METROLINX

Outdoor Load Bank Specification

Specification 26 37 00

Revision 02

September 2025

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Metrolinx,

an Agency of the Government of Ontario

Amendment Record Sheet

Amendment in Clause No.	Date of Amendment	Description of Changes
Cover page	March 2023	Removed 'Capital Projects Group' to reflect organizational changes.
1.2.3, 1.3.4, 2.3, 2.8.14	March 2023	Added 'the latest version of' and updated numbering on Electrical Identification and Nomenclature specification.
2.1.7, 2.5.7	March 2023	Added operation requirements and updated load bank exhaust hood requirements.
Various	September 2025	Updated format and revised requirements for clarity.

Contents:

1. GENERAL

1.1. SCOPE OF WORK

1.1.1. Design, labour, products, equipment, tools, supervision, and services necessary for Outdoor Load Bank Work in accordance with the Contract Documents.

1.2. DESIGN REQUIREMENTS

1.2.1. The equipment furnished and the equipment installation, wiring methods and materials used shall conform to the latest edition of the Ontario Electrical Safety Code, Electrical Safety Authority (ESA) Bulletins and Supplements issued by the Electrical Safety Authority, and the applicable Metrolinx Standards. In case of any conflicts, the more stringent requirement shall apply.

1.2.2. Design electrical equipment and systems to all applicable standards of CSA, ULC, IEEE, and ESA.

1.2.3. Design electrical equipment and systems to the latest version of GO DRM.

1.2.4. Design electrical equipment and systems to standards and codes to the latest editions adopted by and enforced by local Authorities Having Jurisdiction (AHJ).

1.2.5. Design the load bank for the purpose of testing the backup power generators without disturbing normal building operations.

1.2.6. Design load bank for compatibility with associated backup generator, generator switchgear and transfer switches.

1.2.7. Load bank shall be designed for outdoor location. Interior installations shall not be accepted.

1.3. RELATED WORKS

1.3.1. Section 26 05 00 - Electrical General Requirements.

1.3.2. Section 26 05 21 - Electrical Conductors and Cables.

1.3.3. Section 26 05 31 - Splitter Boxes, Junction Boxes and Pullboxes.

1.3.4. Section 26 05 53 – Electrical Identification and Nomenclature.

1.3.5. Section 26 28 00 - Circuit Breakers and Fuses.

1.3.6. Section 26 29 10 - Motor Starters and Contactors.

1.3.7. Section 26 32 00 - Backup Power Supply Generator.

1.3.8. Section 26 36 23 - Transfer Switch.

1.4. REFERENCE STANDARDS

1.4.1. Ontario Electrical Safety Code (OESC).

1.4.2. Ontario Building Code (OBC).

1.4.3. Metrolinx Standards, Drawings and Specifications.

1.4.4. GO Design Requirement Manual (DRM).

1.4.5. Metrolinx Electrical Safety Document.

1.4.6. CSA Z462, Workplace Electrical Safety.

1.4.7. CAN3 C235, Preferred Voltage Levels for AC Systems, 0 to 50,000V.

1.4.8. CAN3-Z299.4, Quality Assurance Program - Category 4.

1.4.9. NEMA ICS 4, General Standards for Industrial Controls and Systems.

1.4.10. EEMAC E14-2, Industrial Controls and System Standard.

1.4.11. ANSI/IEEE C57.13, Requirements for Instrument Transformers.

1.4.12. CAN3-C13-M83, Instrument Transformers.

1.4.13. CSA-22.2 No. 39, Fuseholder Assemblies.

1.4.14. EEMAC E14-2, Industrial Controls and System Standard.

1.4.15. ANSI Z55.1, Gray Finishes for Industrial Apparatus and Equipment, ANSI 49 or ANSI 61.

1.5. SPARE PARTS

1.5.1. Touch-up paint as required, minimum 2 litres.

1.6. TRAINING

1.6.1. Contractor shall train Metrolinx personnel, including training on load bank system components, operations, safety, and troubleshooting.

1.6.2. Contractor shall allow for two separate training sessions to train Metrolinx personnel in all the equipment provided in the Contract.

1.7. WARRANTY

1.7.1. The contractor shall provide a manufacturer's warranty for the work of this section with a minimum warranty period of five years after acceptance by Metrolinx. Warranty shall include the following:

a) Twenty-four hours per day, seven days per week emergency service coverage, all parts and labour included;

b) Service response time of four hours on-site; and

c) Complete maintenance services, parts, and travel at no cost to Metrolinx during warranty period. Maintenance service contract shall cover complete equipment, including auxiliary and accessory items. Contractor shall keep standard maintenance backup parts for complete system readily available. Contractor shall maintain maintenance log on site to include date and time of each system fault, fault description, solution, and service extended.

1.8. DELIVERY, STORAGE AND HANDLING

1.8.1. Protect equipment from damage, weather, and moisture in accordance with Manufacturer's instructions.

1.9. SUBMITTALS

1.9.1. Product data package:

a) Submit Manufacturer's product data indicating:

1) Technical data, supplemented by bulletins, component illustrations, detailed views, technical descriptions of items, and parts lists;

2) Performance criteria, compliance with appropriate reference standards, characteristics, limitations, and troubleshooting protocol;

3) Product transportation, storage, handling, and installation requirements;

4) Functional relationship of equipment, including weights, dimensions, and heat dissipation;

5) Descriptions of equipment shall be furnished, including deviations from these Specifications; and

6) One instruction manual to include functional description of equipment with block diagrams, safety precautions, instructions, step-by-step operating procedures, and routine maintenance guidelines, including illustrations.

1.9.2. Shop drawings package:

a) Submit manufacturer's shop drawings indicating:

1) Single-line diagrams;

2) General arrangement drawings;

3) Detailed schematic diagrams;

4) Detailed layouts of customer power and control connections; and

5) Detailed installation drawings including all terminal locations.

1.9.3. Commissioning package

a) Submit the following:

1) Commissioning Plan;

2) Commissioning Procedures; and

3) Certificate of Readiness.

1.9.4. Qualifications

a) Submit proof of specialization in manufacturing products specified in this section with minimum 10 years documented experience. The manufacturer shall be ISO 9001 certified.

1.9.5. Closeout submittals package

a) Submit the following for incorporation into the Operation and Maintenance Manuals.

1) Complete set of reviewed Shop Drawings of equipment;

2) Complete bills of materials and spare parts showing manufacturer's names, addresses, local replacement sources and telephone numbers;

3) Stock list of recommended spare parts and quantity of each item;

4) Manufacturer's warranties;

5) Manufacturer's certified reports;

6) Installation instructions;

7) Appropriate servicing, troubleshooting and preventative maintenance schedule and instructions for equipment and systems. Equipment and components performance curves;

8) Field testing and commissioning reports;

9) Factory test reports;

10) Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of portion or feature of installation; and

11) Final ESA and local Hydro Certificates.

1.10. QUALITY ASSURANCE

1.10.1. Refer to Section 26 05 00.

1.10.2. All Quality Assurance submittals listed in this Section shall be provided.

1.10.3. Coordination: Submit start-up testing plan for Metrolinx review before scheduling commissioning testing.

1.10.4. Regulatory requirements: All electrical items shall be approved by CSA and/or ULc.

1.10.5. Manufacturer Qualifications: A minimum of ten (10) years' experience in the design, manufacture, and testing of load bank systems is required. The manufacturer shall be ISO 9001 certified.

1.10.6. Factory Testing

a) Before shipment, the manufacturer shall test the system to assure compliance with the Specification. The tests shall include a power frequency voltage withstand test, mechanical operation test, control systems tests, and a load test.

b) A load test shall be performed on each load bank supplied. This test shall be conducted at full rated load without failure, for minimum of 2 hours. The load bank shall be operated at the maximum design temperatures for the test.

c) Metrolinx Engineer or authorized representatives to witness factory acceptance testing, manufacturer to provide all testing details to Metrolinx prior to testing

d) A certified copy of the test results shall be available for each system as indicated on the order.

2. PRODUCTS

2.1. GENERAL REQUIREMENTS

2.1.1. The load bank shall be able to withstand the outdoor environmental conditions stated in Section 26 05 00 without damage or degradation of operating characteristics.

2.1.2. The load bank nominal operating voltage shall match the generator output and shall be 3-phase 3-wire, 60 Hz.

2.1.3. The load bank fault withstand rating shall be no less than 22 kA RMS.

2.1.4. The load bank shall allow loading the generator in steps up to 100% of the rating the total generator rating. The steps shall be available in multiples of 10% of the total generator rating. Each load step shall be controlled by a 3-phase contactor, which is in turn controlled by a manual switch at the remote control panel. Circuit breaker/fuse protection shall be provided on each load step.

2.1.5. The load bank shall be equipped with a main breaker. This breaker shall have provision for locking in off position with up to 3 padlocks. This breaker shall be equipped with a shunt trip coil for remote tripping by Others, the shunt trip coil shall be wired to terminals in the control compartment for customer connection.

2.1.6. The load bank shall be equipped with warning lights. These lights shall be mounted in a clearly visible location on the exterior of the load bank enclosure. These lights shall activate whenever the load bank is energized and under load.

2.1.7. The load bank shall be designed for continuous duty cycle operation with no limitations. The load bank shall be able to operate within an ambient temperature of -40 °C to 40 °C.

2.1.8. The load bank maximum sound level for the load bank running at full load shall be:

a) >150 kW, 65 dB(A) at 7 m;

b) 150 - 500 kW, 75 dB(A) at 7 m; and

c) >500 kW, 80 dB(A) at 7 m.

2.2. GROUNDING

2.2.1. The load bank shall be designed for connection to a solidly grounded system. The exception is at rail layover facilities with wayside power stations, where provision shall be made to connect the load bank to a high-resistance grounding system.

2.2.2. Furnish continuous equipment ground bus, 6 mm x 50 mm minimum, extending full length of each load bank gear assembly, securely bolted to internal structural members of enclosure. Connect equipment requiring ground connection to this copper bus using approved pressure-indent type solderless connectors.

2.2.3. Furnish solderless connector at each end of ground bus for customer #2/0 bare, stranded ground cable.

2.3. IDENTIFICATION

2.3.1. Furnish colour coding in accordance with Metrolinx Electrical Identification and Nomenclature Specification 26 05 53

2.3.2. Provide identification for equipment and the sub-components in accordance with Metrolinx Electrical Identification and Nomenclature Specification 26 05 53.

2.3.3. Provide nameplates, warning signs and labels as required by the AHJ.

2.4. MATERIALS

2.4.1. All materials of the load bank of current manufacture, high grade and shall not have been in prior service except as required during factory testing.

2.5. ENCLOSURES

2.5.1. The load bank shall include separate compartments for the resistor elements, the power components, and the control components.

2.5.2. Provide the following in resistor compartment:

a) Resistor elements. The elements shall be air-cooled, coiled Alloy 875 wire silver soldered to stainless steel terminal studs. The elements shall be held in ceramic support insulators;

b) Air flow switch; and

c) Air temperature instruments.

2.5.3. Provide the following in main power compartment:

a) Main breaker rated for customer cable connection;

b) Load bus bars, copper with cable connectors;

c) Load step contactors and breakers/fuses;

d) Control transformers with primary and secondary fusing;

e) Motor starters;

f) Anti-condensation heater with thermostat shall be fed from separate source; and

g) Terminal block for wiring to remote control panel.

2.5.4. Provide the following in control compartment:

a) Wiring diagram and schematic diagram in a visible location;

b) Anti-condensation heater with thermostat shall be fed from separate source;

c) Control relays; and

d) Warning light.

2.5.5. Load bank resistor compartment enclosures shall be heavy-duty NEMA 4X outdoor weatherproof with bird screens and fan cooling.

2.5.6. Load bank control and power compartment enclosures shall be heavy-duty NEMA 4X outdoor weatherproof.

2.5.7. Discharge air shall be directed up. Intake air shall be drawn from multiple points. The load bank exhaust hoods shall be angled and include interior baffle plates to direct falling rain from the interior of the load bank.

2.5.8. The enclosures shall be freestanding and floor-mounted. Load bank shall include a 91.4 cm galvanized steel mounting base to keep load bank clear from floor level.

2.5.9. The enclosures shall be accessed through hinged doors for servicing, adjustments, and connections. Access doors shall require a special tool (supplied) to open.

2.5.10. The enclosures shall be structurally rated and have provisions for hoisting, jacking and forklift handling.

2.5.11. The enclosures shall be cleaned, primed, and painted with manufacturer’s standard colour and paint method.

2.5.12. The enclosures shall include levelling feet.

2.5.13. The enclosures shall be split into sections 1.625 m long/wide maximum to facilitate shipping and handling.

The enclosures shall allow for top, bottom or side cable entry. Removable plates shall be provided.

2.6. FAN MOTOR STARTERS

2.6.1. Fan motors shall be fed from a separate 600 V 3-phase 3-wire 60 Hz source. A single point shall be provided to connect the customer's 3-phase 3-wire supply cable to the fan main circuit breaker within the power compartment.

2.6.2. Motor starters shall be provided for load bank fan motors. Motor starters shall be combination type, sized to suit the motor size, but not smaller than Size 1.

2.6.3. Motor overload protection shall be provided, with manual reset.

2.6.4. Fan motors shall include a time delay to ensure cooling of resistor coils after main load bank load is removed.

2.6.5. Control transformers shall be provided for motor control and shall be single-phase, double-wound with fused 120 V secondary, sized to suit control circuit load plus 20% spare, and installed within the power compartment.

2.6.6. Spare motor starter auxiliary contacts for running indication shall be provided: 1 NO + 1 NC Contacts shall be wired to terminals in the control compartment for customer connection.

2.7. RESISTOR CONTACTORS

2.7.1. Contactors shall be electrically operated, electrically held, heavy-duty, and designed for the application.

2.7.2. Control transformers shall be provided for contactor control and shall be: single phase, double wound with fused 120V secondary, sized to suit control circuit load plus 20% spare, and installed within the power compartment.

2.7.3. Spare contactor auxiliary contacts for running indication shall be provided: one (1) N.C., and one (1) N.O. Contacts shall be wired to terminals in the control compartment for customer connection.

2.8. WIRING

2.8.1. Wiring practices, materials, and coding in accordance with requirements of the OESC.

2.8.2. All bolted connections of bus bars, lugs, and cables in accordance with requirements of the OESC and other applicable standards.

2.8.3. All electrical power connections shall be torqued to required value and marked with visual indicator.

2.8.4. Control wiring shall be minimum No. 14 AWG.

2.8.5. Control wiring shall be stranded copper wire with 600 V insulation minimum.

2.8.6. Power wiring shall be stranded copper wire with 1000 V insulation minimum.

2.8.7. Nylon-type wraps shall neatly bind and support cable harnesses.

2.8.8. Furnish grommets to eliminate sharp edges.

2.8.9. Furnish extra flexible wires with mechanical protection across hinges. Intermediate splices or tee joints in wiring shall not be used.

2.8.10. Terminate not more than two wires on any one terminal block.

2.8.11. Furnish pressure-type terminal blocks for control wiring and shorting-type terminal blocks for current transformer wiring.

2.8.12. Furnish 15% spare terminal blocks.

2.8.13. Number terminal blocks with same numbers as wire at that point for circuit identification.

2.8.14. Label wires at both ends with markers in accordance with Metrolinx Electrical Identification and Nomenclature Specification 26 05 53.

2.8.15. Furnish long barrel two-hole solderless lugs and supports for power wiring.

2.9. COOLING

2.9.1. Forced-air cooling shall be provided to ensure that all components are operated well within temperature ratings.

2.9.2. Cooling shall be automatic with option of manual override.

2.9.3. The load bank module shall consist of two air plenums containing one cooling fan at the intake end, with two element frames located at the discharge end.

2.9.4. Each air plenum shall contain an air flow sensor and temperature sensor.

2.10. CONTROL PANEL

2.10.1. A remote-control panel shall be provided for all operations of the load bank. This remote-control panel shall be located at most 50 m away from the load bank.

2.10.2. The main door of the remote-control panel shall include:

a) General:

1) Main breaker status light;

2) Emergency stop button; and

3) Digital power meter providing total power, 3-phase voltage, and 3-phase current.

b) Load step Controls:

1) On/off switches for each load section; and

2) Running indication lights for each load section.

c) Fan Controls:

1) 3-position (Manual, Off, Automatic) selector switch;

2) On/off switches; and

3) Running indication lights.

d) Alarm Lights:

1) Overtemperatures;

2) Air blockages;

3) Fan failure;

4) Motor overloads;

5) Breaker Trips; and

6) Fuse blown indications.

2.10.3. Emergency stop button shall trip the main breaker. Spare emergency stop button auxiliary contacts for remote indication shall be provided: one (1) N.C., and one (1) N.O. Contacts shall be wired to terminals in the remote-control panel for customer connection.

2.10.4. Building Automation System Interface: Load bank control module shall have:

a) provisions to interface with the existing or new Building Automation System;

b) Modbus communications protocol allowing integration of the load bank with Building Automation System through a PLC, HMI, or SCADA system; and

c) Direct interface from an Ethernet port within the load bank control panel.

3. EXECUTION

3.1. INSTALLATION

3.1.1. Install load bank as per manufacturer's recommendation and requirements.

3.1.2. Provide site service during installation and commissioning of load bank.

3.2. FIELD QUALITY CONTROL AND COMMISSIONING

3.2.1. Arrange for factory-trained field service representatives from the load bank system equipment manufacturer to:

a) Inspect load banks system equipment supplied, and mechanical and electrical connections for integrity and accuracy;

b) Provide manufacturer's service representative to perform testing at no additional cost to Metrolinx; and

c) Perform commissioning tests in the presence of Metrolinx or its authorized representatives to verify compliance with load bank system design performance requirements.

3.2.2. The following inspections and test procedures shall be performed by factory-trained field service personnel during the load bank start-up:

a) Visual Inspection:

1) Inspect equipment for signs of damage;

2) Verify installation per drawings;

3) Inspect load banks for foreign objects; and

4) Verify conductors are properly sized and configured.

b) Mechanical Inspection:

1) Check all control wiring connections for tightness;

2) Check all power wiring connections for tightness; and

3) Check all terminal screws, nuts, and/or spade lugs for tightness.

c) Electrical Inspection:

1) Check all wiring for continuity;

2) Confirm input voltage and phase rotation are correct; and

3) Verify control transformer connections are correct for voltages being used.

d) Site testing:

1) Full load test.

END OF SECTION