



## **Safety Alert: Electrical Connectors and Junction Boxes Must Maintain Proper Internal Separation for Conductors of Multiple Intrinsically Safe Circuits**

Electrical connectors and junction boxes used for intrinsically safe (IS) circuits must maintain proper separation between conductors of multiple IS circuits. The conductors of multiple IS circuits would include the connection pins of the connector. An issue arose on a Caterpillar Mobile Bridge Carrier (MBC) system where a connector was installed in a multi-conductor cable that contained multiple IS circuits. Upon inspection of the connector, it was determined that the spacing between the connection pins did not have the proper IS separation. Connection pins and uninsulated conductors of each IS circuit contained within the connector or junction box, must have a clearance distance of a minimum of 6 mm (¼ inch) unless a reduced spacing is permitted in the approval or evaluation drawings for these circuits. These connection pins could also be separated by an insulated or grounded metal barrier. When a junction box is used, this separation distance can be maintained by the use of terminal blocks and/or by a method of securing the IS conductors within a junction box.

Caterpillar has noted on their circuit schematic for their MBC's that "Optional connectors can be used in cables that have one, and only one intrinsically safe circuit. These may be used to connect safety pad, footswitch, and/or tapeswitch" and "Optional junction boxes may be used on all intrinsically safe circuits, up to four optional junction boxes may be used on each Pig and on each MBC."

Any type of IS connector or junction box that houses more than one IS circuit must have the proper internal spacing of 6 mm (¼ inch) or separate the circuits with insulating or grounded metal barriers. This applies to all machine manufacturers. Mines that perform wiring changes to IS circuits must maintain this separation when installing connectors or junction boxes in cables containing multiple IS circuits.

MSHA recommends that mine operators inspect their IS connectors and junction boxes to make sure that the proper separation is maintained between conductors of different IS circuits. IS connectors that allow for multiple wire pairs with the proper separation between IS circuits are commercially available.