SPECIFICATION FOR MEDIUM VOLTAGE OUTDOOR RESISTIVE LOAD BANK WITH NO TRANSFORMER

PART 1.0 GENERAL

1.1 SCOPE

A. This specification contains the minimum requirements for the design, manufacture and testing of outdoor weatherproof medium voltage, direct connect, resistive load bank. The load bank will be designed and built without the use of a step-down transformer for the medium voltage load elements.

B. The medium voltage load bank is required for periodic exercising and testing of the (standby) emergency power source. The load bank shall be permanently mounted outdoors in a weather resistant enclosure. Unit shall be forced air cooled.

C. This specification shall apply if the load bank is supplied to the purchaser, or as a part of other equipment.

D. Should the vendor take exception to any part of this specification, it shall be stated in the bid, and referenced to the specification line number.

1.2 SUBMITTALS

A. The manufacturer shall submit, for review, technical data including: features, performance, electrical characteristics, physical characteristics, ratings, accessories, and finishes.

B. Shop drawings shall include: dimensional plans, front and side elevations and mounting details sufficient to properly install the load bank. Load bus configuration and load connections termination area shall be clearly identified.

C. Electrical schematic drawings shall be provided to detail the operation of the load bank and the provided safety circuits. Over-current protection and control devices shall be identified and their ratings marked. IF not part of the schematics, a system interconnection drawing shall be included for control wiring related to the load bank.

1.3 STANDARDS

A. The equipment covered by this specification shall be designed with the latest applicable NFPA-70, NEMA, NEC, IEEE, and ANSI standards.

PART 2.0 PRODUCTS

2.1 RATINGS

A. The total capacity of the load bank shall be rated (_____) kW at (_____) Volts, 3-Phase, 3-Wire, (50) or (60) Hertz, (___) Amps per Phase at unity Power Factor and _____ kW minimum load step resolution.

B. The load bank shall be designed for continuous duty cycle operation with no limitations. The load bank shall operate in an ambient temperature of -29°C to 49°C (-20°F to 120°F).

C. To avoid any transformation of voltage, load bank shall be designed as a true medium voltage direct connect unit. The use of a medium voltage step down power transformer and low voltage load bank shall not be permitted.

2.2 MATERIAL AND CONSTRUCTION

A. The load bank shall be outdoor construction, suitable for installation and operation on a roof, concrete pad, or structural base.

B. All exterior fasteners shall be stainless steel.

C. The frame is provided with four overhead lifting cleats for crane lifting.

D. The load bank frame shall be fabricated from formed and welded heavy gauge steel, making a rigid, drip-proof structure. The frame shall be primed on the inside and out with catalyzed epoxy primer. Finish shall be two coats of ANSI 61 Grey urethane.

E. The main medium voltage input load bus and medium voltage vacuum load contactors shall be located within a dedicated local load bank enclosure. Medium voltage load input bus shall be internal bus bars. Hinged access panels are provided for customer load and low voltage control connections. For internal bus load bank is designed for bottom entry load wiring. This enclosure has a factory provided bolt on gland plate for easy load connection access. Tin plated copper bus bars with standard NEMA hole pattern are provided for customer load connections.

F. Access panels are provided to safely enclose all resistor sections.

G. An integral low voltage enclosure shall be provided to house control devices, fuses, blower start/control relays and safety circuits. A thermostatically controlled heater shall be located within the control section to provide protection to the control devices from the effects of moisture and condensation.

H. Airflow through the load bank resistor section shall be vertical. Ambient intake cooling air shall be drawn in at the base 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.

I. Fixed Aluminum exhaust hoods shall be provided loose for field installation (one for each resistor stack). The load bank exhaust hoods shall be angled and include interior baffle plates to direct falling rain from the interior of the load bank. The exhaust hoods shall be constructed from corrosion resistant aluminum with stainless steel exhaust screens.

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

2.3 RESISTIVE LOAD ELEMENTS

A. Load elements shall be ASCO Helidyne, helically wound chromium alloy 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 stainless steel rods. Element supports shall be designed to prevent a short circuit to adjacent elements or to ground.

B. The change in resistance due to temperature shall be minimized by maintaining conservative watt densities.

C. 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 full rated kW at rated voltage.

2.4 COOLING

A. The load bank shall be cooled by integral TEFC or TEAO motors which are 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.

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

C. An integral control power transformer shall be provided to supply 120V, 1 phase, 60 Hz to the load banks control and motor starter circuitry. Transformer primary and secondary control circuits shall be fuse protected.

2.5 PROTECTIVE DEVICES

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

B. An over-temperature switch shall be provided to sense the load bank exhaust in each (stack) vertical resistor case assembly. The switch shall be electrically interlocked with the load application controls to prevent load from being applied in the event of an over temperature condition.

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

2.6 CONTROL SYSTEMS – DIGITAL CONTROLS

A. A robust purpose designed microprocessor based module with industrial connectors and LED status display shall be installed in the load bank. The module shall connect with Voltage and Current Transformers to obtain real time monitoring of the load bank at a sampling rate of at least 28.8kHz. The module shall have large flash memory, which allows remote upgrading and space for configuration data and calibration maps. Non-volatile RAM provides 500 event history log time stamped by on-board real time clock.

B. Usage counters shall provide information on individual contactor operation, element run times, overall power-on time, load-on time and kWh. Load monitoring checks each phase for faulty contactors, blown fuses or faulty elements. Faults are logged with visual indication via blinking stop lamp and warning code. Automatic detection senses the supply-on-test voltage, frequency, phase and phase rotation.

C. The module shall have a load correction facility, which shall compensate for any voltage drop on supply.

D. The module shall balance the usage of each load element to increase the life of the load bank.

E. An HMI Hand Held controller shall also be provided with a 10 meter cable for operator interface with all functionality faults and features. When carrying out full-load testing, one page will show the three-phase measurements of voltage (V), frequency (Hz), current (A), power (both kW and kVA) and power factor (Cos ø).

F. Building Management Interface: Load bank control module shall have provisions to interface with existing building management system. Modbus communications protocol which shall allow integration of load bank with building supervisory & monitoring systems through a PLC,

HMI or SCADA systems. Interface shall be directly from an Ethernet port within the load bank.

G. Switchgear Interface: Load bank shall have provisions to interface with the switchgear critical power management system. This shall be done through Modbus Ethernet.

2.7 CONTROL SYSTEMS – MANUAL CONTROLS

A. The control panel shall be a remote 19″ rack mounted panel housed in a NEMA 4 type enclosure. The control panel shall contain the following manual controls:

1. Power ON/OFF switch
2. Fan START/STOP pushbuttons.
3. Master load ON/OFF switch.
4. Load step switches for ON/OFF application of individual load steps.

Control panel visual indicators shall be as follows:

1. Power ON indication light.
2. Fan ON light.
3. Fan/Air FAILURE light.
4. OVERTEMPERATURE light.

B. An integral control power transformer shall be provided to supply 120V, 1 phase, 60 Hz to the load banks control and motor starter circuitry. Transformer primary and secondary control circuits shall be fuse protected.

2.8 DOCUMENTATION

A. Installation and operation manuals shall be provided with the equipment and shall include complete details for the installation, commissioning, operation, and maintenance of the load bank.

B. The manuals shall include the electrical schematic and interconnect drawings for the power and control wiring for the load bank and all control devices.

C. A complete parts list with part numbers, device identification, and rating shall be included in the manuals.

D. The manuals shall be provided electronically on a USB drive.

PART 3.0 QUALITY ASSURANCE

3.1 QUALITY CONTROL

A. 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 ohmic value.

B. The manufacturer 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.

C. All electrical circuits shall have a high potential insulation resistance test performed at twice rated voltage plus 1000 VAC to assure insulation integrity.

D. All quality control test equipment shall be regularly maintained and calibrated to traceable national standards.

E. The Company's Quality System shall be at least ISO9001:2015 Certified.

3.2 QUALIFICATIONS OF MANUFACTURER

A. 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 of experience with at least twenty five (25) installations of load banks similar or equal to the ones specified herein.

B. The manufacturer shall have a written Quality Control procedure available for review by the purchaser, which will document all phases of operations, engineering, and manufacturing.

C. Manufacturer must have a field service organization with service personnel having a minimum of an Associate Degree in Electrical Engineering.

D. The manufacturer shall have a service organization capable of providing service within a 4 hour time frame.

E. A 2 Year warranty shall be provided for both the resistors and the load bank. A longer warranty period shall be available as a purchased option.

F. The load bank shall be manufactured by:

ASCO Power Technologies, Avtron Load Bank Products
6255 Halle Drive, Cleveland, Ohio 44125
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Email customercare@ascopower.com **Web** loadbanks.ascopower.com