

# MEDIUM VOLTAGE CABLE BUS SPECIFICATION

## PART 1 GENERAL

### 1.01 SCOPE

- A. This specification describes the electrical and mechanical requirements for a medium voltage (5-46kV), ventilated, non-segregated phase metal enclosed cable bus.

### 1.02 REFERENCES

- A. Cable bus systems and all components shall be designed, manufactured, tested, and certified in accordance with CSA 22.2 No. 273:19
  - i. Only products carrying a CSA Listing or Recognized Status to CSA 22.2 No. 273:19 will be accepted.
- B. Cable bus systems and all components shall fully comply to the CE Code.
- C. Cable bus systems shall have cable ampacity provisions to comply with Rule 8-104 in the CE Code.

### 1.03 SUBMITTALS – FOR REVIEW/APPROVAL

- A. A factory authorized representative shall perform on-site field measurements for an accurate cable bus layout.
- B. A complete set of
  - i. Engineering drawings
  - ii. Installation drawings shall be supplied for each system to facilitate system design and installation and include electrical detail of the conductors together with enclosure dimensions.
- C. Installation drawings shall include the following:
  - i. Load to be supported at each individual indoor and outdoor support
  - ii. Complete Bill of Materials (BOM)

#### **1.04 SUBMITTALS – FOR CONSTRUCTION**

- A. Drawings and information for items listed in Section 1.03 shall be submitted and shall incorporate all changes made during the manufacturing process.
- B. Manufacturer shall provide field measurements, survey, and detailed drawings, and include this with scope of supply.
- C. One Complete printed set and one electronic set of installation instructions and installation drawings shall be provided with the cable bus duct system.

#### **1.05 QUALIFICATIONS**

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly and the manufacturer shall be ISO 9001.
- B. Only cable bus products carrying a CSA Listing or Recognized Status to CSA 22.2 No. 273:19 will be accepted.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of ten (10) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. The cable bus duct shall be packaged in optimal sized sections to facilitate shipping and handling as well as minimization of installation costs.
- B. One (1) copy of manufacturer's instructions shall be included with the equipment at time of shipment.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Power Bus Way

The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified certifications, ratings, features, and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

B. Rigid bus bar duct, cable tray, or cables in conduit are NOT acceptable alternatives.

### 2.02 CABLE BUS - GENERAL

A. Cable bus construction shall comply with all requirements in CSA 22.2 No. 273:19.

B. The cable bus duct system shall be designed to supply the following for each system run:

LABEL	VOLTAGE	AMPACITY	% NEUTRAL	AMBIENT TEMP	CONDUCTOR TERM TEMP

- C. The cable bus duct system shall include all necessary straight sections, fittings, cable support blocks, covers, splice plates, hardware, weatherproof entrance fittings, firestops, single conductor cables, compression lugs, termination kits, external supports and other accessories as required to form a complete system.
- D. Each straight section and fitting are to be uniquely identified with an affixed label to correspond to an itemized list as shown on the installation drawing to facilitate assembly.
- E. The cable bus duct system shall be assembled at the point of installation as supplied by Power Bus Way Ltd. in accordance with installation drawings provided by same.

### 2.03 CABLE BUS – CONSTRUCTION

In addition to the requirements in CSA 22.2 No. 273:19, the cable bus shall have the following:

- A. All load bearing members of the cable bus duct system including side rails, rungs and splice plates shall be manufactured from mill finished 6061-T6 aluminum alloy and be a minimum of 1/4" (6mm) in thickness for maximum strength and equipment bonding.
- B. The maximum allowable design stress shall not exceed 15,000 psi and a minimum design factor of safety of 2.5 shall be used.
- C. The enclosure assembly shall be mechanically fastened, and not welded.
- D. The enclosure shall be fabricated from natural, unpainted mill finish aluminum and shall be suitable for indoor and outdoor use.
- E. All enclosure hardware shall be stainless steel for maximum corrosion resistance and minimum electrical losses. Plated hardware is not acceptable.
- F. All elements of the enclosure shall be so designed to eliminate any and all sharp edges or projections that may cause injury to personnel or damage to conductors.
- G. Ventilated covers shall be manufactured from 1/8" (3mm) thick corrosion resistant aluminum. Both top and bottom covers shall be removable and fit neatly one to another without sharp edges.
- H. Cover ventilation openings shall be designed to prevent entry of foreign objects and rodents and shall not permit entry of a round rod measuring 7mm (.28") in diameter and shall permit sufficient passage of air to cool conductors below the specified conductor termination temperature.
- I. Conductor cables shall be positively secured on supports made of a minimum 1/2" thickness NEMA grade glass reinforced polyester (GPO-3) spaced a maximum of 30 inches (760 mm) horizontally and 18 inches (455 mm) vertically along the length of the cable bus duct. Metallic clamps, HDPE, and wood blocks are not acceptable.

- J. Conductor cable support blocks shall be designed in segments maintaining a minimum of one conductor diameter in both horizontal and vertical planes to maintain free air conductor rating.
- K. Conductor cable supports are to be retained in place using a slotted side-rail construction into which the cable support segments slide into position without requiring the use of through-type retention bolts in order to facilitate ease of cable installation.
- L. Enclosure fittings shall be sized to ensure that the cable bending radius is not less than that recommended by the cable manufacturer.
- M. The cable bus duct shall include a watertight seal with a minimum **2-hour fire** rating when passing through fire rated walls, floors, or ceilings.
- N. The cable bus duct wall penetration seal shall be weatherproof for exterior walls.
- O. Sprinkler proof switchgear shall be equipped with a watertight entry flange using CSA approved connectors.

#### **2.04 CABLE BUS – ELECTRICAL**

- A. All cables shall be:
  - i. single conductor;
  - ii. CSA listed and approved for MV105;
  - iii. have an FT4 vertical tray flame test rating; and
  - iv. suitable for indoor and outdoor use.
- B. Cables shall be phased and supported without intermediate transpositions of the cable to maintain low impedance and assure the mechanical strength necessary to prevent cable movement or damage under short circuit fault conditions.
- C. Cables shall be arranged in a phasing pattern that provides minimal interphase and intra-phase unbalance and provide an equal sharing of the load.



- D. Cables shall be new and field loaded in continuous lengths once the enclosure has been set in place and secured. There shall be no splices in any cable.
- E. The medium voltage cables shall be terminated with termination kits suitable for the cable and voltage specified.
- F. Cable ampacity ratings shall use proper correction factors to conform with the maximum continuous loading requirements as per Rule 8-104 of the CE Code.
- G. Enclosure shall be grounded at sufficient points to prevent a potential above ground on the enclosure in the event of a fault.
- H. NEMA 2-hole compression type lugs with shall be used exclusively at the termination of the conductor runs and shall be provided by the manufacturer.
- I. The enclosure shall have a resistance across the enclosure splice that shall not exceed 40 microohms.
- J. Each fitting and section of enclosure shall be bonded by the bolted joint between sections.
- K. A bonding conductor shall be provided in accordance with the CE Code and shall be sized in accordance with Table 16.



## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. The installer shall install the cable bus and all accessories per the manufacturer's installation manual.

### **3.02 WARRANTY**

- A. The manufacturer shall provide an eighteen (18) month warranty from the date of shipment against any cable bus failure when installed in compliance with manufacturer's written instructions and any applicable national or local code.