

WATER RESISTANT OUTDOOR BUSWAY SYSTEM

BACKGROUND OF THE INVENTION

5 This invention relates to busway systems, and more particularly, to water resistant outdoor busway systems.

10 The use of electric power busway is described within US patent 4,804,804 entitled "Thermally Efficient Power Busway System" for carrying high ampere current within an industrial electrical power distribution system. The busway is in the form of a plurality of copper current-carrying bars, one per each current phase and carrying an insulative coating to prevent inter-phasal transfer.

15 Electrical connection between separate sections of the power busway is achieved by means of busway joints consisting of copper plates separated by means of a plurality of fiber or glass-filled polyester spacers. Examples of such thermally-efficient busway joints are described within US patents 4,842,533 and 4,950,841 both entitled "Thermally Efficient Splice Joint
20 for Electrical Distribution Busway".

 When such busway systems are exposed to the environment, the polyester spacers are of sufficient thickness to insure adequate electrical insulative properties in the presence of condensed moisture conditions. The

thickness requirement for outdoor busway joints improves the electrical resistance properties of the spacers while, at the same time , reducing the thermal transport of the heat generated within the copper plates.

- 5 The purpose of this invention is to provide electrical busway joint connectors having both electrical insulative as well as thermally conductive properties not influenced by the presence of excessive moisture.

SUMMARY OF THE INVENTION

- 10 Electrical power distribution busway joints include opposing plates of conductive and non-conductive materials for connecting between adjoining busway sections. The non-conductive plates comprise glass-filled epoxy laminate sheets having high thermal conductivity, high electrical resistance and good mechanical strength in the presence of excess moisture. The glass is
15 in the form of extended fibers exhibiting improved mechanical strength.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an end view of the electrical busway joint according to the invention;

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Figure 2 is side view of the interior of the busway joint of Figure 1;

Figure 3 is a side sectional view of the busway joint of Figure 2; and

Figure 4 is a graphic representation of the physical and electrical properties of the materials employed within the insulative plates of the busway joint of Figures 1-3.

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DESCRIPTION OF THE PREFERRED EMBODIMENT

A three-phase busway connector joint 10 is shown in Figures 1 and 2 to consist of a pair of outer housing plates 11A and 11B carried by a support strap 12. The connector joint includes successive apertured metal splice plates 25, 26, 27 with corresponding apertured inner insulative plates 23, 24 for insulating between the splice plates as well as corresponding apertured outer insulative plates 21, 22 for insulating between the splice plates and the outer housing plates 11A, 11B. As described within aforementioned US patent 4,842,533 slotted openings 28, 29, 30 are defined between the metal splice plates 25, 26, 27 to accept the respective ends of the busway system busbars (not shown) for connecting therebetween. Anti-turn insulating tubes 17 of oval cross-section are inserted within corresponding oval-shaped openings 17A formed through the outer housing plates 11A and 11B. Prevention of turning is also provided by the anti-turn lugs, one of which is shown at 15, which cooperate with slotted openings 16 formed in the rectangular washers 19A, 19B respectively. Belleville washers 18A, 18B are arranged on the outer surface of both of the outer housing plates to provide added compressive force to the outer plates when attached together by means of cylindrical bolts 13, 14 and corresponding nuts 19, 20 respectively. Although means are depicted for only three bus conductors herein, additional bus conductors such

as neutral and ground conductors are usually employed, thereby requiring additional pairs of splice plates 25, 26, 27 and insulative plates 21, 22, 23, 24.

5 In accordance with the invention, it has been determined that the use of glass filled polyester for the insulative plates must be of sufficient weight and thickness to comply with rigid industry electrical resistivity tests within high humidity enclosures. The thickness of the insulative plates increases the overall size of the joint, especially within 3 phase-4 wire; internally grounded industrial electrical distribution systems.

10 To substantially reduce the overall size and cost of the joints the insulative plates are now fabricated from a glass-filled epoxy composition, such as a type NP510 obtained from Norplex Inc. wherein the glass was arranged as extended glass fibers embedded in the epoxy in the form of thin laminates, and the composite laminates were then arranged in a plurality of layers. The optimum electrical resistance and mechanical strength properties were
15 obtained within the range of about 75-160 layers per inch of the composite laminates.

20 The relationship between the glass fiber content in the epoxy composition and the measured properties of a fixed laminate thickness are depicted in Figure 4. It is noted that the tensile strength 32 and impact resistance 33 increase in proportion to the amount of glass fibers whereas the dielectric strength 34 decreases therewith. An effective composition for maximum insulative plate
25 performance in electrical busway joint performance within a high humidity environment is found within about 35 to about 75 weight percent glass.

An efficient electrical busway joint for maintaining electrical resistivity between the phases of a multi-phase electrical distribution system has been shown to include resistivity plates fabricated from a glass-filled epoxy composition. The electrical resistivity is sustained between the phases when
5 subjected the electrical busway joint is subjected to high humidity testing.

CLAIMS

What is claimed is:

1. An electric busway joint having a pair of outer support plates and a plurality of electrically-conductive plates intermediate said support plates and a plurality of electrically-insulative plates intermediate said electrically-conductive plates, wherein the improvement comprises said electrically-insulative plates comprising a glass-filled epoxy composition.
2. The busway joint of claim 1 wherein said glass-filled epoxy composition comprises between about 35 and about 75 weight percent said glass in said epoxy.
3. The busway joint of claim 1 wherein said glass is arranged as a plurality of glass fibers.
4. The busway joint of claim 3 wherein said glass fibers and said epoxy composition define a plurality of planar laminates.
5. The busway joint of claim 4 wherein said planar laminates are arranged in a multiplicity of layers.



6. The busway joint of claim 5 wherein said multiplicity of layers range from about 75-160 layers per inch.
- 5 7. An electrically-insulative plate for electrical isolation between phases of a multi-phase electrical busway joint comprising a plurality of glass fibers encased within an epoxy composition.
8. The electrically-insulative plate of claim 7 said glass fibers and said epoxy
10 composition define a plurality of planar laminates.
9. The electrically-insulative plate of claim 8 wherein said planar laminates are arranged in a multiplicity of layers.
- 15 10. The electrically-insulative plate of claim 9 wherein said multiplicity of layers range from about 75-160 layers per inch.
11. The electrically-insulative plate of claim 7 wherein said glass-filled epoxy composition comprises between about 35 and about 75 weight percent said
20 glass in said epoxy.

