



Standard Specification for Steel Wire, Music Spring Quality¹

This standard is issued under the fixed designation A 228/A 228M; 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 approval. A superscript symbol (n) indicates an editorial change since the last revision or approval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers a high quality, round, cold-drawn steel music spring quality wire, uniform in mechanical properties, intended especially for the manufacture of springs subject to high stresses or requiring good fatigue properties.

1.2 The values stated in either SI (metric) units or inch-pound units are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore, each system must be used independently of the other.

2. Referenced Documents

2.1 ASTM Standards:

- A 370 Test Methods and Definitions for Mechanical Testing of Steel Products²
- A 510 Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel²
- A 510M Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel [Metric]²
- A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment³
- A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products²
- A 938 Standard Test Method for Torsion Testing of Wire²
- A 941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys⁴
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications⁵
- E 1077 Test Method for Estimating the Depth of Decarburization of Steel Specimens⁶

2.2 Military Standard:

- MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage⁷

2.3 Federal Standard:

- Fed. Std. No. 123, Marking for Shipment (Civil Agencies)⁸

2.4 American National Standards:

- B32.4 Preferred Metric Sizes for Round, Square, Rectangle, and Hexagon Metal Products⁹

2.5 AIAA Standard:

- AIAA B-5 02.00 Primary Metals Identification Tag Application Standard¹⁰

3. Terminology

3.1 **Definitions**—For definitions of terms used in this specification, refer to Terminology A 941.

4. Ordering Information

4.1 It shall be the responsibility of the purchaser to specify all requirements that are necessary for material under this specification. Such requirements may include, but are not limited to, the following information:

- 4.1.1 Quantity (mass),
- 4.1.2 Name of material (music steel spring wire),
- 4.1.3 Dimensions (Table 1 and Section 9),
- 4.1.4 Finish (see 10.2),
- 4.1.5 Packaging (Section 15),
- 4.1.6 Heat analysis report, if requested (see 6.2),
- 4.1.7 Certification or test report, or both, if specified (Section 14), and
- 4.1.8 ASTM designation and year of issue.

Note 1—A typical metric ordering description is as follows: 2500 kg Music Spring Wire, 1.40 mm diameter, phosphate coated in 25 kg coils to ASTM A 228M dated _____ or for inch-pound units, 5000 lb Music Spring Wire, 0.055 in. diameter, phosphate coated in 50 lb coils to ASTM A 228 dated _____.

5. Materials and Manufacture

5.1 The steel may be made by any commercially accepted steel-making process. The steel may be either ingot cast or strand cast. The rod to be used in the manufacture of wire furnished to this specification shall be in accordance with Specification A 510 or A 510M.

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.01 on Steel Rod and Wire.

Current edition approved March 10, 2002. Published April 2002. Originally published as A 228 – 39 T. Last previous edition A 228/A 228M – 00.

² Annual Book of ASTM Standards, Vol 08.03.

³ Annual Book of ASTM Standards, Vol 08.08.

⁴ Annual Book of ASTM Standards, Vol 08.01.

⁵ Annual Book of ASTM Standards, Vol 14.02.

⁶ Annual Book of ASTM Standards, Vol 01.04.

⁷ Available from Standardization Documents Order Desk, Hq. 4 Section D, 700 Robinson Ave., Philadelphia, PA 19111-5094, Attn: NPDUNS.

⁸ Available from American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10018.

⁹ Available from the American Industry Action Group, 26280 Eubank, Suite 200, Southfield, MI 48034.

Astm A228

**Joseph Edward Shigley, Charles R.
Mischke**



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Metallic Materials Specification Handbook R.B. Ross,2013-11-27 **Advanced Mechanics and Design of Mechanical System** Mr. Rohit Manglik,2024-05-03 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources Specializing in competitive exams and academic support EduGorilla provides comprehensive and well structured content tailored to meet the needs of students across various streams and levels **Worldwide Guide to Equivalent Irons and Steels** Fran Cverna,2006-01-01 More than 30 000 listings are presented in this edition with increased coverage from major steel producing countries such as China India and Japan Department Of Defense Index of Specifications and Standards Federal Supply Class Listing (FSC) Part III July 2005 , Air Force Manual United States. Department of the Air Force,1973 *Department Of Defense Index of Specifications and Standards Alphabetical Listing Part I July 2005* , **Mechanical Design Engineering Handbook** Peter Childs,2013-09-02 Mechanical Design Engineering Handbook is a straight talking and forward thinking reference covering the design specification selection use and integration of machine elements fundamental to a wide range of engineering applications Develop or refresh your mechanical design skills in the areas of bearings shafts gears seals belts and chains clutches and brakes springs fasteners pneumatics and hydraulics amongst other core mechanical elements and dip in for principles data and calculations as needed to inform and evaluate your on the job decisions Covering the full spectrum of common mechanical and machine components that act as building blocks in the design of mechanical devices Mechanical Design Engineering Handbook also includes worked design scenarios and essential background on design methodology to help you get started with a problem and repeat selection processes with successful results time and time again This practical handbook will make an ideal shelf reference for those working in mechanical design across a variety of industries and a valuable learning resource for advanced students undertaking engineering design modules and projects as part of broader mechanical aerospace automotive and manufacturing programs Clear concise text explains key component technology with step by step procedures fully worked design scenarios component images and cross sectional line drawings all incorporated for ease of understanding Provides essential data equations and interactive ancillaries including calculation spreadsheets to inform decision making design evaluation and incorporation of components into overall designs Design procedures and methods covered include references to national and international standards where appropriate

Fundamentals of Machine Component Design Robert C. Juvinall,Kurt M. Marshek,2020-06-23 Fundamentals of Machine Component Design presents a thorough introduction to the concepts and methods essential to mechanical engineering design analysis and application In depth coverage of major topics including free body diagrams force flow concepts failure theories and fatigue design are coupled with specific applications to bearings springs brakes clutches fasteners and more for a real world functional body of knowledge Critical thinking and problem solving skills are

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purchased as a set for a special discounted price Learn how others have investigated and solved failures in various industries involving a wide range of failure modes materials and analysis techniques *Design of Machine Elements* Mr. V.

Venkatrami Reddy, Prof. Mangesh Ambadas Ahire, Dr. Nitin Keshaorao Khedkar, Dr. B.R. Senthil Kumar, 2024-08-16 *Design of Machine Elements* is focused on the principles and applications of designing various mechanical components essential to machine construction This fundamental concepts of stress analysis material selection and safety factors with chapters dedicated to specific elements such as shafts bearings gears springs and fasteners It integrates theoretical insights with practical design examples ensuring students and engineers understand both analytical and computational methods for safe and efficient designs Ideal for engineering students and professionals it provides tools to navigate complex mechanical design challenges across industries Fundamentals of Machine Component Design Wael A. Altabey, 2023-09-25

Fundamentals of Machine Component Design bridges theory and practice to provide readers with a thorough understanding of best practices for machine component design and application Load and stress analysis fatigue fracture and other mechanical behaviors that can result in the failure of a machine component are discussed in the early chapters before the book moves onto to cover different connections welded and bolted prevalent in machine components and then individual components such as gears shafts bearings springs pressure vessels brakes clutches keys and couplings and more The book ends with chapters outlining different design methods as well as design problems for readers to practice with the solutions to which are also provided Covers the design of shafts power screws bolts welded connections springs and pressure vessels as well as transmitted power elements such as belts chains gears and wire ropes Outlines finite element methods and other techniques that can be used for effectively designing machine components Discusses contact and sliding bearings keys and couplings gears helical spur bevel and worm and more Includes solved problems to help readers refine their skills

Mechanical Design of Machine Elements and Machines Jack A. Collins, Henry R. Busby, George H. Staab, 2009-10-19

Taking a failure prevention perspective this book provides engineers with a balance between analysis and design The new edition presents a more thorough treatment of stress analysis and fatigue It integrates the use of computer tools to provide a more current view of the field Photos or images are included next to descriptions of the types and uses of common materials The book has been updated with the most comprehensive coverage of possible failure modes and how to design with each in mind Engineers will also benefit from the consistent approach to problem solving that will help them apply the material on the job

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Machine Design with CAD and Optimization Sayed M.

Metwalli, 2021-04-08 MACHINE DESIGN WITH CAD AND OPTIMIZATION A guide to the new CAD and optimization tools and skills to generate real design synthesis of machine elements and systems Machine Design with CAD and Optimization offers the basic tools to design or synthesize machine elements and assembly of prospective elements in systems or products It contains the necessary knowledge base computer aided design and optimization tools to define appropriate geometry and material selection of machine elements A comprehensive text for each element includes a chart excel sheet a MATLAB program or an interactive program to calculate the element geometry to guide in the selection of the appropriate material The book contains an introduction to machine design and includes several design factors for consideration It also offers information on the traditional rigorous design of machine elements In addition the author reviews the real design synthesis approach and offers material about stresses and material failure due to applied loading during intended performance This comprehensive resource also contains an introduction to computer aided design and optimization This important book Provides the tools to perform a new direct design synthesis rather than design by a process of repeated analysis Contains a

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