Designation: F689 – 97 (Reapproved 2011)

Standard Practice for Determination of the Temperature of Above-Ground Plastic Gas Pressure Pipe Within Metallic Casings[1]

This standard is issued under the fixed designation F689; 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

1.1 This practice describes a procedure for the determination of the temperature history of above-ground plastic gas pressure pipe encased in a metallic casing. Such temperature changes may be due to ambient air temperature, or solar exposure, or both.

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

1.3 *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]

D2513 Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings

E220 Test Method for Calibration of Thermocouples By Comparison Techniques

2.2 *Other Document:*

Thermoplastic Fuel Gas Piping/Investigation of Maximum Temperatures Attained by Plastic Pipe Inside Metal Service Risers, TR 30, Plastic Pipe Institute, May 1978[3]

3. Terminology

3.1 *Definitions:*

3.1.1 *anodeless riser*—A type of transition fitting that is designed to transport gas from an underground polyethylene service line to above-ground steel piping. In an anodeless riser polyethylene pipe is always the gas carrier, at least, in the below ground section.

3.1.2 *plastic gas pipe*—an approved gas carrier that complies with Specification D2513.

4. Significance and Use

4.1 This practice provides a procedure for determining the temperature history of plastic gas pressure pipe encased in metallic casings.

4.2 The data obtained are indicative of the temperature attainable within a service riser of a specific design and size in a given geographical location under the climatogical conditions in existence during the test period.

4.3 The data obtained can be used within the constraints of 4.2 to design the maximum allowable operating pressures permitted by existing codes.

5. Apparatus

5.1 *Four-Channel Continuous Chart Thermocouple Recorder.*

5.2 *Thermocouple Probes.*

5.3 *Solar Load Panel,* 12 by 20 by 0.032 in. (300 by 500 by 0.8 mm), steel, painted flat black with an insulated thermocouple attached to the underside.

5.4 *Ambient Thermocouple Apparatus,* consisting of a well-ventilated, shaded housing containing a thermocouple for monitoring ambient air temperature (see Fig. 1).

6. Test Specimens

6.1 The riser may be either preassembled or fabricated in accordance with written procedures.

6.2 The outlet from the specimen defined by 6.1 shall be capped to simulate no-flow (stagnant) conditions.

6.3 The riser shall be fitted with a bare junction type "J" or "K" thermocouple probe 20–30 AWG that shall be installed 3 in. below the internal transition on the polyethylene pipe. The probe tip shall be embedded into the outer surface of the polyethylene pipe by using a soldering iron. The thermocouple

[1] This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.60 on Gas.

Current edition approved Feb. 1, 2011. Published March 2011. Originally approved in 1980. Last previous edition approved in 2004 as F689 – 97(2004). DOI: 10.1520/F0689-97R11.

[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.

[3] Available from Plastics Pipe Institute (PPI), 105 Decker Court, Suite 825, Irving, TX 75062, http://www.plasticpipe.org.

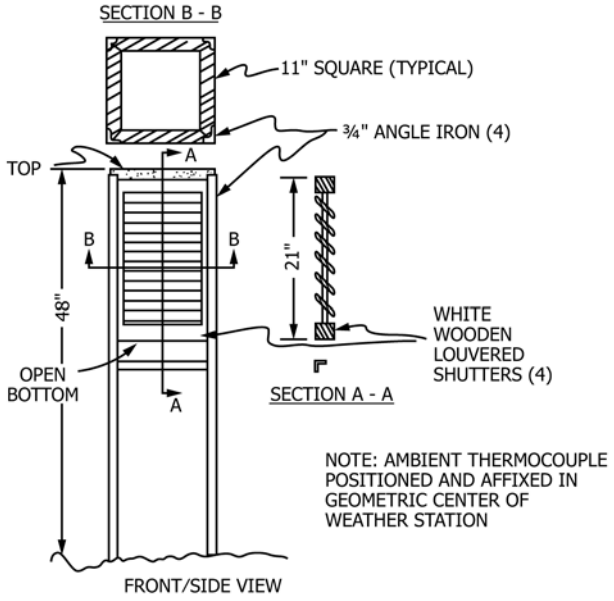

FIG. 1 Weather Station

wiring shall follow the piping and exit out the horizontal portion of the riser (see Fig. 2).

6.4 At least two specimens shall be used at each test site.

7. Procedure

7.1 Calibrate all thermocouple recorder combinations in accordance with Method E220.

7.2 Install the riser so that the bare thermocouple probe location is 6 ± 1 in. (150 m ± 25 mm) above grade and facing south. Install a vertical reflective panel 8 ± 1 in. (200 ± 25 mm) due north of the specimens, facing due south. The reflective panel shall be at least 1 ft (300 mm) higher than the exposed height of the specimens and shall extend at least 1 ft (300 mm) beyond the center line of the test specimen in each horizontal direction. The panel shall have a matte-white surface. A bed of light-colored crushed stone shall be provided extending from the reflective panel at least 1 ft (300 mm) beyond the test specimen (see Fig. 2). Connect specimen thermocouples to the continuous chart recorder.

7.3 Install the ambient thermocouple apparatus in accordance with Fig. 1 within the immediate vicinity of the specimen and connect it to the continuous chart recorder. An optional fifth thermocouple may be installed 12 in. below grade.

7.4 Install the solar load panel in the immediate vicinity of the specimen facing due south, and inclined at an angle with the horizontal equal to local latitude. The panel shall be located so that it will receive maximum direct sunlight. Connect the solar load thermocouple to the continuous chart recorder.

7.5 Monitor riser temperatures and compare these data with daily ambient and solar load readings. These temperature comparisons will yield a relationship of solar radiation, cloud cover, thermal induction, and other parameters. These data can then be compared with data obtained at other geographic locations.

7.6 Record any abnormal test conditions.

7.7 The measurements should be taken during the warmest months of the year as determined from local meteorological records (for example, month with the highest ambient temperature and least amount of cloud cover).

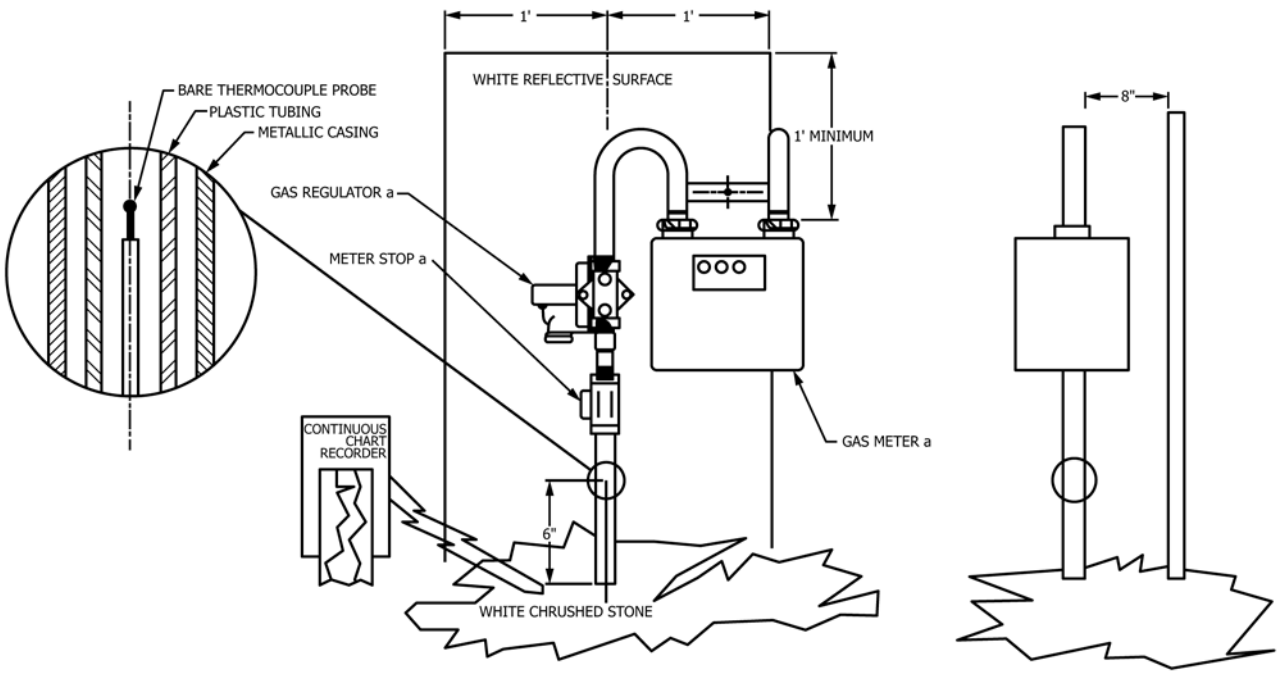

FIG. 2 Self-Centering Riser SI Equivalents

7.8 The test data should be compared with the historical records for the ambient temperature and cloud cover to ensure that the test period was typical for both average ambient temperature and hours of sunshine.