

CTI TECHNICAL BULLETIN

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Bonding Jumpers Not Required for Standard Cable Tray Splice Plates

It is not necessary to install bonding jumpers in parallel with the standard rigid aluminum or steel one-piece metallic bolted side rail splice plates that are the connections between the cable tray sections. Here, the use of bonding jumpers does not make a safety contribution to a properly installed cable tray system, and wastes both materials and labor.

For personnel and facility safety all the metallic electrical equipment enclosures and supports that may become energized in the event of an electrical fault must be bonded electrically back to the equipment connection for the system's equipment grounding conductor cable tray wiring systems must comply with all the appropriate requirements of NEC Article 20 - Grounding Properly installed standard metallic splice plates provide the electrical continuity between the cable tray sections to meet the NEC Section 31S6(a) requirement that the electrical continuity of the cable tray system shall be maintained.

During the 1970s, chemical industry engineers conducted fault current tests on the then designated NEMA Class II aluminum and galvanized steel ladder cable tray components at the Bussmann Fuse - Sauget, Illinois Test Facility. The setups consisted of four ladder cable tray sections to provide three different connections (C1, C2 & C3) between the ladder cable tray sections that could be monitored during each test. The tests were confined to one side rail only, which produced more severe conditions than if both side rails were allowed to conduct, current as is the case in an actual installation.

Four bolt hole splice plates (2 bolts holes for each cable tray side rail) were used.

Test Current - 3,600 amperes for 14 cycles (Aluminum Cable Tray)

C1 Corroded Aluminum Rigid Splice Plate –

Connections between the splice plate and the side rails were one nylon bolt Splice plate temperature rise was 34 degrees Celsius.

C2 3/0 AWG Copper Bonding Jumper –

Connections between the copper bonding jumper and the side rails were AL-CU compression lugs with one steel bolt Bonding jumper connection temperature rise was 75 degrees Celsius.

C3 Clean Aluminum Rigid Splice Plate –

Connections between the splice plate and the side rails was one steel bolt Splice plate temperature rise was 29 degrees Celsius.

For this test, single nylon or steel bolts were used for each splice plate connection. In an actual installation, two steel or stainless steel bolts would be used for the splice plate connection which would result in lower temperature rises in the splice plates for the same fault conditions. The copper bonding jumper installation was the same as an actual installation. The standard rigid splice plates tested had lower temperature rises than the copper bonding jumper connection. The test performance of the splice plates was superior to the test performance of the copper bonding connection.

No conducting compound was used between any of the contact surfaces. The normal oxide film on the aluminum was not disturbed. No damage occurred on any of the test components. The test fault current flow time was excessive for what would occur in an actual installation where the protective device ratings or settings were properly selected.

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