



## Shielding Methods, Construction and Life on AmerCable Underground Mining Products



Shielding methods for mining cables is one of great interest for cable users involved with splicing, terminating, or general handling of cables. Knowledge of shield construction yields understanding regarding the limitations of the cable.

Considering the 10 to 12 year life of cables in surface mines and the rugged use, there is always potential for shield damage and shield wear. The same is true for underground mine trailing cable, except over a shorter period of time.

The shielding system has to hold up to flexing, torsion and shear, as do all the other components. However, the shielding comprises the smallest individual components in the entire cable. Most Type SHD-GC cables are manufactured with a composite braid of fabric twine and copper. The copper serve comprises 12 carriers each having 4 to 8 number 28 AWG wires. In the case of a mine power feeder, the shielding is a thin 0.003 or 0.005 inch copper tape helically applied and overlapped.

Mine power feeder shielding is the simplest and provides 100% coverage, including a 10% minimum overlap application of the tape. This overlap allows movement and extension when the cable is handled during installation. Never should the mine power feeder be bent to extremes where the "outside" overlap is reduced to near 0%. The resulting compression on the inside of the bend would be extreme. When the cable is straightened, even more damage can occur. Severe cutting and wrinkling of the copper tape will result. The underlying layers can also be cut or damaged. The potential for failure at these damaged locations exists. Problems may take the form of the following: 1) long term corona and ionization; 2) electrical failure if the insulation is cut; or 3) reduced effectiveness of the shield at this point.

Type SHD cables can be flexed and bent in a much tighter radius than the mine power feeder. There are no concerns with shield overlap. Neither are there rigid strands to kink nor "bird cage" in an SHD cable. Flexible trailing cables are cabled in a shorter helix than mine

power feeders to withstand tighter bends and give increase to flexibility.<sup>1</sup>

Braid shielded trailing cables are available in two styles: 1) full copper, with 12 carriers traveling in a left-hand lay and 12 carriers with a right-hand lay; or 2) nylon/copper with 12 carriers of copper with a right-hand lay and color-coded nylon braided in the left-hand direction. Each braid shield offers certain advantages. Full copper braid is the older style and offers 84% coverage of the insulation. The strength of material assures that all wires will remain in or close to their original manufactured position. Overlaps are considered the wear point and the mode of ultimate failure.

A composite copper-nylon braid shield has 60% minimum coverage of copper. The nylon provides a cushion and eliminates the wear point. Longer life is the result, but over years of use, fabric will wear and migration of the wires can occur. When compared to other materials commonly used in composite braids, AmerCable's nylon is strong and tough and holds up very well. AmerCable's nylon also is resistant to moisture related deterioration, being an inorganic substance.

Whether a shield tape or braid is utilized, it should not be considered to be fragile. However, both have finite limits on their installation, use and handling. Guidelines for achieving the optimum performance from a cable are: 1) determine the best style of shield for the application when ordering cable; 2) properly terminate the shield at the ends; and 3) practice good cable handling on a daily basis. With these three, a good solid cable program can be established and excellent longevity can be realized.

### Bending Radii

Cable	kv Rating	Factor*
MP-GC	2-25	12
SHD-GC	2-5	6
SHD-GC	8-25	8

<sup>1</sup>See Table 1 for normal recommended bend radii

\*Times cable diameter