

Series – S3 Track Busway Specifications

1 Summary

1.1 This specification covers the electrical characteristics and general requirements for an IP54-Rated track busway system, hereafter referred to as “Series – S3 Busway” or the “S3 System”. The system shall be designed primarily for power distribution of electrical power. Once installed, Series – S3 Busway will provide a simple, versatile, fast and economic means of distributing power. Loads fed from Series – S3 Busway plug-in units can be added or removed without shutting down the busway. The following specification only applies to Series – S3 Busway.

1.2 Specification includes:

1.2.1 Three-phase Series – S3 Busway with the following features:

1.2.1.1 Extruded aluminum busway housing with conductors

1.2.1.2 Power feed

1.2.1.3 Plug-in units for power distribution

1.2.1.4 Monitoring

1.2.1.5 Installation tool and joint kits

1.2.1.6 Optional accessories

2 Standards and Certification

2.1 The S3 System shall be designed and manufactured to the following standards:

2.1.1 Electrical Testing Laboratories (ETL) (US/Canada) Certified to UL 857.

2.1.2 International Electrotechnical Commission (IEC) Standard, IEC 61439-1, edition 2.0 – Low Voltage Switchgear and Controlgear Assemblies, Part 1: Type Tested and Partially Type Tested Assemblies

2.1.3 International Electrotechnical Commission (IEC) Standard, IEC 61439-6, edition 1.0 – Low Voltage Switchgear and Controlgear Assemblies, Part 6: Particular Requirements for Busbar Trunking Systems (Busways).

2.1.4 CE (Europe) Certified to IEC 61439-1 and IEC 61439-6.

2.1.5 NOM (Mexico) Certified to NOM-003-SCFI-2000

2.1.6 National Electric Code (NEC) – Article 368 – Busways

- 2.1.7 National Fire Protection Agency (NFPA) – 70, National Electric Code (NEC)
- 2.1.8 National Electrical Manufacturers Association (NEMA) – AB1, Molded Case Circuit Breakers and Molded Case Switches (*if applicable*)
- 2.1.9 National Electrical Manufacturers Association (NEMA) – KS-1, Enclosed and Miscellaneous Distribution Equipment Switches (600 VAC) (*if applicable*)
- 2.1.10 International Electrotechnical Commission (IEC) – 60529, Degrees of Protection Provided by Enclosures (IP Code)
- 2.1.11 National Electrical Manufacturers Association (NEMA) – 250, Enclosures for Electrical Equipment (1000 Volts Maximum)
- 2.1.1 NEMA BU 1.1. *“General Instructions for Proper Handling, Installation, Operation and Maintenance of Busway Rated 600V or less”*

3 System Description

3.1 Electrical Requirements

- 3.1.1 System voltage: up to 600V
- 3.1.2 Frequency: 50/60 Hz.
- 3.1.3 Ampacity: 100, 225
- 3.1.4 Neutral Ampacity: Minimum of 100% of rating (optional 200% Neutral)
- 3.1.5 Short circuit rating of each busway must be:
 - 3.1.5.1 100A System: 22kAIC up to 600V
 - 3.1.5.2 225A System: 22kAIC up to 600V
- 3.1.6 Conductors: 3 phase conductors, 1 neutral conductor solid copper, tin plated
- 3.1.7 Grounding: Aluminum casing or 1 dedicated conductor solid copper, tin plated

3.2 Operational Requirements

- 3.2.1 Environmental Conditions: Series – S3 Busway shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage, degradation or derating of operating capability.
 - 3.2.1.1 Series – S3 Busway shall operate with continuous load with no derating up to 40 degrees Celsius, 0.95 multiplier at 45 degrees C., 0.90 multiplier at 50 degrees C, 0.85 at 55 degrees C and 0.825 at 60 degrees C
 - 3.2.1.2 Relative humidity: 0 to 95 percent, noncondensing
 - 3.2.1.3 Altitude: Sea level to 6600 feet (2000m)
 - 3.2.1.4 Dusty or wet environments requiring up to IP54 or NEMA 3R ingress protection ratings
 - 3.2.1.5 Indoor or “protected outdoor” environments where the system is not directly exposed to weather elements (rain, sleet, snow, ice, sun, etc.)
- 3.2.2 Safety and Security Requirements: The S3 System shall include the following minimum features:
 - 3.2.2.1 Minimum IP54 ingress protection rating for Series – S3 Busway and plug-in units
 - 3.2.2.2 Minimum NEMA 3R enclosure rating for Series – S3 Busway and plug-in units
 - 3.2.2.3 Floor visible and operable circuit breakers to meet NEC 404.7 and 404.8
 - 3.2.2.4 Circuit breaker lockout feature
 - 3.2.2.5 Enclosure locking feature for plug-in units for safety and security
 - 3.2.2.6 UV light and corrosion resistant system components

3.3 Manufacturers Qualification

- 3.3.1 A minimum of 30 years’ experience in the manufacturing of the busway products.

3.4 Manufacturing Requirements

- 3.4.1 All S3 System components and accessories shall be manufactured by Starline Holdings, LLC.

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4 Submittals

4.1 Submittals shall be in accordance with specified procedures. Submit shop drawing and product data for record purposes prior to shipment. Shop drawings for S3 Systems must include:

- 4.1.1 Detailed equipment assemblies and dimensions, weights, location and identification of each field connection
- 4.1.2 Wiring Connection: For power and monitoring wiring
- 4.1.3 Orientation of plug-in units face in final installation
- 4.1.4 Include plug-in schedule with detailed description

4.2 Provide electrical characteristics and connection requirements for the system and accessories

4.3 Indicate special receiving and handling procedures

5 Warranty

5.1 Series – S3 Busway manufacturer shall guarantee the entire system against defective material and workmanship for a period of one (1) year from date of shipment

5.2 Additional years of warranty and ability for start-up services must be an option if required per drawings

5.3 Warranty shall only cover S3 System components manufactured by Starline Holdings LLC, and with a minimum IP54 rating. Use of any aftermarket components is strictly prohibited

5.4 Series – S3 Busway shall only be installed with the open access channel facing downward. This is required to ensure the product meets the ingress protection requirements. Improper installation can result in system damage and void the product warranty

6 Product Components

6.1 Series – S3 Busway Housing

- 6.1.1 Extruded aluminum housing certified to serve as a 100% ground. Standard housing lengths are 5 and 10 feet. Additional lengths can be provided upon factory consultation. The housing should be properly extruded with a slot to receive rod mount hangers to hang from a ceiling. This housing should be open on the bottom to accept plug-in units anywhere along its length. The open channel must be sealed between plug-in units utilizing the manufacturer's closure strip.
- 6.1.2 Busway housing shall be protected against corrosion utilizing protective coating (per MIL-DTL-5541), while maintaining case grounding capability with the option for powder-coating.
- 6.1.3 All conductors shall be made of copper and sized to handle 100% of its rating continuously up to the maximum ambient temperature. The conductors shall be electrically isolated from the housing. All insulators must be UL and IEC compliant.
 - 6.1.3.1 Ground conductor: An internal, 100% ground conductor is to be supplied if shown on the drawings
 - 6.1.3.2 Oversized neutral: An oversized, 200% neutral conductor shall be supplied, where applicable, if shown on the drawings
- 6.1.4 Busway housing sections shall be joined together by a 'press fit' that requires no bolted connection and no future maintenance. These housing sections at these "joint" locations shall include a smooth flat machined surface to accommodate the manufacturer's specified Series – S3 joint kit with appropriate sealing components.
- 6.1.5 Busway housing shall be available in standard silver, red, blue, black, white or custom RAL colors

6.2 Series – S3 Power Feeds

- 6.2.1 The power feed shall provide the connections from the incoming cables to the busway system. The power feed shall have an internal connection to a section of busway conductors. End feeds and above feeds shall be available depending upon desired feed location. Feeds shall have the option to be designed with mechanical or compression type lugs.

6.2.2 Power feeds shall be provided by the manufacturer with appropriate hangers, gland plates, and sealing components to meet IP54 and NEMA 3R requirements.

6.3 Series – S3 Plug-In Units

6.3.1 Plug-in units shall be polarized to avoid incorrect installation

6.3.2 Plug-in units can be added, removed or repositioned without de-energizing the busway

6.3.3 Plug-in units shall use circuit protection as directed in the schedule on the project drawings

6.3.4 Plug-in units shall be capable of being built with customer-specified circuit breaker protection, outlets and accessories

6.3.5 Plug-in units shall have a soldered wire connection on each stab that picks up power from the busway. This wire shall then be directly connected to the line side of the circuit breaker. The use of crimp connectors is prohibited

6.3.6 Plug-in units shall be “turn-n-lock” style, to allow for seamless insertion into the busway housing slot and engage the electrical connection

6.3.7 Plug-in units shall be supported with bolt-on tabs to secure units to the busway

6.3.8 Plug-in units that include drop cords shall be manufactured with cord grips and receptacles as specified in the drawings

6.3.9 Plug-in units shall be configured by the manufacturer to balance the load based on quantity of plug-in unit types provided

6.3.10 Plug-in units shall have a minimum of 10kAIC and the ability to obtain a maximum of 65kAIC

6.3.11 Plug-in units shall be rated to IP54 and NEMA 3R. Plug-in units are interchangeable within the S3 System

6.3.12 Plug-in units shall be available with optional, revenue grade metering devices

6.3.13 Plug-in units’ authenticity shall be proven by the presence of a Starline ratings label

- 6.3.14 Plug-in units shall require a Series – S3 specified seal assembly system between the plug-in unit and the busway housing. Standard track busway plug-in units are not compatible with Series – S3 Busway
- 6.3.15 Plug-in units shall be designed to maintain visibility of breaker status, through either a transparent cover and/or manufacturer designed breaker handle system

6.4 Monitoring (*OPTIONAL*)

- 6.4.1 Plug-In Unit Monitoring: The plug-in units as indicated on the schedule on the project drawings shall have the following power measurements and remote monitoring interface.
 - 6.4.1.1 Input Voltage (L/L and L/N)
 - 6.4.1.2 Current per Phase (Min/Max)
 - 6.4.1.3 Voltage per Phase (Min/Max)
 - 6.4.1.4 Power Factor
 - 6.4.1.5 Frequency
 - 6.4.1.6 Power (Active, Reactive, Apparent)
 - 6.4.1.7 Demand (kWH)
 - 6.4.1.8 Current Peak Demand
 - 6.4.1.9 Accuracy is better than 0.5%
 - 6.4.1.10 Communications is Modbus RTU, Modbus TCP, Ethernet SNMP, BACnet and optional wireless plus available daisy chain Ethernet topology
 - 6.4.1.11 Optional display

7 Installation

- 7.1 The contractor shall install Series – S3 Busway in accordance with the manufacturer's instructions
 - 7.1.1 End feeds to be bottom or side fed only – never from the top
 - 7.1.2 Busway runs shall consist of lengths as shown on the drawings
 - 7.1.3 The plug-in unit orientation shall be indicated on the drawings
 - 7.1.4 Hanging of the busway: The system shall be hung from a structure above or beside the busway, using the supplied busway hangers. The hangers shall connect to the busway, and to an all-thread rod provided by the installing contractor. The maximum spacing between hangers along the busway is 10 feet

7.1.4.1 Series -S3 Busway shall only be installed with the open access channel facing downward

7.1.5 Connecting busway sections: The installer will use a joint kit designed specifically for Series – S3 Busway to combine two sections of busway. This kit includes housing couplers, coupler covers, bus connector and joint seal. An installation tool must be ordered from the manufacturer to properly connect a busway joint. Once connected, the joint requires no bolted connection or further maintenance

7.1.6 Terminating busway runs: Series – S3 Busway end caps shall be required at the end of each run

7.1.7 Sealing the open access channel: The closure strip is a required component of the S3 System. The closure strip must be cut and fitted per the manufacturer’s installation instructions to adequately cover ingress of the open channel. Closure Strip is not included with each housing section of Series – S3 Busway, and must be ordered separately

8 Delivery, Storage and Handling

8.1 Deliver, store and handle busway assemblies according to NEMA BU 1.1. “*General Instructions for Proper Handling, Installation, Operation and Maintenance of Busway Rated 600V or less*” and/or according with the manufacturer’s instructions

9 Field Quality Control

9.1 Manufacturers Field Services: The S3 System must be accompanied with a required service package of Level 3 Commissioning to be performed by a Starline Certified Technician. Additional service packages with features including both on-site and post-installation support are available. These services include:

9.1.1 On-site Training

9.1.1.1 Pre-installation site visit and contractor training with a Starline Certified Technician prior to installation to ensure best practices are followed throughout the installation process

9.1.2 Installation Inspection, Commissioning and Certification

9.1.2.1 Level 3 Commissioning

- 9.1.2.1.1 Inspect each run of busway to ensure all parts are installed as intended
- 9.1.2.1.2 Inspect each joint and connection point of the busway confirming joint seal is installed properly and there are no gaps
- 9.1.2.1.3 Verify closure strip is installed and sealing the open channel from joint to joint
- 9.1.2.1.4 Verify all conduit entry points into plug-ins and end feeds are using a watertight conduit
- 9.1.2.1.5 Verify all lid gaskets are installed
- 9.1.2.1.6 Verify all plug-in units are installed to the busway using the watertight gasket
- 9.1.2.1.7 Inspection of the conduit entry to each busway power feed verifying no strain on the feed
- 9.1.2.1.8 Ensure the busway is correctly and safely mounted
- 9.1.2.1.9 Verify the ends of the busway have been capped off correctly
- 9.1.2.1.10 Verify correct connection at power feeds according to single-line diagram
- 9.1.2.1.11 Perform insulation resistance tests of each busway, phase to phase, and phase to ground (Megger) tests
- 9.1.2.1.12 All Initial Series – S3 installations must be reviewed and commissioned by an approved manufacturing representative
- 9.1.2.1.13 Completion and submission of L2 system startup checklist and findings

9.1.2.2 Level 4 Commissioning

- 9.1.2.2.1 Starline Certified Technicians will exercise and operate the Starline busway and load bank equipment by providing up to 100% of the available load for a specified burn period
- 9.1.2.2.2 Thermal scanning is performed as load is applied and documented, verifying the busway has been installed correctly and all components are torqued and functioning as intended
- 9.1.2.2.3 Additional Starline warranty is provided upon completion

9.1.3 Preventative maintenance and IR Scanning

- 9.1.3.1 Starline-certified technicians visually and thermally scan all critical joints and connections for maximum uptime

- 9.1.3.2 Expert inspection and component replacement of any seals
- 9.1.3.3 Detailed thermography report which includes recommendations, thermal images, and maintenance checklists for your busway system
- 9.1.4 Meter Programming
 - 9.1.4.1 Inspection and comprehensive verification of meter functionality
 - 9.1.4.2 Custom programming of set points and communication protocol settings
 - 9.1.4.3 Optional network cabling to all Starline devices
- 9.1.5 Recertification and Extended Warranty Programs
- 9.1.6 24/7 Emergency Service and Phone Support

10 Documentation

- 10.1 The following documentation shall be available to assist in product selection and installation, and is available for download at <https://www.dvl.net.com/products/starlinebusway> :
 - 10.1.1 Track Busway Product Selection Guide
 - 10.1.2 Operation, Installation and Maintenance Manuals
- 10.2 Product drawings shall be rendered and provided at the time of ordering