Designation: F610/F610M – 15

Standard Practice for Evaluating the Quality of Molded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings by the Heat Reversion Technique[1]

This standard is issued under the fixed designation F610/F610M; 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 covers a procedure for evaluating the quality of molded poly(vinyl chloride) (PVC) plastic pipe fittings after exposure to heat.

1.2 *Units*—The values stated in either inch-pound or SI units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

NOTE 1—The values in square brackets are SI units requirements.

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. Summary of Practice

2.1 A representative sample of the fitting being produced is placed in a thermostatically controlled oven at 302 ± 5.4°F or [150 ± 3°C] for 30 min. The acceptability of the fitting quality, after the required test time, is based or expressed as a percentage of the original wall thickness or surface area of the fitting.

3. Significance and Use

3.1 This practice is applicable to distinguish between properly and improperly molded PVC plastic pipe fittings. It can be used to:

3.1.1 Determine whether cold slugs or unfused areas are present (Note 2),

3.1.2 Determine the amount of molded-in stress produced by the molding process (Note 3),

3.1.3 Reveal contamination, and

3.1.4 Show the quality of the weld line.

NOTE 2—A cold slug is a piece of material that enters the mold at a significantly lower temperature than the rest of the mass.

NOTE 3—A stress-free part will generally have better properties and higher strength than those with a high degree of stress. Stress-free parts will generally react better when exposed to chemicals.

4. Apparatus

4.1 *Circulating Air Oven,* thermostatically controlled, capable of operating at 302 ± 5.4°F or [150 ± 3°C] such that after insertion of the fittings to be tested the test temperature is regained within 15 min or less. (See Annex A1.)

NOTE 4—The oven should be vented to the outside of the building.

5. Conditioning

5.1 A specific conditioning period is not required although the fitting shall be at room temperature. This test can be performed on a particular fitting any time after it has been produced.

6. Procedure

6.1 Select the fittings to be tested and examine them for the following, making proper notation for the report:

6.1.1 The condition and appearance of both inner and outer surfaces of the fitting,

6.1.2 The condition and appearance of the weld lines and areas adjacent to them,

6.1.3 The condition and appearance of the gate and area adjacent to it, and

6.1.4 The condition and appearance of the internal surface opposite the gate and gate area.

6.2 Place the fittings to be tested in the oven so that each fitting stands on one of its socket entrances and with sufficient separation between individual specimens so that the hot air can flow freely between them. Record the time when the air in the oven recovers to 302 ± 5.4°F or [150 ± 3°C]. After an additional time as indicated in Table 1 at this temperature, remove the fittings, taking care not to distort or otherwise damage them.

6.2.1 When the fitting being tested has a body and branch wall that falls within two different exposure times, two fittings shall be tested. One will be tested using the lower exposure time, and the other will be tested using the longer exposure time.

[1] This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.40 on Test Methods.

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

TABLE 1 Exposure Time

Minimum Wall Thickness, e[A]		Exposure Time,
in.	[mm]	min.
e ≤ 0.118	[e ≤ 3]	15
0.118 < e ≤ 0.393	[3 < e ≤ 10]	30
0.393 < e ≤ 0.787	[10 < e ≤ 20]	60
0.787 < e ≤ 1.181	[20 < e ≤ 30]	140
1.181 < e ≤ 1.574	[30 < e ≤ 40]	220
e > 1.574	[e > 40]	240

[A] Minimum wall thickness refers to the standard's specified minimum body wall thickness for the fitting being tested. If a minimum wall thickness is not specified in a standard, then the average body wall thickness shall be calculated to select the appropriate exposure time.

6.3 Allow the fittings to cool to room temperature naturally in the air. When cool enough to handle, examine them for the following, making proper notation for the report:

6.3.1 The condition and appearance of both inner and outer surfaces of the fitting,

6.3.2 The condition and appearance of the weld lines and areas adjacent to them,

6.3.3 The condition and appearance of the gate and area adjacent to it, and

6.3.4 The condition and appearance of the internal surface opposite the gate and gate area.

7. Interpretation

7.1 A suggested interpretation of the results observed is given in Appendix X1. Refer to specific product standards for deviations from this suggested interpretation of results.

8. Report

8.1 The report shall include the following information:

8.1.1 Complete identification of the fitting, including the nominal size, material type and production codes such as part number, production date, shift, and machine number.

8.1.2 Condition and appearance of weld line and area adjacent to weld line before and after test.

8.1.3 Condition and appearance of the gate and of the area opposite the gate on the inner surface before and after the test.

8.1.4 Condition and appearance of the outer and inner surfaces before and after the test.

8.1.5 Type and extent of any delamination produced.

8.1.6 Extent and location of any peeling produced.

8.1.7 Maximum localized reduction of wall thickness expressed as a percentage of the original wall thickness at the immediately adjacent area.

8.1.8 Any other changes attributable to the test.

8.1.9 Date of test.

NOTE 5—Where cracks appear in the fitting, a 45° angle cut through the fitting at the crack may be made to facilitate examination of the depth of the crack.

9. Keywords

9.1 evaluating; fittings; plastic; PVC; quality

ANNEXES

(Mandatory Information)

A1. DESCRIPTION OF OVEN

A1.1 The oven shall be large enough to allow free movement of air around each sample.

A1.2 The oven is a circulating hot air oven thermostatically controlled at a temperature of 302 ± 5.4°F or [150 ± 3°C] and must be capable of maintaining the required temperature for the duration of the test period.

A1.3 The oven must be capable of reattaining the required test temperature within 15 min after placing the fittings in the oven.

A1.4 The oven must be equipped with a rack placed such that free movement of air may be maintained completely around the fitting being tested.

A2. PLACING OF FITTINGS IN OVEN

A2.1 When size permits, all specimens shall be placed in a vertical position in the test oven standing on one of its socket entrances.

A2.2 When a fitting with a tee configuration is being tested, it shall be placed in the oven on the run of the tee, not on the branch leg. See Fig. A2.1.

A2.3 Where 45° wyes are being tested, the socket entrance on the body of the fitting adjacent to the area of the fitting where the wye branch connects to the body shall be the socket entrance on which the fitting is placed on the oven rack. See Fig. A2.2. The socket entrance of the 45° branch should be pointing downwards.

A2.4 When testing is being performed on a regular basis the oven being used shall be of a size which will accept the fitting in one piece. For occasional testing, when the size of a fitting is too large to place inside the oven in one piece, the fitting may be cut into sections in order to fit inside the oven. The sections shall be cut in such a manner that any cut made shall not pass through the weld line or gate area of the fitting being tested. The fitting in one piece shall be the referee method.

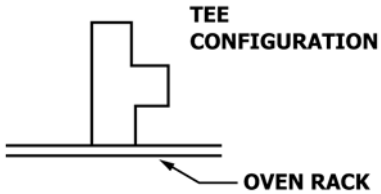

FIG. A2.1 Placing of Tee Configurations In Oven

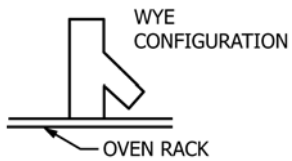

FIG. A2.2 Placing of Wye Configuration In Oven

APPENDIX

(Nonmandatory Information)

X1. SUGGESTED INTERPRETATION OF RESULTS

X1.1 The specimen quality is satisfactory if the penetration of the wall resulting from weld line separation or gate flaw or surface peeling is such that the combined penetration(s) of the two sides is not more than 25 % of the original thicknesses. See Fig. X1.1.

X1.2 The fitting has not developed delamination nor peeling over more than 25 % of its surface area. See Figs. X1.2 and X1.3.

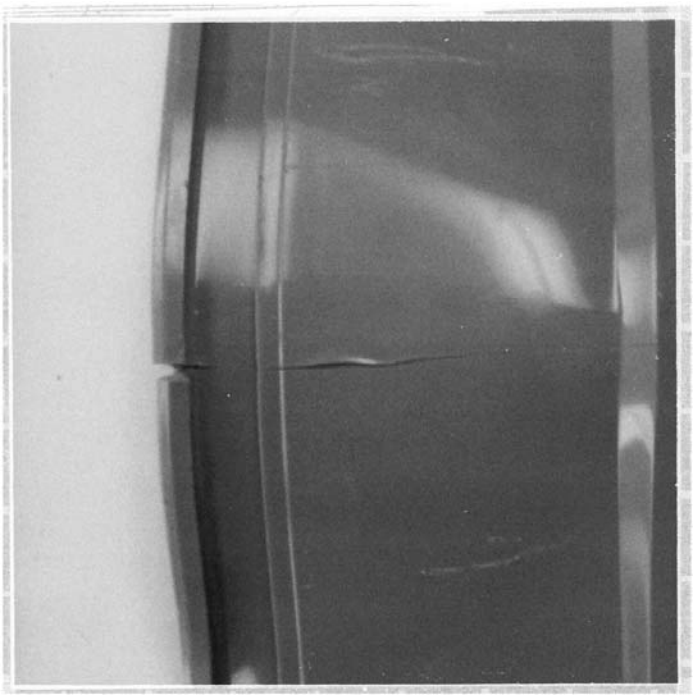

FIG. X1.1 Weld Line Separation

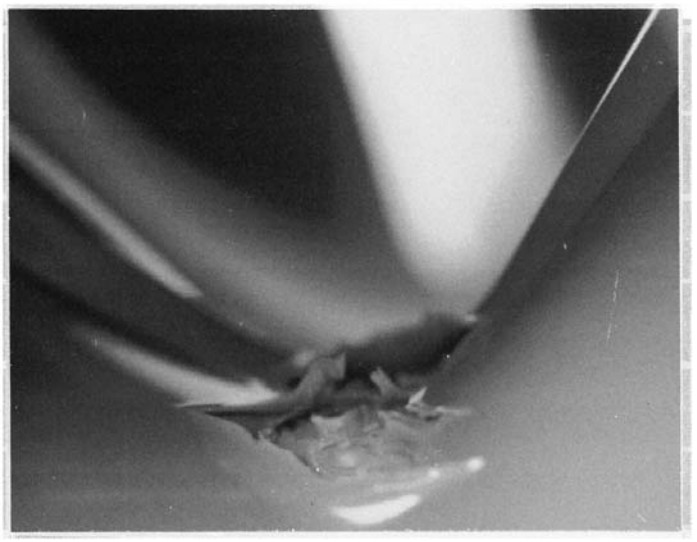

FIG. X1.2 Surface Peeling On Inner Surface At Gate

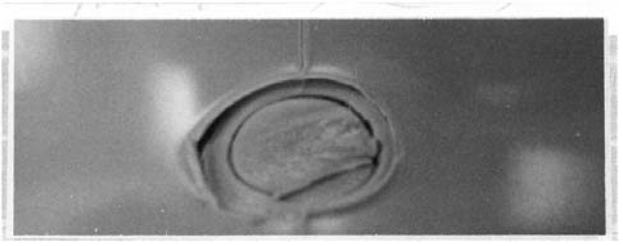

FIG. X1.3 Surface Peeling On Inner Surface At Gate

SUMMARY OF CHANGES

Committee F17 has identified the location of selected changes to this standard since the last issue (F610/F610M-10) that may impact the use of this standard.

(1) Changed unit references to indicate that the values are stated in either SI units or inch-pound units. Table 1 modified for the same reason.

(2) Changed *test method* in title and document to *practice*.

(3) Removed the Precision and Bias section.