



Cold Drawn Steel Wire for Restraint Applications

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose/Material Description. This specification covers low carbon steel wire, supplied in coils or bar form for use in automotive body structures. The wire produced per this specification is cold-drawn and uncoated for assembly into sub-assemblies or directly into the vehicle structure.

1.2 Symbols. Not applicable.

1.3 Applicability. This specification applies to cold hard drawn wires, which are drawn without the use of thermal treatment. The structural wire products specified here are used in automotive body structures for parts commonly known in automotive industry as isofix wire for applications such as child tether loops, cargo box tie down loops, etc.

2 References

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

2.1 External Standards/Specifications.

ASTM A751 ASTM E8/E8M

2.2 GM Standards/Specifications.

GMW3059

3 Requirements

3.1 Requirements on Test Specimens. This section defines specific requirements for material on delivery, processing, performance and other stages during life cycle.

3.2 Requirements on Delivery. Any deviations to this specification and shall be agreed between Purchasing and supplier.

3.2.1 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

3.3 Chemical Requirements.

3.3.1 Base Metal. Base metal composition based on product (wire) analysis determined per ASTM A751 shall conform to the requirements in Table 1.

Table 1: Chemical Composition Requirements ^{Note 1}

C [%]	Mn [%]	P [Maximum %]	S [Maximum %]
0.08 to 0.23	0.30 to 0.90	0.035	0.035

Note 1: Residual elements shall be agreed upon between purchaser and supplier.

3.4 Mechanical Requirements. The steel products shall be tested per ASTM E8/E8M and shall meet the mechanical properties as specified in Table 2. Due to the wire drawing process, the cold work imparted in the

wire results in variation of properties from surface-to-core. Therefore, excessive removal of the surface of the wire as part of test sample preparation will affect the observed mechanical properties. Thus, per ASTM E8M, the full cross-sectional area of the wire should be used for testing whenever possible. If not possible, light sanding/removal of surface material may be performed, but no more than 0.25 mm of surface material may be removed for any wire over 5 mm in diameter.

Table 2: Mechanical Property Requirements ^{Note 1}

Yield Strength at 0.2% Offset ^{Note 2} [MPa]	Tensile Strength [MPa]		Total Elongation ^{Note 3} [%]
Minimum	Minimum	Maximum	Minimum
500	600	800	12

Note 1: Additional demands can be specified by local units.

Note 2: The yield stress values shall apply for the 0.2 proof stress, $R_{p0.2}$, if the yield stress cannot be easily recognized; otherwise, the values shall be the lower yield stress, R_{eL} .

Note 3: 25 mm gauge length per ASTM E8/E8M specification.

3.5 Physical Requirements.

3.5.1 Material Thickness and Tolerance. The detailed engineering part drawing or electronic math file will specify the wire diameter and tolerance.

3.5.2 Surface Quality. The steel shall be free from surface defects as negotiated between purchaser and supplier. For unexposed (U) surface, defects such as pores, slight indentations, small marks, minor scratches, and slight coloring, which do not affect formability or the application of surface coatings, are allowed. Surface shall conform at least to unexposed surface quality (U) and shall be free of defects which might affect the uniform appearance of quality paint or an electrolytic coating, electrodeposited primer, cathodic e-coat (ELPO). Detailed requirements will be issued by the responsible formability analysis organization (e.g., GMNA Manufacturing Engineering Material Parts Specification (MPS) sheet, GM responsible manufacturing, or metallurgical engineering document etc.)

3.5.3 Finish. Cold drawn wire may be furnished with a variety of finishes depending upon the drawing practices used by the manufacturer. Unless otherwise specified in the purchase order, the wire is normally produced with a common dry drawn finish, usually referred to as a bright finish. Other finishes are also available such as clean and extra smooth wire, requiring special drafting practices.

3.5.4 Other Requirements. Requirements such as tolerances on product shape and dimensions, inspections units, number of tests, sampling, test conditions, retests, inspection documents, packing, and handling of disputes shall be agreed upon between supplier and the local business unit.

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.