Designation: ~~A1032 – 04 (Reapproved 2010)~~ A1032 – 15

Standard Test Method for Hydrogen Embrittlement Resistance for Steel Wire ~~Hard Drawn~~ Hard-Drawn Used for ~~Prestressing~~Prestressed Concrete Pipe[1]

This standard is issued under the fixed designation A1032; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. ~~Scope~~ Scope*

1.1 This test method describes procedures to determine the hydrogen embrittlement (HE) resistance of ~~hard drawn~~ hard-drawn steel wire used for ~~prestressing~~prestressed concrete pipe.

1.2 HE resistance is reported as time-to-failure of specimens tested in a laboratory.

1.3 The values stated in SI units are to be regarded as standard. The values given in parentheses are mathematical conversions to inch-pound units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards*:[2]

A648 Specification for Steel Wire, Hard-Drawn for Prestressed Concrete Pipe

D1193 Specification for Reagent Water

3. Summary of Test Method

3.1 Characterization of HE resistance of hard-drawn steel wire is accomplished by determining the time-to-failure of a wire specimen under a maintained constant tensile force, while immersed in a heated solution of ammonium thiocyanate (NH_4SCN). The ~~load,~~ tensile force, the solution temperature, and length of time in the test are continuously monitored.

4. Significance and Use

4.1 Hard-drawn steel wire as used in ~~prestressing~~prestressed concrete pipe may be exposed to elemental hydrogen favorable to hydrogen induced embrittlement and cracking. Resistance to hydrogen embrittlement is necessary for prestressing wire to provide long-term performance to installed pipe.

4.2 The length of time that a stressed wire specimen resists failure while exposed to a heated solution of NH_4SCN, is an indication of the specimen's resistance to hydrogen embrittlement.

5. Apparatus

5.1 *Test Cell*—The test cell shall contain the test solution and the wire specimen and be constructed of material which is inert to NH_4SCN (as shown in Fig. 1). The test cell shall be cylindrical with an inside diameter sufficient to provide a minimum of 5 mL of solution per 100 mm^2 (2 $in.^3$ per $in.^2$) of wire specimen surface area in contact with the solution. The test cell length shall allow the exposure of a minimum test ~~sample~~specimen length of 150 mm (6 in.) to the test solution. The test cell shall be so designed that the wire specimen passes through it and is sufficiently exposed outside the end of the cell as to allow application of a tensile force to the specimen.

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[1] This test method is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.05 on Steel Reinforcement.

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

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