2. The load bank shall be as manufactured by

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