

SPECIFICATION FOR INDOOR PORTABLE RESISTIVE LOAD BANK (100-700kW)

PART 1.0 GENERAL

1.1 SCOPE

- A. This specification contains the minimum requirements for the design, manufacture and testing of an air-cooled, indoor rated resistive load bank.
- B. The load bank is required for periodic exercising and testing of the (standby) emergency power source. The load bank shall be portable with casters, forced air-cooled and shall have a local control panel.
- 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. An 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, 60 Hertz, (___) Amps per Phase at unity Power Factor.
- B. The load bank shall be designed for continuous duty cycle operation with no limitations.

2.2 MATERIAL AND CONSTRUCTION

- A. The load bank shall be suitable for operation indoors. All exterior fasteners shall be stainless steel. The load bank shall include forklift channels in the base for lifting.
- B. The load bank shall be constructed of heavy gauge aluminized steel per ASTM A463. Aluminized steel provides superior corrosion protection and extended service life, with a better tolerance to high heat exposure compared to the more common Galvanized steel.

- C. The main input load bus, load step relays, fuses and blower/control relays shall be located within the load bank enclosure.
- D. Airflow throughout the load bank shall be vertical. Ambient intake cooling air shall be drawn in at the sides of the unit and heated air exhausted out the top.
- E. The load bank enclosure shall have a baked polyester powder coated finish with a film thickness of 2.8 +/-0.4 MILS per coat.
- F. Load elements shall be contained in multiple resistor cases or trays. Each can be removed in its entirety as a unit for inspection or service.

2.3 RESISTIVE LOAD ELEMENTS

- A. Load elements shall be ASCO Helidyne, helically wound chromium alloy rated to operate at approximately 1/2 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 fan motor 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.
- B. The fan blade is to be an airfoil design constructed from aluminum or non-corroding material.

2.5 PROTECTIVE DEVICES

- A. A differential pressure switch shall be provided to detect air loss. The switch 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. The switch shall be electrically interlocked with the load application controls to remove load from being applied in the event of an over temperature condition.
- C. 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.
- D. The exterior of the load bank shall have appropriate warning/caution statements on access panels.

2.6 CONTROL SYSTEMS – DIGITAL CONTROLS

NOTE: Please choose either section 2.6 Digital Controls or 2.7 Manual Controls

- A. The system shall be controlled by a microprocessor-based module with non-volatile memory, specifically developed for load bank control and protection. Generic type PLC's shall not be used.
- B. The local digital switches shall allow for synchronous load step engagement and automatic derating when set to a lower voltage mode from the optional touchscreen hand held controller.
- C. All instrumentation measurements shall be made from high accuracy current transformers located within the load bank.
- D. Full three phase Instrumentation shall be displayed on a bright LED display on the front of the load bank.
- E. Warning and Error messages shall be displayed on both the local LED display and the remote hand held.
- F. The system shall be capable of networking and controlling up to 25 load banks including a variety of different sized resistive units with proportional load sharing from one hand held controller or a single PC.
- G. The system shall use CAN bus communication protocol for fast real-time control and measurement, each load bank shall automatically be recognized and added to the string.
- H. **(OPTIONAL)** A 4.3" full color touch screen hand held controller shall also be provided with a 10-meter cable for operator interface with all functionality including data logging from a USB port, individual load bank control, and full 3 phase instrumentation display.
- I. **(OPTIONAL)** 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.

2.7 CONTROL SYSTEMS – MANUAL CONTROLS

NOTE: Please choose either section 2.6 Digital Controls or 2.7 Manual Controls

- A. The control panel shall be a local panel mounted on the load bank. The control panel shall contain the following manual controls:
 - 1. Power ON/OFF switch
 - 2. Blower 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. Blower ON light
- 3. Blower/Air FAILURE light
- 4. OVERTEMPERATURE light

- B. A digital meter shall be installed in the control panel to show 3 line digital display of voltage, current, frequency, and power measurement. The software interface to the meter shall allow for real-time data acquisition and data logging from a laptop PC.
- C. (**OPTIONAL**) An integral control power transformer shall be provided to supply 120V, 1 phase, 60 Hz to the load banks control and safety circuitry. Transformer primary and secondary control circuits shall be fuse protected.

2.8 DOCUMENTATION

- A. Installation, quick start guides, and operation manuals shall be provided with the equipment and shall include complete details for the installation, commissioning, operation, troubleshooting 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. The original manufacturers name and part number shall be included in the parts listing.
- 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 Parts and Labor Warranty shall be provided for both 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

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