Application Note

Medium Voltage Switchgear and Substation Cable

Background

Southwire's Medium Voltage Switchgear and Substation Cable is a non-shielded, insulated, finely stranded cable that has no voltage rating. The cable has no UL listing and is not recognized by the National Electrical Code (NEC). The cable's primary use is for installation in medium voltage switchgear, motor controllers, and substations. For inside enclosures and equipment a UL approval can be obtained on the complete assembly by having the system tested and approved.

Simple Termination

The cable has a finely stranded conductor to allow for easier installation and tight bends inside enclosures. Because the cable has no metallic shield it is simple and easy to terminate. There is no semi-conductive insulation shield to remove and there is no metallic shield to terminate. Termination is as simple as removing the insulation to expose the conductor and attaching the lug. The lack of a complex termination and the fact that the cable's conductor is finely stranded facilitates quick and easy use and installation inside enclosures and substations.

No Standard or Approvals

Although Southwire's Medium Voltage Switchgear and Substation Cable has no industry approvals, the cable does meet the requirements for insulation used on conductors (whether rigid or flexible) contained in clause 6.2.1.3 of ANSI/IEEE C37.20.2-1999 and clause 6.2.7.1 of ANSI/IEEE C37.20.3-2001), which defines the test requirements for insulation used on bus bars. In addition, the cable has passed the Basic Insulation Level (BIL) test that simulates a Lightning Strike withstand of 150kV. This is the specified test voltage used for BIL testing of switchgear operating at 38kV. Passing these tests demonstrates the cables suitability to be used within medium voltage switchgear.

No Voltage Rating

The cable has no voltage rating because the voltage a conductor can safely hold is related to the cable's insulation, air spacing and the dielectric strength of the insulator. The NEC offers no guidelines for cable spacing inside enclosures for insulated cables. The NEC does publish cable spacing data for indoor and outdoor bare cables in Table 490.24.

Insulated cables, like Southwire's Medium Voltage Switchgear and Substation Cable are able to be spaced closer together than a non-insulated cable. Southwire has performed testing on this cable in controlled conditions and has determined spacing guidelines for installation inside medium voltage enclosures under controled conditions. Under less than ideal conditions where water,

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dirt, dust, or other contaminates can find their way into the enclosure, cable tracking can occur and cause failure. It is important that the inside of the enclosure be kept clean and free of contaminates.

The following table outlines Southwire's guidelines for cable spacing inside switchgear and outdoor substation use:

Cable Installation Guidelines

Operating Voltage	Switchgear Installation		Substation Installation	
	ϕ - ϕ	ϕ - Ground	ϕ - ϕ	ϕ - Ground
Volts	inches	inches	inches	inches
4,160	2.0	1.0	7.0	3.0
13,800	4.0	2.5	12.0	5.0
38,800	8.0	4.5	15.0	9.5

The above guidelines were developed by Southwire at their Cofer R&D Center. No industry Standards were used in developing this table. The above values are for informational use only.

Written by Southwire engineers Mark Dulik and Steve Wetzel who have over 60 years of combined experience in cable installation, terminating, manufacturing, engineering and support.