ABSTRACT

This communication cable has a metal shield coated with a corrosion protecting coating of polyethylene blended with an adhesive copolymer to control the adhesion of the coating. A jacket is extruded directly over the outside of the coated shield and is uniformly bonded to the coated shield. The bond to the metal is strong enough to prevent delamination of the coating from the metal and the cable is buried and exposed to ground water; but the bond of the coating to the metal is limited enough to permit the coating on the outside of the shield to be peeled from the metal at cable ends and splices so as to expose bare metal.

7 Claims, 4 Drawing Figures
COMMUNICATION CABLE WITH IMPROVED COATED SHIELD

RELATED PATENTS

The Jachimowicz U.S. Pat. No. 3,233,035 discloses a communication cable with an aluminum shield, coated with plastic that bonds strongly to the aluminum, and a plastic outer jacket over the coated aluminum shield. To make the removal of the outer jacket at terminations less difficult, special provisions were made to reduce the adherence of the jacket to the coated shield. The adherence of the coating to the aluminum was very tenacious so that the coating could not be peeled from the aluminum, though it could be scraped off with considerable labor where necessary to make terminations and splices.

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to cables, especially communication cables, that have a core surrounded by a metal shield of approximately 8 mils in thickness, such as an aluminum shield. The aluminum is coated on both sides by a copolymer of polyethylene with reactive carboxyethyl groups. Such cables of the prior art have had the bond of the coating to both the metal shield and an outer plastic jacket, that covers the shield so great that it was difficult to remove them at cable terminations and splices.

The use of oil, tallow, or other substances over the outside surface of the coated shield, to reduce adherence to the shield and jacket, required an additional operating step in manufacture of the cable and the results were not uniform so that some parts of the jacket would be bonded to the coating more firmly than other parts and at some locations there would be little or no bond. Even when the release material made removal of the outer jacket reasonably convenient, it was still necessary to remove the coating from the outer surface of the shield in order to get access to bare metal. The coating had to be scraped from the metal and this entailed substantial labor.

I have discovered that the bonding of the shield with its corrosion protecting coating can have plenty of adhesion to prevent delamination of the coating from the shield when buried and exposed to ground water, and at the same time the adhesion of the coating can be controlled so that it can be peeled from the surface of the shield. This requires that the tensile strength of the coating be correlated with the adhesion to the shield so that the force applied to peel the coating does not cause the coating to break or to split as it pulls away from the surface of the shield.

By controlling the adhesion of the coating material, this invention makes practical the extrusion of the outer jacket directly over the coated shield without prior application of oil and/or tallow to the coating. More important, it also makes possible the peeling of the corrosion protecting coating from the shield to expose bare metal when necessary to make connections with extensions of the shield circuit. The installing of the cable is made more convenient and installation costs are substantially reduced.

The coating of this invention is a blend of a highly adhesive copolymer such as ethyl-methacrylic copolymer with polyethylene or its equivalent. Another highly adhesive copolymer that can be blended with polyethyl-

BRIEF DESCRIPTION OF DRAWING

In the drawing, forming a part hereof, in which like reference characters indicate corresponding parts in all the views:

FIG. 1 is a side elevation, partly broken away and in section, showing a communication cable made in accordance with this invention;

FIG. 2 is a sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a greatly enlarged sectional view taken on the line 3—3 of FIG. 1; and

FIG. 4 is a view similar to FIG. 3 but at a location where the outer jacket has been cut away and this Figure shows the way in which the coating can be peeled from the outer surface of the shield to expose bare metal.

DESCRIPTION OF PREFERRED EMBODIMENT

A cable 10 includes a core 12 consisting of a plurality of insulated conductors 14 enclosed in an insulating sleeve 16. There is a metal shield 18 surrounding the core 12; and this metal shield 18 is preferably applied by longitudinally folding a metal strip around the core with edges of the strip forming a longitudinal, lap seam in accordance with conventional practice.

The shield 16 is made of metal 22, such as aluminum, and there is a plastic coating on the metal 22. In the construction illustrated, there is a coating 24 on the outside surface of the metal 22 and a coating 26 on the inside surface. This coating 24 and 26 is for the purpose of preventing corrosion of the metal 22 when the metal is made of aluminum or other corrosive material.

The adhesion of polyethylene to aluminum was not sufficient to prevent delamination of the polyethylene coating from the aluminum shield when communication cables were buried in the ground and exposed to ground water. It was not until the invention by Jachimowicz of a cable shield with polyethylene coating having carboxyethyl groups (U.S. Pat. No. 3,233,036, dated Feb. 1, 1966 that communication cables could be buried in the ground, exposed to ground water, and still suffer no delamination of the corrosion protecting coating from the metal shield.

I have discovered that polyethylene can be adhered to metal strips, such as aluminum, with sufficient adhesion to prevent delamination underground and exposed to ground water; and that if the adhesion is controlled, it can be low enough to permit the coating to be peeled from the metal and to expose bare metal, at terminations and splices. This makes installation of communication cables much easier and less expensive than with coatings which had such high adhesion that peeling was impossible. The adhesion is still high enough, however, to avoid delamination and to thus protect the cable indefinitely even though exposed to ground water, as already explained.

FIG. 4 shows the way in which the outer coating 24 of the shield 16 can be peeled back by being gripped and pulled by an operator's fingers 30. The tensile strength of the coating 24 is high enough with relation to the adhesion of the coating to the metal 22, so that
3,891,791

3

the coating 24 does not break or split as it is pulled cleanly from the outside surface of the aluminum shield 22.

The coating 24 is preferably made of low density polyethylene blended with an ethylene acrylic acid copolymer or an ethylene-methacrylic copolymer in such proportions that the ratio of polyethylene to the copolymer is between about three to four and four to three. The proportions of the blend should provide such adherence of the coating to the metal that a force of between 1 and 2.5 pounds is required to separate a one inch wide strip of the coating from the metal shield at 10 inches per minute.

This reduction in the adherence of the coating 24 to the metal shield 22 also reduces the adherence of the outer jacket 20 to the coating as compared to cable constructions of the prior art which have had coating to metal adherence high enough to resist delamination when exposed to ground water. As the result of this reduced adherence of the shielded coating, I have found that it is practical to extrude the outer jacket 20 in direct contact with the coated shield; that is, without any oil, talc or other release agent between the coated shield and the extruded outer jacket 20. This adherence is low enough so that at terminations and splices the outer jacket 20 can be cut and pulled loose from the coated shield before any portion of the coating is peeled away from the metal of the shield. The technique of cable installation is greatly facilitated.

The preferred embodiment of the invention has been illustrated and described, but changes and modifications can be made and some features can be used in different combinations without departing from the invention as defined in the claims.

What is claimed is:

1. An electric communication cable comprising a cable core, insulation on the cable core, a shield of corrosive metal around the core, a corrosion protecting coating on the shield including a mixture of polyethylene and an adhesive copolymer, the adherence of the mixture to the metal of the shield being sufficiently strong to prevent delamination of the coating and the shield when the cable is buried and exposed to ground water, but the adhesion being limited to such a value that the coating can be peeled from the surface of the shield when an edge of the coating is broken loose from the metal the coating containing sufficient adhesive copolymer to require a force of between 1 and 2.5 pounds to separate a one inch wide strip of the coating from the metal shield at 10 inches per minute, and the maximum ratio of polyethylene to copolymer being about 4:3.

2. The communication cable described in claim 1 characterized by an outer jacket over the coated shield, the outer jacket being an extrudant applied directly to the corrosion protection coating on the outside of the shield.

3. The communication cable described in claim 2 characterized by the outer jacket being bonded to the coating on the shield by an adhesion less than that of the coating to the metal.

4. The communication cable described in claim 3 characterized by the outer jacket being polyethylene fusion bonded to the coating on the shield but with a bond strength less than that of the coating to the metal of the shield.

5. The communication cable described in claim 1 characterized by the copolymer being from the group consisting of ethylene-acrylic acid copolymer and ethylene-methacrylic copolymer.

6. The communication cable described in claim 5 characterized by the proportion of polyethylene and copolymer in the coating being a ratio of polyethylene to copolymer between 3 to 4 and 4 to 3.

7. The communication cable described in claim 4 characterized by the tensile strength of the coating being greater than the adhesion of the coating to the metal so that the coating can be peeled from the surface of the metal shield without breaking the peeled portion of the coating to which the peeling force is applied and without splitting the coating as it is pulled from the surface of the metal.