



Polypropylene Insulated Ground Check Conductors for Type SHD-GC and SHD-CGC Cables

The selection of ground check monitor wire insulation is very important to the overall performance of mining cables. The monitor wire can be the most troublesome component within a cable. This is due to the fact that it is usually the smallest conductor. Mechanical stresses of tension, torsion, compression and shear work against all of the cable's components. All stresses can apply specifically to the monitor wire.

Torsion can twist the power conductors into a tighter lay, which pulls the monitor deeper and tighter into the interstice, creating radial compression upon the insulation. Conversely, the lay of assembly can loosen. This allows the monitor wire to become slack, compressing the wire longitudinally underneath the jacket. In most cases where softer insulation is used, slack wire has no choice but to kink or double-back over itself underneath the jacket. Shear of the monitor wire against the insulated and shielded components on either side can hasten the formation of kinks especially after

splicing the monitor wire with a standard butt connection. [A special method of splicing ground check monitor wires with hard insulation is given in Appendix I.]

Many different ground check insulating materials are recognized by the Insulated Cable Engineers Association (ICEA) Specification S-75-381/NEMA WC-58. In practice there are two materials commonly used for this application. Comparisons of typical values for the two insulations, ethylene propylene rubber (EPR) and polypropylene thermoplastic, are given below. EPR comes in Type I and Type II, each having its own set of physical properties. For the purposes of comparison, only Type II is considered since it is the stronger and more rigid of the two. Polypropylene insulation is a high modulus material and also has good heat resistance. The cable can be continuously operated at 90°C conductor temperature and withstand excursions up to 130°C.

Minimum Properties Per ICEA Polypropylene EPR Type II

Tensile strength, psi	3000	1200
Elongation at rupture, percent	300	150
Tensile stress at 100% elongation, psi	2500	500
Cold Bend at -50°C (finished cable)	pass	pass

Minimum Properties Polypropylene EPR Type II

Cold Bend at -50°C (monitor wire itself)	pass	pass
Kink resistance	excellent	good
Mechanical strength	excellent	good

- Remove three-fourths inch of insulation from ground check conductor strand without nicking any wires. Allow for approximately one-half inch of slack plus the extra material required for butting the ends together.
- Bend the seven bunches back over the insulation.
- Find a crimp sleeve one and one-half or two inches in length which will snugly fit over the bunches and the insulation.
- Crimp firmly, but not so hard as to deform the underlying polypropylene. (This transfers the stress from the strand to the polypropylene.)
- Re-insulate using proper tape.