

# Vertiv™ PowerBar MPB GUIDE SPECIFICATIONS

## 1.0 GENERAL

### 1.1 Related Documents

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division [XX] Specification Sections, apply to this Section.

### 1.2 Summary

- This guide specification describes the requirements for a low voltage, medium amp busbar system totally encased, non-ventilated, air insulated busbar designed to deliver power to medium size loads.
- The system should be designed primarily for overhead power distribution of electrical power.
- System shall be designed to be installed at critical distribution points to power specific loads, servers, and workstations.
- Loads fed from plug-in/tap off boxes at fixed positions.
- Once installed, the completed system will provide a manageable, economical means for power distribution and communications.

### 1.3 Standard

The busbar range is fully ASTA Tested Certified and is CE approved.

It is manufactured in a certified management system environment where Quality ISO 9001, ISO 45001 and Environmental ISO 14001 standards are applied to all aspects of the manufacturing health and safety, and installation processes.

It is manufactured in accordance with IEC61439-1 and IEC61439-6.

Systems to be manufactured across multiple ISO-certified facilities to ensure production resilience.

### 1.4 System Description

#### 1.4.1 Environmental Conditions

The busbar/busway shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage, degradation, or derating of operating capability:

- Ambient temperature for electronic components: -5 °C (23 °F) to 40 °C (104 °F) average over 24 hours or 40 °C (104 °F) maximum peak.
- Relative humidity of 95% or below (non-condensing).
- This product is designed for indoor use.

### 1.4.2 Electrical Specification/Performance Requirements

The busbar/busway system shall perform as specified in this specification while supplying rated full-load current as shown on the project drawings.

- The busbar/busway system shall be available in the following current ratings:
  - **IEC Aluminum:** 160 A/250 A/400 A/630 A/800 A.
  - **IEC Copper:** 250 A/400 A/630 A/800 A/1000 A.
- **System voltage:** Busbar/busway shall be rated to 690 V.
- **Insulation voltage:** 1000 V.
- **Frequency:** Available in 50 Hz.
- **Short circuit rating:** Minimum of 18 kA (1 second).
- **Conductors:** Copper with minimum 97% conductivity and aluminum with minimum 55% conductivity.

### 1.4.3 Performance Features

The conductors for this busbar are air-insulated. The gap is maintained by mounting the conductors on a durable, high strength mount.

The busbar housing is constructed of a roll formed steel profile with a painted finish.

The busbar has a fully certified fire wall penetration barrier.

The busbar has a standard ingress level (International protection) rating level of IP52. IP55 is available on request.

The busbar can be used as a feeder or distribution application, or as a combination of both.

It is a dual sided system with tap off slots on both sides of the busbar.

Up to 10 taps off points can be fitted per a standard 3 meter length.

## 1.5 Documentation/Action Submittals

### 1.5.1 Submittals/Drawings

#### Provided by Vertiv to client

Submittals /shop drawings shall be supplied for busway and tap off units.

#### Provided by client to Vertiv

Product data: For each type of product indicated, include data features, components, ratings, and performance.

Busbar drawings must include all relevant dimensions. Center line dimensions are expected. Highlight any dimensions that are not center line.

Walls and floors must be indicated, and the relevant dimensions provided.

The phasing and location of all switchboards must be provided.

## 1.5.2 Installation and Operations

An installation manual shall be provided.

Operation and maintenance data: For busbar/busway system, operation and maintenance manuals shall be provided.

Ensure all site conditions meet the specifications outlined in the manual.

Make sure that all materials are in an area protected against dampness, water ingress, and any extremes of temperature.

If the busbar is not to be installed immediately upon delivery, it should be stored in a heated, clean, and dry area. Busbar should never be stored outdoors.

Prepare the work area in accordance with local safety requirements.

The installation guide provided will provide step-by-step instructions for the entire installation process.

The busbar sections are secured to a framing system, such as Unistrut or by using drop rods fixed to the ceiling. It can also be fixed to a wall. The bar can be secured both on its flat or on its edge.

The busbar hanging brackets must be used.

## 1.6 Warranty

Vertiv provides a one-year warranty from the date of shipment on the entire system against defective material, manufacturing and workmanship.

Additional years or warranty shall be an option if required.

## 1.7 Quality Assurance

**Testing agency qualifications:** An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a national recognized testing Laboratory as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.

**Testing agency's field supervisor:** Person currently certified by the International Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

**Source limitations:** Obtain busbar and tap off box components and accessories using qualified manufacturers.

**Product options:** Drawings indicate size, profiles, and dimensional requirements of busbar and are based on the specific systems indicated.

## 2.0 SYSTEM DESCRIPTION

### 2.1.1 Manufacturers

This Specification is based on PowerBar Busway manufactured by Vertiv.

## 2.2 Components

### 2.2.1 Busbar Assembly

The lengths provided on the project shall be as recommended and selected by the manufacturer to meet the project requirements.

The busbar shall be available in lengths up to three meters.

The hangers provided with the system should not in any way interfere with the tap off installation.

Various hangers need to be available for different types of installations to meet individual site needs.

The busbar shall have fixed plug-in positions to accept the tap off boxes. This opening shall pass the UL and IEC hypothetical finger probe test.

**Housing:** The busbar housing sections shall be constructed of a roll-formed steel profile with a painted finish.

**Bus:** Busbars shall be constructed from either high density, high conductivity copper, or high density 55% conductivity tinned aluminium.

Shall be capable of carrying rated current continuously up to an ambient temperature of 40 °C (104 °F).

**Isolated earth:** An isolated earth is to be supplied if shown on the drawings. This is required for systems where earth isolation is required, such as systems with heavy microprocessor-based loads or large computer-based installations.

The conductors shall be air insulated.

### 2.2.2 Tap Off Boxes

Tap off boxes shall be polarized to prevent incorrect installation.

All tap off boxes have mechanical interlock which prevents the tap off door from being opened while the tap off unit is in the ON position.

The tap off unit is secured to the busbar housing using high tensile strength, lockable hardware, with an extended shutter actuator and mechanical clamping mechanism.

Tap off boxes shall use either a circuit breaker or a fuse for branch circuit protection as shown in the schedule on the project drawings and shall have the option of interlocking the MCB at the client's request.

Tap off boxes that include drop cords can be manufactured with cord grips and receptacles as specified on the schedule on the project drawings.

Tap off boxes shall be configured by the manufacturer to balance the load based on quantity of tap off box types provided.

Tap off boxes rated up to 250 A can be fitted to busbar rated up to 400 A. Tap off boxes up to 400 A can be fitted to busbar rated 630 A and above. In line tap off units are utilized when the tap off box rating is 630 A.

The tap off units shall be compatible for vertical and horizontal mounting of the busway.

The tap off units shall be compatible with all current ratings of the busbar/busway system.

The required protection device shall be indicated on the manufacturer's submittal drawings.

The required outlet device shall be indicated on the manufacturer's submittal drawings.

For tap off boxes requiring drop cords, the cord length shall be specified by the customer at the time of purchase order. The length shall be the length of the cord and not the pre-assembled outlet.

Vertiv can also manufacture special tap off units based on your specific needs and requirements, with features including:

- Metering options.
- BMS monitoring of breaker status.
- BMS monitoring of metering systems.
- Automatic remote open/close features.
- Load shedding features.
- Integral sockets.
- Integral distribution boards.

## 2.3 End Feed

The end feed shall provide the connections from the incoming cables to the busbar system.

The end feed shall be an IP2X enclosure with various access panels for incoming cabling.

The end feed shall have an internal connection to a section of busbar conductors.

End feed or center feed boxes are available to accommodate existing or future site conditions.

## 2.4 Final Circuit Monitoring (Optional)

The final circuit monitoring should be integrated into the busway delivering the measurement of total load for individual tap off loads to the DCIM/BMS system.

Protocol: Modbus RTU or Modbus TCP or any other industry standard open protocol.

The final circuit monitoring system shall be capable of monitoring and providing all power calculations for the total input power for each busway run at end feed level. Tap off box monitoring (optional).

The final circuit monitoring system shall be capable of complete integration with the DCIM and BMS system.

Tap off box monitoring: The tap off boxes as indicated on the schedule on the project drawings shall have the following power measurements and remote monitoring interface.

- Input voltage per phase (L/L and L/N).
- Current per phase (min/max).
- Voltage per Phase (min/max).
- Power factor.
- Frequency.
- Power (active, reactive, apparent).
- Demand/energy consumption (kWH).
- Current peak demand.
- THD – total harmonic distortion (optional).

- Status monitoring (optional).  
In system should be capable of monitoring closed and trip status for each MCB. The status signals are to be fed back to the end feed using the integrated Ethernet cabling.
- Accuracy of 0.5%.
- Communication is Modbus RTU or Modbus TCP and SNMP simultaneously.
- Tap off box monitoring must support 1, 2, and 3-pole circuits with varying phase configurations.

#### 2.4.1 End Feed Monitoring (Optional)

End feed monitoring (option – select as required): The end feed is to be provided with the following power measurements and remote monitoring interface:

- Input voltage (L/L and L/N)
- Current per phase (Min/Max)
- Voltage per phase (Min/Max)
- Neutral current
- Power factor
- Frequency
- Power (active, reactive, apparent)
- Demand (kWH)
- Voltage and current THD%
- Current peak demand
- Accuracy is better than 0.5%
- Communication is Modbus RTU or Modbus TCP and SNMP Simultaneously
- LED

#### 2.4.2 End Feed Thermal Monitoring System (Optional)

- Provide a continuous thermal monitoring system (TMS) for feeder termination points as well as other power conduction points that have the potential to develop hot spots over time.
- TMS shall provide real-time heat rise data for each cable landing. Heat rise data shall be provided to the EPMS system via Modbus TCP protocol.
- TMS shall be factory-installed and tested to the extent possible by the equipment manufacturer. Any fieldwork required shall be performed by factory-certified personnel.

**Option 1: IR/Contact Continuous Temperature Monitoring**

- Thermal sensors for bus connections shall be non-contact, non-powered, and shall not require periodic calibration.
- Thermal sensors for cables shall be contact type, non-powered, and shall not require periodic calibration.
- Sensors should be positioned appropriately to detect heat rise from potentially overloaded or poorly conducted electrical connections.
- Thermal sensors shall be monitored via a Modbus data concentrator, which in turn will be connected to the EPMS via Ethernet.

**Option 2: Infrared Windows for Periodic Manual Scanning**

- Provide price delta to substitute infrared arc resistant view windows for IR/contact thermal monitoring. IR windows to be installed in the electrical equipment by manufacturers in locations to allow unobstructed and safe IR scanning of feeder termination points as well as other power conduction points that may develop hot spots over time.

**2.4.3 Miscellaneous Hardware**

- **End cap:** The end cap is installed at the end of the busbar run.
- **Joint kit:** The joint kit is used to make electrical and mechanical connections between busbar sections and end feeds, via a bolted means and no special tooling is required.
- **Busbar hangers:** Busbar hangers are installed on the busbar and provide connections to the suspension system provided by the installation contractor. Hanger assemblies must not interfere or obstruct the busbar/busway opening intended for installation of tap off units. The installing contractor shall supply threaded rods or Unistrut where required for hanging the busbar/busway.

The manufacturer should have access to a standard range of accessories including elbows, and so on for complete system installation.

## 3.0 PERFORMANCE FEATURES

### 3.1 Factory Testing

Standard factory tests shall be performed on the equipment provided under this section.

All tests shall be in accordance with the latest version of ISO standards.

The manufacturer shall provide certified copies of factory test reports upon request.

### 3.2 Examination

With an installer present, examine site conditions to ensure they comply with the requirements that impact busbar performance.

Proceed with installation only after any unsatisfactory conditions have been corrected.

### 3.3 Installation

The contractor shall install the busbar in accordance with the manufacturer's instructions.

The busbar runs shall consist of lengths as shown on the drawings.

The Tap Off Box orientation shall be as indicated on the drawings.

Hanging of the busbar shall be done using the busbar hangers from a structure above the busbar.

The hangers shall connect to the busbar, and to an all-thread rod provided by the installing contractor.

The spacing of the hangers along the busbar is 1.5 meter or less as recommended by the manufacturer.

The end feed shall have connection provisions for the contractor supplied feeder cabling.

The End Feed shall be connected to the busbar section using a joint kit.

Connection of sections of the busbar shall be done using a joint kit. The connection shall be made per the manufacturer's instructions.

An end cap shall be installed at the end of the busbar run.

As shown on the drawings, elbow or tee connections may also be required.

Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions.

Connections: Contractor shall make connections to supply circuits according to manufacturer's instructions and project drawings.

### 3.4 Field Quality Control

#### 3.4.1 Installing Contractor Inspections

Prepare inspection reports to include the following:

- Comply with the manufacturer's written instructions.
- Inspect interiors and exteriors of enclosures, including the following:
  - Integrity of mechanical and electrical connections.
  - Component type and labelling verification.
  - Ratings of installed components.

#### 3.4.2 Infrared Scanning

After substantial completion, but not more than 60 days after final acceptance, perform an infrared scanning of each busway.

- **Follow-up infrared scanning:** Perform an additional follow-up infrared scan of each busway six months after the date of substantial completion but prior to final project close out.
- **Instrument:** Use an infrared scanning device designed to measure temperature or detect significant deviations from normal values. Provide calibration record for device.
- **Record of infrared scanning:** Prepare a certified report that identifies busways checked and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

### 3.5 Testing and Certification

Type-tested for:

- Strength of materials and parts.
- Degree of protection of enclosures.
- Clearance and creepage distances.
- Protection against electric shock and integrity of protective circuits.
- Dielectric properties.
- Temperature rise limits.
- Short circuit withstand strength.