

**Aluminized Wire for Coiled Wire Armor for
Automotive Fluid Handling Tubing
Do Not Use on New Programs; No Replacement****1 Scope**

This standard covers aluminum-coated steel wire.

1.1 Material Description. This material consists of carbon steel wire, hot dip coated with an aluminum-silicon alloy.

1.2 Symbols. Not applicable.

1.3 Typical Applications. This wire armor is typically used for mechanical and abrasion protection of designated areas of air and fluid carrying tubes and pipes.

1.4 Remarks. The coil pitch, length and diameter are outside the scope of this material specification and shall be specified separately on component drawings.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM A370

ASTM A428

ASTM A510M

2.2 GM Standards/Specifications.

GMW3059

GMW3286

2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements**3.1 Base Metal.**

3.1.1 Chemical Composition. The chemical composition of the steel wire shall be as shown in Table 1.

3.1.2 Wire Manufacture. The steel wire furnished to this specification shall be hard drawn wire manufactured in accordance with ASTM A510M to 1.2 mm diameter. Dimensional tolerance of the wire shall conform to ASTM A510M requirements as applicable.

Table 1: Wire Chemical Composition

Element	Composition Percent (%)
Carbon ^{Note 1}	0.55 to 0.80
Manganese ^{Note 2}	0.40 to 0.90
Phosphorus	0.035 maximum
Sulfur	0.035 maximum
Silicon	0.10 to 0.35

Note 1: Carbon in any one lot shall not vary more than 0.13%.

Note 2: Manganese in any one lot shall not vary more than 0.30%.

3.1.3 Mechanical Properties. Mechanical properties of the wire shall be determined by the methods described in ASTM A370.

3.1.3.1 Tensile Strength. The tensile strength of the wire shall be in the range of 1310 MPa to 1655 MPa.

3.1.3.2 Wrap Test. The wire shall be capable of being wrapped around a mandrel equal to the wire diameter without fracture.

3.2 Coating.

3.2.1 Coating Chemistry. The ingot or pig aluminum used for coating shall conform to the impurity limits shown in Table 2. The silicon content of the bath shall be adjusted to promote better adherence during forming but shall not exceed 6%.

Table 2: Coating Impurity Limits

Element	Maximum Allowed
Copper	0.10%
Iron	0.50%

3.2.2 Coating Weight. The coating weight shall be 60 g/m² minimum as determined per ASTM A428.

3.3 Adhesion. Coating adherence shall be determined by wrapping the wire at least twice in a close helix around a cylindrical mandrel having a diameter equal to 3x the diameter of the wire. The aluminum coating shall adhere to the wire without flaking or peeling and without being removed by rubbing with the bare fingers.

3.4 Corrosion Resistance. The aluminized wire shall withstand neutral salt spray testing per GMW3286 for a minimum of 240 h with no red rust on significant surfaces, except that up to 10% red rust is allowed as occasional pin spots at or near the cut-off ends.

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

5.3 Inspection and Rejection. Samples of components or materials released to a GM material specification shall be tested for conformity with the requirements of this material specification and approved by the responsible Engineering department prior to commencement of delivery of bulk supplies.

A new approval must be received for any changes, e.g., properties, manufacturing process, location of manufacture, etc. If not otherwise agreed, all testing and documentation normally required for initial release must be completed.

It is the responsibility of the supplier to inform the customer in a timely manner, without solicitation, and to include documentation of all modifications of materials and/or processes and to apply for a new release.

If not otherwise agreed, all release tests shall be repeated and documented by the supplier prior to commencement of delivery of non-conforming bulk supplies. In individual cases, a shorter test can be agreed to between the responsible Engineering department and the supplier.

5.4 Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS). For new product submissions, or when a change in chemical composition of an existing product has occurred, a complete copy of the Material Safety Data Sheet/Safety Data Sheet must be submitted in compliance with the Globally Harmonized System of