



Designation: A1023/A1023M – 21

## Standard Specification for Carbon Steel Wire Ropes for General Purposes<sup>1</sup>

This standard is issued under the fixed designation A1023/A1023M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope\*

1.1 This specification covers the general requirements for the more common types of steel wire ropes. Included in this specification are wire ropes in various grades and constructions from  $\frac{1}{4}$  to  $3\frac{1}{2}$  in. [6 to 89 mm] manufactured from uncoated or metallic coated wire. Also included are cord products from  $\frac{1}{32}$  to  $\frac{3}{8}$  in. [0.8 to 10 mm] manufactured from metallic coated wire. For specific applications, additional or alternative requirements may apply.

1.2 The values stated in either inch-pounds or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>2</sup>

A931 Test Method for Tension Testing of Wire Ropes and Strand

A1007 Specification for Carbon Steel Wire for Wire Rope

#### 2.2 ISO Standards:<sup>3</sup>

ISO 2232 Round Drawn Wire for General-Purpose Non-alloy Steel Wire Ropes and for Large Diameter Steel Wire Ropes

ISO 3108 Steel Wire Ropes for General Purposes—  
Determination of Actual Breaking

2.3 Military Standards:<sup>4</sup>

MIL-DTL-5688 Wire Rope Assemblies: Aircraft, Proof Testing and Prestretching

### 3. Terminology

#### Definitions of Terms Specific to This Standard:

3.1 *inserts, n*—fiber or solid polymer so positioned as to separate adjacent strands or wires in the same or overlying layers or to fill interstices of the rope.

#### 3.2 Lubrication:

3.2.1 *impregnating compound, n*—material used in the manufacture of natural fiber cores, covers, or inserts for the purpose of providing protection against rotting and decay of the fiber material.

3.2.2 *preservation compound, n*—material, usually containing some form of blocking agent, applied during, after, or both during and after manufacture of the rope to fiber inserts, fillers, and coverings for the purpose of providing protection against corrosion.

3.2.3 *rope lubricant, n*—general term used to signify material applied during the manufacture of a strand, core, or rope for the purpose of reducing internal friction, providing protection against corrosion, or both.

3.3 *rope cores, n*—central element, usually of fiber or steel (but may be a combination of both), of a round rope around which are laid helically the strands of a wire rope or the unit ropes of a cable-laid rope (Fig. 1).

3.3.1 *fiber core (FC), n*—an element made from either natural or synthetic fibers.

3.3.2 *solid polymer core, n*—a single element of solid polymer material that is either cylindrical or shaped (grooved). It may also include an element or elements of wire or fiber.

3.3.3 *steel core, n*—a wire rope (IWRC), or a round strand (WSC) construction; the round strand or the wire rope core or its outer strands, or both, may also be covered or filled with either fiber or solid polymer; steel cores are normally made as a separate independent element, the exception being rope with a wire rope core closed parallel with the outer strands.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.03 on Steel Rod and Wire.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from International Organization for Standardization (ISO), 1 rue de Varembe, Case postale 56, CH-1211, Geneva 20, Switzerland, <http://www.iso.ch>.

<sup>4</sup> Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

\*A Summary of Changes section appears at the end of this standard

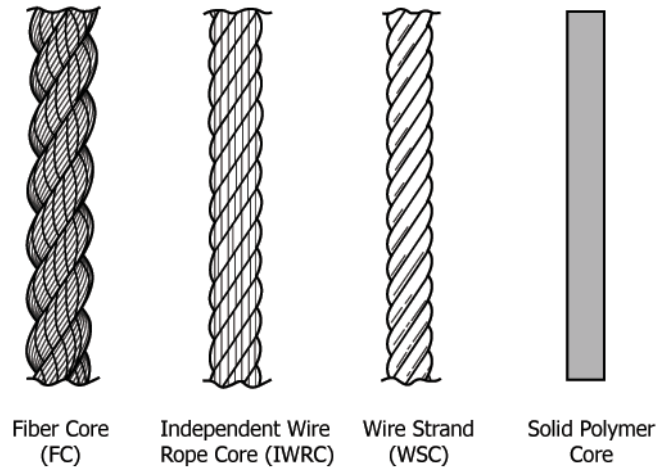


FIG. 1 Examples of Cores

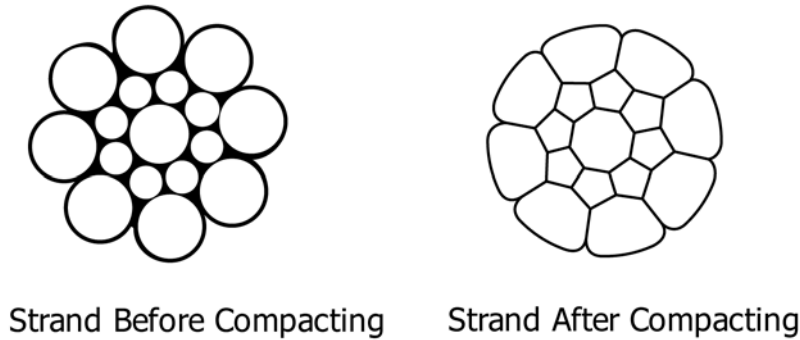


FIG. 2 Compacted Round Strand—Before and After

3.4 *strand, n*—an element of rope normally consisting of an assembly of wires of appropriate shape and dimensions laid helically in one or more layers around a center; the center may consist of one round or shaped wire, of several round wires forming a built-up center, or of fiber or some other material; if multiple wires are used in a strand center, they may be counted as one wire.

#### 3.4.1 Cross-section Shape:

3.4.1.1 *compacted strand, n*—a strand that has been subjected to a compacting process such as drawing, rolling, or swaging (Fig. 2).

3.4.1.2 *round strand, n*—strand having a perpendicular cross-section that is approximately the shape of a circle (Fig. 3).

3.4.1.3 *triangular strand, n*—strand having a perpendicular cross-section that is approximately the shape of a triangle (formerly referred to as flattened strand) (Fig. 4).

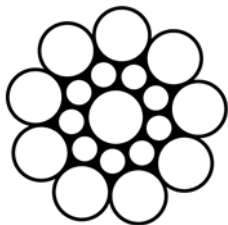


FIG. 3 Round Strand

(a) Style B—Solid center wire.

(b) Style G—3×2 or 3×2+3F center.

(c) Style H—3 or 3+3F center.

(d) Style V—1×7 center.

3.4.2 *strand lay direction, n*—the direction right (z) or left (s) corresponding to the direction of lay of the outer wires in relation to the longitudinal axis of the strand (Fig. 5).

#### 3.4.3 Type and Constructions:

3.4.3.1 *multiple operation lay, n*—construction containing at least two layers of wires in which successive layers are laid in more than one operation, with different lay lengths; there are two basic types of multiple operation strand:

(a) *compound lay, n*—strand that contains a minimum of three layers of wires where a minimum of one layer is laid in a separate operation, but in the same direction, over a parallel lay center.

(b) *cross-lay, n*—strand in which the wires are laid in the same direction. The wires of superimposed wire layers cross one another and make point contact.

3.4.3.2 *parallel lay, n*—strand that contains at least two layers of wires, all of which are laid in one operation (in the same direction); the lay length of all the wire layers is equal, and the wires of any two superimposed layers are parallel to each other, resulting in linear contact; there are four types of parallel lay constructions:

(a) *combined, adj*—describes a parallel lay construction having three or more layers laid in one operation and formed