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Building with BUSWAY

Circulation Systems for Electrical Power

The life-blood of any building, electricity provides the power for heating, cooling, lighting, and other such necessities for efficient operation. At the heart of the electrical system is a generator, most often located in a power plant many miles away from where the electricity is used. The generated electrical power is converted to a form that can be transported and is then transformed back at the point of use. Electrical power distribution equipment acts as a cardiovascular system, delivering power where needed, when needed, safely, and in the right amounts.

The larger a building, the greater the need for electrical power. More power requires larger wire sizes, additional wires and alternative ways to distribute the power. The alternative to large and numerous cables (large wires) is busway. Today, busway systems can be found in factories above production lines, underneath city streets, in chemical processing facilities, and in high rise buildings — almost any place where large amounts of power need to be conveyed from one location in a building to the next.

Busway, as defined by the National Electric Code[1], Article 368, is "a grounded metal enclosure containing factory mounted, bare or insulated conductors, which are usually copper or aluminum bars, rods, or tubes." Busway is produced in all voltage ranges and in capacities up to 6000 amps alternating current. The majority of busway produced is rated under 600 volts, and greater than 600 amps.

The main advantages for busway usage are lower installation costs and reduced space requirements. For example, a single run of busway rated at 1000 amps and loaded to 80% is equivalent to a run of 16, 1 1/8 inch diameter cables of the same length. The costs to install busway are not insignificant, but the costs to install an equivalent run of cables can be expected to be much greater.

In-Line Meter Center

Increases in commodity prices, labor costs and the cost of real estate has also driven the need for more specialized busway designs. A good example of a product new to the market is an in-line meter center. An in-line meter center is an enclosure around the busway designed such that the busway runs through the center of a nest of electric meters within the enclosure, rather than running the busway next to a meter center. The electricity is tapped directly from the busway within the enclosure. In-line meter centers save space and reduce the number of bolted connections required for installation, all of which translates into reduced construction and real estate costs. Cost comparison calculators are available on the websites of many major busway manufacturers.

[1] *The National Electrical Code is published by the National Fire Prevention Association for use primarily by those who design, install and inspect electrical installation. For more information about the National Electrical Code, see the article "Don't Be Shocked" in the September 2006 issue of* **The Stress Point**, *available at www.edtengineers.com under News.*

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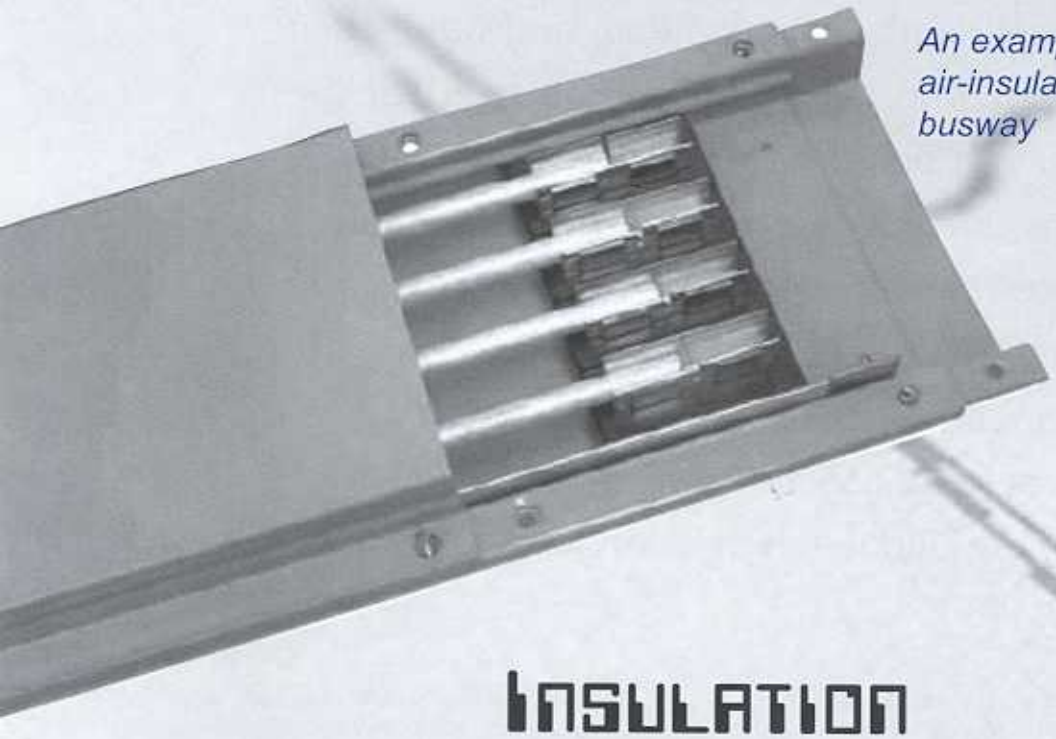
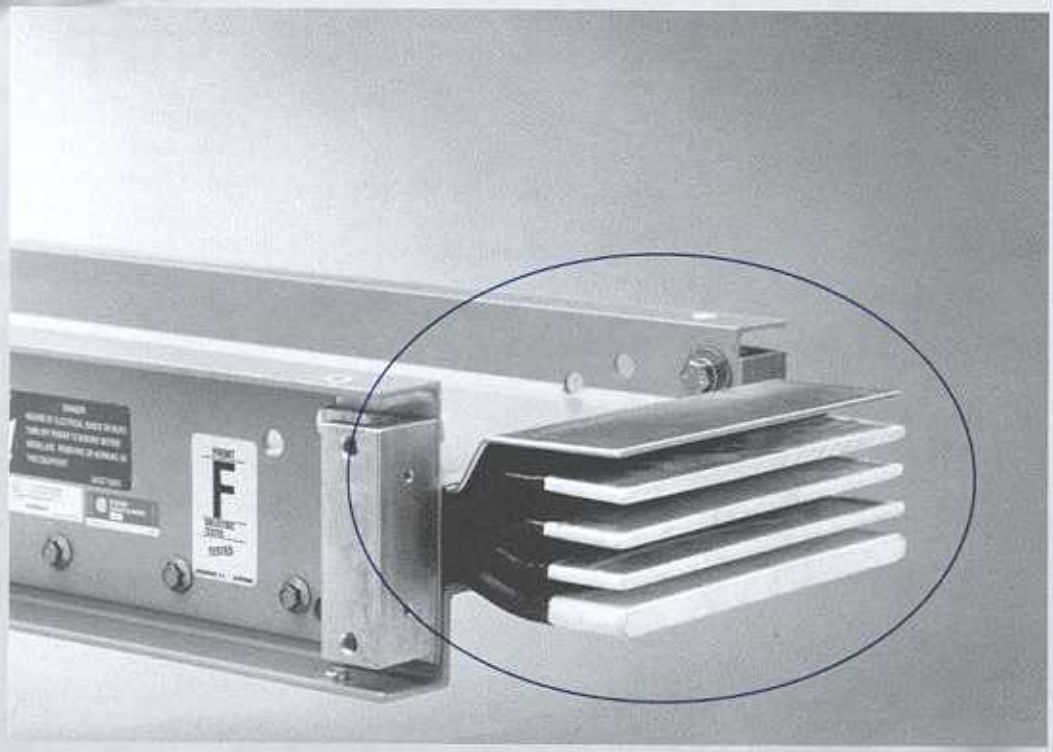


An example of air-insulated busway

Insulation

Low voltage electrical busway (less than 600 volts) is insulated either with air or with a surface coating. A surface coating can be electrical tape, a special epoxy blend, or other electrically insulating materials that adhere to the surface of the busway conductors.



An example of an end connection on epoxy-insulated busway

Preservation

As with our own cardiovascular system, proper care of an electrical power distribution equipment goes a long way in avoiding major problems or system failure. Busway is no exception. For example, busway that is being stored prior to installation has to be stored indoors where it can be kept clean, dry and at a uniform temperature to prevent condensation. Even busway rated for outdoor conditions should be stored in this manner prior to assembly.

Care must also be taken to size the busway as intended by the manufacturer. The rating of a busway system applies when the assembly of the system is complete (for example, when all of the covers are installed and the system power is ready to be energized).

When electrical current runs through an electrical conductor, be it in a cable or a busway, heat is created. The temperature of the conductor will continue to rise as the electrical current is increased. Various standards regulate the maximum temperature that conductors can experience. These standards are written with the expectation that the contact surfaces between conductors will degrade over time, and the insulation touching the conductors will degrade faster at higher temperatures.

Another condition to be avoided is an installation where the busway is under-loaded, particularly busway that is in use in an uneven temperature environment. A 4000 amp busway could be installed in an open-air warehouse to power only a 1000 amp load. However, with this application, the busway will eventually form enough condensation to provide an electrical path between conductors, with critical results. The preferred application is where the electrical load is close to the rating of the busway, thereby creating the necessary resistance to raise the operating temperature to a level to prevent condensation.

Typical busway installation

As our bodies continue to age, we change. Care must be taken to keep all parts in optimum working order. Likewise, aging buildings can also be expected to change. A step in keeping buildings healthy is a well-designed, well-maintained and well-monitored electrical system. Both the installation and the changing use of the electrical system within a building, including busway, requires an awareness of how the equipment is affected.