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Music Steel Spring Wire and Springs

1. **Scope**—This SAE Recommended Practice covers a high quality, hard-drawn, steel spring wire, uniform in mechanical properties, intended for the manufacturer of spring and wire forms subjected to high stresses or requiring good fatigue properties. It also covers processing requirements of springs fabricated from this wire.
2. **References**
 - 2.1 **Applicable Publications**—The following publications form a part of this specification to the extent specified herein.
 - 2.1.1 **ASTM PUBLICATIONS**—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959
 - ASTM A 228—Specification for Steel Wire, Music Spring Quality
 - ASTM A 228M—Specification for Steel Wire, Music Spring Quality (Metric)
 - ASTM A 510—Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
 - ASTM A 510M—Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel (Metric)
3. **Wire**
 - 3.1 The wire shall conform to ASTM A 228/A 228M and ASTM A 510 or A 510M.
 - 3.2 **Wrap Test Requirement**—The wire shall wind on itself as an arbor without fracture. This test shall be conducted on wire prior to any stress relieving.
 - 3.3 **Decarburization**—Transverse sections of the wire properly mounted, polished, and etched shall show a maximum affected depth of partial decarburization to be no more than 1% of the wire diameter, but not to exceed 0.038 mm (0.0015 in) when examined at a magnification of 100X.

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3.4 Surface Condition—The surface of the wire specimens, which has been stress relieved at approximately 430 °C (800 °F) for 1/2 h, shall be examined after etching in a solution of equal parts of commercial hydrochloric acid and water at a temperature of 70 to 80 °C (165 to 175 °F), for a sufficient time to remove approximately 1% of the wire diameter. This examination shall be made using a binocular microscope at a magnification not to exceed 10X for sizes 0.50 mm (0.020 in) and larger. For sizes under 0.50 mm (0.020 in), the magnification used is subject to negotiation. The surface of the wire shall be free from imperfections such as seams, pits, die marks, scratches, and other defects tending to impair the fatigue properties of the springs.

4. Springs

4.1 Heat Treatment—Springs made from this wire shall normally be stress relieved for a minimum of 30 min at heat. Typical temperatures are 230 to 260 °C (450 to 500 °F). It should be recognized that in certain applications lower than typical stress relieving temperatures may be used or omitted completely. This is also true for thin flexible spring designs to minimize distortion.

4.2 Surface Condition—The springs shall be free from rust and there shall be no marks, nicks, cracks, or gouges which will impair the serviceability of the part.

4.3 Hydrogen Embrittlement—To relieve hydrogen embrittlement, parts which are electroplated after coiling shall be heated at 175 °C (350 °F) for a minimum of 2 h immediately after plating. Higher minimum temperatures and time may be necessary.

PREPARED BY THE SAE IRON AND STEEL TECHNICAL COMMITTEE DIVISION 17—SPRING WIRE

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