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Designation: ~~D2152 – 95 (Reapproved 2010)~~ D2152 – 13

An American National Standard

Standard Test Method for Adequacy of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion[1]

This standard is issued under the fixed designation D2152; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. ~~Scope~~ Scope*

1.1 This test method covers the determination of the adequacy of fusion of extruded rigid poly(vinyl chloride) (PVC) pipe and molded fittings as indicated by reaction to immersion in anhydrous acetone.

1.2 The values stated in inch-pound units are to be regarded as the standard except where instruments are calibrated in SI units.

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.* Specific hazards statements are given in Annex A1.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D618 Practice for Conditioning Plastics for Testing

3. Significance and Use

3.1 This test method is applicable only for distinguishing between inadequately fused and adequately fused PVC. The difference between thermally degraded and adequately fused PVC cannot be detected by this test method. Acetone immersion is not a substitute for burst, impact, or other physical or chemical tests on PVC pipe or fittings and it, therefore, shall not be used as the only test specification for purchasing of PVC pipe and fittings. This test only detects inadequate fusion and does not determine the over-all quality of the PVC pipe or fittings.

3.2 This test method is useful in determining whether inadequate fusion contributed to failure of PVC pipe or fittings in other physical or chemical tests, or in service.

3.3 This test method is useful in evaluating the adequacy of PVC fusion obtained in process or materials trials.

3.4 This test method determines adequacy of fusion on a single, relatively small specimen. This test method requires the use of a hazardous reagent which must be properly handled and disposed. Therefore, this test method may not be cost-effective to employ as a routine quality control test.

4. Apparatus

4.1 *Container*—Either individual, sealable containers for each specimen or one large, airtight container capable of holding several specimens without touching one another.

4.2 *Hydrometer and Cylinder*—Precision hydrometer, graduated in thousandths, with a minimum range of 0.780 to 0.790 g/mL and a cylinder large enough to immerse the hydrometer.

4.3 *Thermometer*—ASTM 12C total immersion thermometer, range from −20°C to 102°C accurate to 0.2°C, or equivalent.

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[1] This test method is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.25 on Vinyl Based Pipe.

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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**

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5. Reagent

5.1 *Acetone*—American Chemical Society Reagent Grade, having a maximum density of 0.7857 g/mL at 25°C.

NOTE 1—See Annex A1 for the safety and health precautions to be used with acetone.

5.2 Prior to conducting the test, check the density of the acetone with a precision hydrometer to determine its dryness. If the density of the acetone is greater than 0.7890 g/mL at 23°C, (corresponding to approximately 1 % water by mass (see Fig. X1.1)), use fresh acetone or dry the wet acetone with a drying agent. Recheck the density of the fresh or dried acetone before using.

NOTE 2—Wet acetone can be dried by thoroughly agitating it with at least 15 g of anhydrous calcium sulfate ($CaSO_4$) for each gram of water present.

NOTE 3—The presence of water in the acetone reduces its sensitivity to differences in the degree of fusion of rigid poly(vinyl chloride) (PVC). It is important to dry the acetone properly and conduct the test in a sealed container, because acetone rapidly absorbs moisture from the atmosphere.

NOTE 4—Round-robin testing between four laboratories showed that test results are not significantly altered with up to 2 % water by weight in the acetone.

6. Sampling

6.1 Specimens shall be taken from individual pipe sections, fittings, or remnant portions of pipe or fittings. Specimens shall be taken from locations which are to be evaluated for adequacy of fusion, or immediately adjacent to them.

6.2 The number of individual specimens to be tested and their locations shall be chosen to be representative of the pipe or fittings being evaluated for adequacy of fusion.

7. Test Specimens

7.1 *Size of Specimen*—Specimen shall be a size that is convenient to immerse in the test container but not less than ½ in. (13 mm) in height. For small diameter pipe, the specimen shall be a complete circumferential section of the pipe. For large diameter pipe, the specimen shall be a full pipe section but it may be cut into smaller pieces to facilitate testing. Small molded parts shall be immersed as a single item. For large molded fittings, the specimen shall be a complete circumferential section which may be cut into segments before being immersed. If the pipe or fitting to be evaluated has fractured or fragmented in other tests or in service, specimens of any shape and size may be tested.

7.2 *Specimen Preparation*—For pipe having a wall thickness greater than 0.125 in. (3.2 mm) the wall thickness shall be reduced ~~by at least one-half its thickness for a minimum of one-half the height~~ to allow testing of the entire wall thickness of the specimen at six or more intervals around the circumference of one end of the specimen. The mid-wall surface exposed for testing shall be from the interior wall surface to the exterior wall surface at a minimum of 45 degrees from the square cut on the end of the pipe as shown in Fig. 1. Removal shall be effected by filing, wet sanding, or other means that will minimize localized heating of the surface. It is not necessary to reduce the wall thickness on molded fittings.

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8. Conditioning

8.1 Unless otherwise specified, condition the specimens in air for 1 h at 23 ± 2°C (73.4 ± 3.6°F) prior to testing. The specimens shall not be conditioned in water because of the effect water has on the acetone. For referee purposes conditioning shall be in accordance with Procedure A of Practice D618.

9. Procedure

9.1 Conduct the tests in a Standard Laboratory Atmosphere of 23 ± 2°C unless otherwise specified.

9.2 Place sufficient dried acetone into the container to ensure complete immersion of the specimen.

9.3 Place the test specimen in the acetone, seal the container, and do not agitate. Allow specimen to stand immersed for 20 min.

9.4 After 20 min, remove the specimen from the container and inspect for signs of attack.

9.5 Attack is described as a lifting, raising, or removing, or both, of any material outside surface, inside surface, or mid-wall, of the specimen. Swelling or softening of the test specimen shall not be considered attack.

10. Fusion Criteria

10.1 At least 50 % attack of the inside, outside, or mid-wall surface or at least 10 % attack on more than one surface shall be considered to be indicative of inadequate fusion.

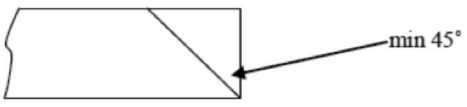

FIG. 1 Specimen Preparation