

CABLE ARMOR: Aluminum vs. Steel

There are some questions that seem to go on forever. One is “which came first -- the chicken or the egg?” Another is “which is better -- aluminum or steel cable armor?”

Armored cable is normally used in applications where the cable is expected to be exposed to A harsh mechanical environment or where Type MC (metal clad) cable is required by the NEC (National Electrical Code). For example, armor is often specified for directly buried cables where rocks in the backfill could damage the cable. Armored cable is also frequently used in cable trays to protect the cable from falling objects, to provide added fire resistance and to provide additional safety for electrical maintenance workers.

Cable armor is generally one of three basic types: interlocked aluminum, interlocked galvanized steel, or corrugated-and-welded aluminum (Philsheath[®] for example). Other specialized types are also available. Many, if not most, applications can be satisfactorily served by *either* aluminum or steel armor. However, unique requirements sometimes make one or the other the preferred material. Aluminum and steel armor are compared in a few key areas below:

Crush Resistance

Aluminum and steel interlocked armor must both conform to the same UL crush resistance REQUIREMENT described in UL Standard 1569 for Type MC cables. To compensate for aluminum's softer characteristics, ICEA (Insulated Cable Engineers Association) specifications require aluminum armor to be 5 mils thicker than steel armor as follows:

<u>Diameter of Cable Under Armor</u>	<u>Nominal Armor Thickness</u>	
	<u>Steel</u>	<u>Aluminum</u>
0 to 1.5 inches	20 mils	25 mils
Larger than 1.5 inches	25 mils	30 mils

Impact Resistance

Both aluminum and steel armored cables must pass the same impact resistance requirements described in UL Standard 1569 for Type MC (metal clad) cable.

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Conductivity

The higher (better) electrical conductivity of aluminum plus the greater thickness of aluminum armor, makes the end-to-end conductivity of aluminum armor about 5 times better than that of steel.

Weight

Total cable weight is significantly less with aluminum. Depending on conductor size, aluminum armored cables are typically 60% to 90% the weight of steel armored cables.

Corrosion Resistance

Corrosion of aluminum or steel is virtually non-existent in a dry environment. This is also true in a wet environment if the armor is protected by an overall jacket such as PVC. Field experience has shown that aluminum and steel are generally similar in corrosion resistance except where certain acids or alkalis come in direct contact with the metal. In this case, selection of the armor material should be based on field experience or on laboratory tests in which their relative performance is determined by exposure to the chemical(s) in question.

Shielding

Electromagnetic interference (EMI) is best blocked by highly conductive *and* strongly magnetic materials. Steel is magnetic, aluminum is non-magnetic. As a result, steel is usually somewhat more effective than aluminum in high current (high magnetic field) applications. Aluminum usually outperforms steel in low current (low magnetic field) applications where aluminum's better electrical conductivity predominates.

Cost

The relative cost of aluminum AND STEEL ARMORED CABLE is nearly equal. One OR THE OTHER can be lower in cost at any point in time DEPENDING on market conditions.

Well ... we *still* don't know whether the chicken or the egg came first. **HOWEVER**, you *do* know the relative performance of aluminum versus steel cable armor.