



Standard Specification for Duplex, Base Metal Thermocouple Wire With Glass Fiber or Silica Fiber Insulation¹

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1. Scope

1.1 This specification sets forth the requirements for duplex, types E, J, K, N and T thermocouple wire, insulated with E-glass, S-glass, amorphous silica fiber or polycrystalline fiber.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. They may not be exact equivalents, but either may be used as given.

1.3 *This standard does not purport to address all of the safety problems, 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:

D 1125 Test Methods for Electrical Conductivity and Resistivity of Water²

E 207 Test Method for Thermal EMF Test of Single-Thermoelement Materials by Comparison with a Reference Thermoelement of Similar Emf-Temperature Properties³

E 220 Test Method for Calibration of Thermocouples by Comparison Techniques³

E 230 Specification and Temperature-Electromotive Force (Emf) Tables for Standardized Thermocouples³

E 344 Terminology Relating to Thermometry and Hydrometry³

3. Terminology

3.1 *Definitions*—The definitions given in Terminology E 344 shall apply to this standard.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *amorphous silica fiber, n*—a continuous filament of heat insulating material whose principal constituent is amorphous silica.

3.2.2 *duplex wire, n*—a matched pair of parallel, solid thermoelements, individually insulated (double wrap or braid)

with insulating fibers and a fiber braid of the same material overall.

3.2.3 *E-glass, n*—a family of calcia-alumina-silicate glasses that are used for general purposes and most electrical applications.

3.2.4 *impregnate, vt*—to saturate the fiber insulation of wires with a high-temperature electrical insulating compound to form a moisture barrier around the wires and to inhibit fraying of the fibers.

3.2.5 *polycrystalline fiber, n*—a continuous polycrystalline filament of heat insulating material whose composition is alumina, boria, and silica in an approximate ratio of 3:1:2, respectively.

3.2.6 *S-glass, n*—a family of magnesia-alumina-silicate glasses with a higher tensile strength and higher softening temperature than E-glass.

4. Significance and Use

4.1 This specification presents the requirements for impregnated and non-impregnated fiber insulated thermocouple wire for normally accepted industrial use, but does not attempt to define such usage.

4.2 A supplement contains the requirements for insulated thermocouple wire that will be exposed to high humidity. The purchase order or inquiry shall specify if this supplement is required.

5. Classification

5.1 *Class A-Duplex*—E-glass fiber insulated, impregnated with a high-temperature electrical insulating compound and color coded in accordance with ANSI/ASTM Specification E 230.

5.2 *Class B-Duplex*—E-glass fiber insulated (Note 1) not impregnated and not color coded.

5.3 *Class C-Duplex*—Amorphous silica fiber insulated (Note 2) not impregnated and not color coded.

5.4 *Class D-Duplex*—Polycrystalline fiber insulated (Notes 2 and 3) not impregnated and not color coded.

5.5 *Class E-Duplex*—S-glass fiber insulated, impregnated with a high-temperature electrical insulating compound and color coded in accordance with ANSI/ASTM Specification E 230.

5.6 *Class F-Duplex*—S-glass fiber insulated (Note 1) not

¹ This specification is under the jurisdiction of ASTM Committee E20 on Temperature Measurement and is the direct responsibility of Subcommittee E20.04 on Thermocouples.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 14.03.