



Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets¹

This standard is issued under the fixed designation D2855; 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 U.S. Department of Defense.

1. Scope*

1.1 This practice describes a two-step (primer and solvent cement) method of joining poly(vinyl chloride) (PVC) or chlorinated poly(vinyl chloride) (CPVC) pipe and piping components with tapered sockets.

NOTE 1—Simplified procedures may be allowed in non-pressure applications where local codes permit.

NOTE 2—Where conflicts occur between the code and the manufacturer's installation instructions, the more restrictive provisions apply.

1.2 The products covered by this practice are intended for use with the distribution of pressured liquids only, which are chemically compatible with the piping materials. Due to inherent hazards associated with testing components and systems with compressed air or other compressed gases, some manufacturers do not allow pneumatic testing of their products. Consult with specific product/component manufacturers for their specific testing procedures prior to pneumatic testing.

NOTE 3—Pressurized (compressed) air or other compressed gases contain large amounts of stored energy which present serious safety hazards should a system fail for any reason.

1.3 This standard practice does not address the one-step method of joining pipe and piping components with tapered sockets with solvent cement without the use of primer.

1.4 The techniques covered are applicable to joining PVC to PVC or CPVC to CPVC pipe and piping components with tapered sockets. In the remainder of this standard practice, the term "piping components with tapered sockets", whether it be bell end pipe, spigot connections, or any other type of tapered connections, will be referred to as "fittings."

1.5 A partial list of standards for PVC and CPVC pipe, piping components, and solvent cements suitable for use in joining pipe and fittings is given in [Appendix X1](#).

¹ This practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.20 on Joining.

Current edition approved Nov. 1, 2015. Published January 2016. Originally approved in 1970. Last previous edition approved in 2010 as D2855 – 96(2010). DOI: 10.1520/D2855-15.

1.6 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.

1.7 The text of this practice references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the practice.

1.8 *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

- D1600 Terminology for Abbreviated Terms Relating to Plastics
- D1784 Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- D1785 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- D2241 Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
- D2466 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- D2467 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
- D2564 Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
- D2665 Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

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

- D2672 Specification for Joints for IPS PVC Pipe Using Solvent Cement
- D2729 Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- D2949 Specification for 3.25-in. Outside Diameter Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
- D3034 Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- F402 Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
- F412 Terminology Relating to Plastic Piping Systems
- F438 Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
- F439 Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- F441/F441M Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
- F442/F442M Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
- F480 Specification for Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80
- F493 Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
- F512 Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation
- F656 Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- F758 Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
- F789 Specification for Type PS-46 and Type PS-115 Poly(Vinyl Chloride) (PVC) Plastic Gravity Flow Sewer Pipe and Fittings (Withdrawn 2004)³
- F891 Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core
- F1866 Specification for Poly (Vinyl Chloride) (PVC) Plastic Schedule 40 Drainage and DWV Fabricated Fittings

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology F412, and abbreviations are in accordance with Terminology D1600, unless otherwise specified.

4. Summary of Practice

4.1 In order to achieve consistently strong and leak-free joining of poly(vinyl chloride) (PVC) or chlorinated poly(vinyl chloride) (CPVC) pipe and fittings, the following principles need to be clearly understood and followed:

4.1.1 The joining surfaces must be softened (dissolved) and made semi-fluid. (See Fig. 1.)

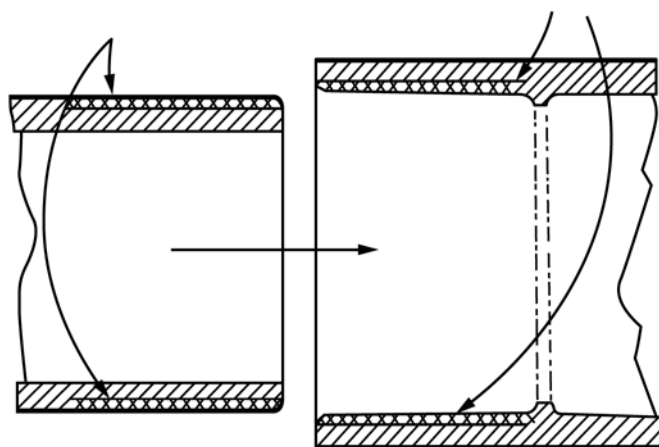


FIG. 1 Joint Surface Areas that must be Penetrated and Softened

4.1.2 Solvent cement must be applied to the pipe end to fill the gap between pipe and fitting socket. (See Fig. 2.)

4.1.3 Assembly of pipe and fittings must be made while the surfaces are still wet and semi-fluid. (See Fig. 3.)

4.1.4 Joint strength develops as the solvents evaporate from the joint. At the bottom of the socket where there is an interference fit, the surfaces will fuse together; at the socket entrance where there is a gap, the solvent cement will fill the gap and bond to both surfaces. (See Fig. 4.)

4.2 Penetration and dissolution of the pipe and socket surfaces are achieved by use of both primer and solvent cement.

4.3 Solvent cement must be applied to the pipe end to fill the gap between the pipe and fittings.

4.4 During assembly, while the layers on the pipe and fittings are wet and semi-fluid, the surfaces will intermingle together and become *one* layer

4.5 As the solvents evaporate, the dissolved surfaces will harden with a corresponding increase in joint strength over time. A properly made joint will withstand the required working pressure long before the joint has fully cured. Assembled joints should not be disturbed until they have cured to withstand handling in accordance with primer and solvent cement manufacturers' recommendations.

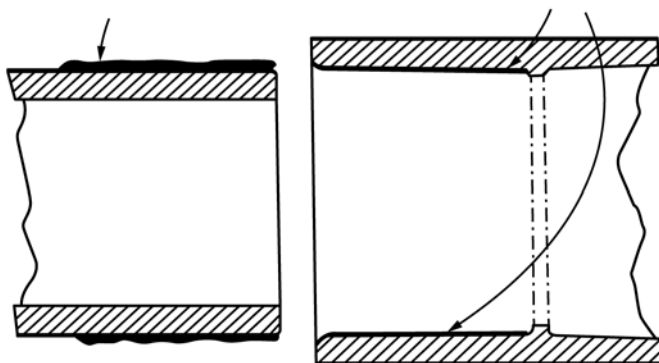


FIG. 2 Solvent Cement Coatings of Appropriate Thickness

³ The last approved version of this historical standard is referenced on www.astm.org.

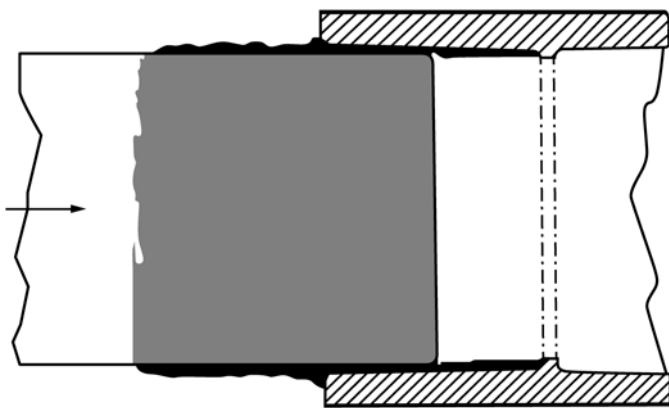


FIG. 3 Components must be Assembled while all Surfaces are Wet and Soft

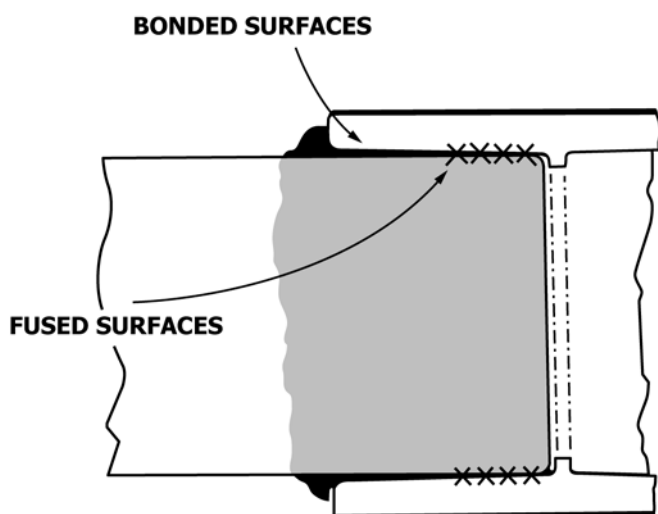


FIG. 4 Bonded and Fused Surfaces of Joined Pipe

5. Significance and Use

5.1 A solvent cement bonder/installer must follow all procedures to produce consistently strong and leak-free joints, either in shop operations or in the field.

6. Materials

6.1 *Pipe and Fittings*—The pipe and fittings shall meet the requirements of current applicable PVC or CPVC pipe and piping components standards. A partial list of these standards is given in [Appendix X1](#).

6.2 Solvent Cement:

6.2.1 *Specification*—The solvent cement should meet all the requirements of Specification [D2564](#) for PVC solvent cement or Specification [F493](#) for CPVC solvent cement.

6.2.2 *Selection*—Solvent cements are available in a variety of viscosities and wet film thicknesses to cover the range of pipe sizes from 1/4-in. to 30-in. (6.3 to 762 mm) for interference fit joints.

6.2.2.1 The ability of a solvent cement to fill a gap in a pipe joint can be determined by considering its viscosity and wet-film thickness (see [Note X2.1](#)).

6.2.3 *Storage*—Solvent cements must be stored in a cool, dry place. All solvent cements have a limited shelf life. Consult the solvent cement manufacturer for specific recommendations on storage conditions and shelf life. The solvent cement is unsuitable for use if it exhibits an appreciable change from the original viscosity, or if signs of gelation (jelly-like) are apparent. Restoration of the original viscosity or removal of gelation by adding solvents or thinners is not recommended.

6.3 *Chemical Cleaners*—Chemical cleaners are used to remove surface debris only (for example, oil, dirt, grease, hydraulic fluid, paint, etc.). Chemical cleaners are not primers and therefore, do not soften the plastic surfaces. Chemical cleaner does not meet the 10% dissolution rule specified in Specification [F656](#). A chemical cleaner is as follows:

6.3.1 Cleaner recommended by the pipe, fittings, or solvent cement manufacturer.

6.3.2 Sandpaper or similar abrasive clothes or grinders shall not be used to clean pipe or fittings.

NOTE 4—This practice can remove significant amount of material from the surfaces to be joined which will adversely affect the interference fit of the pipe and fitting and reduce the joint strength.

NOTE 5—Consult with pipe, fittings, and solvent cement manufacturers for their specific recommendations for mechanical abrading.

6.4 *Primers*—Primers are used to soften and dissolve the surfaces in order to better prepare them for joining. Refer to specific recommendations of the manufacturer

6.4.1 *Primer Specification*—primer shall meet the requirements of Specification [F656](#).

7. Procedure

7.1 *Cutting the Pipe*—Using a suitable cutter, cut the pipe perpendicular to the pipe axis.

NOTE 6—It is important to cut the pipe perpendicular (square) to the pipe axis. A square cut provides maximum bonding area on the surface of the pipe. Tools used to cut plastic pipe must be in good condition and used in accordance with the tool manufacturer's recommendations. If there is any indication of damage or evidence of cracking after cutting the pipe, cut off at least 2 in. (50.8 mm) beyond any visible crack. Care must be exercised if using ratchet cutters, especially at 50°F (10°C) or lower temperatures, as they may split the pipe if not properly used and maintained. Care must also be exercised if using wheel-type plastic tubing cutters with a blade made for cutting plastic pipe, as they will create raised ridges which are caused by material displacement from the downward force of the cutting wheel and must be removed.

7.2 Chamfering and Deburring:

7.2.1 *Chamfering*.—Chamfer the exterior pipe edge with a file or a chamfering tool specifically designed for plastic pipe. The chamfer angle shall be between 10° and 22½° with a width range of a minimum 3/32 to a maximum 5/16 of an inch (2.5 to 7.9 mm) depending upon the pipe diameter (See [Fig. 6](#) for tolerances). It is necessary to chamfer the exterior pipe edge to remove the burrs, raised ridges or sharp edges, or both, from the exterior pipe edge created by the pipe cutting process. (See [Fig. 6](#).)

NOTE 7—Burrs, raised ridges or sharp edges or any combination thereof, if not removed, will scrape away softened socket material and deposit it and solvent cement into the fitting or pipe waterway creating a potential leak path in the joint. This accumulation of softened socket material and solvent cement inside the waterway of the pipe and fitting must be avoided. Chamfering allows the pipe to enter the fitting socket



FIG. 5 Cut the pipe straight at a 90° angle.

O. D. CHAMFER

3/32" TO 1/8" (2.5 TO 3.2) BELOW 4-IN. DIA. (10.2)

3/16" TO 1/4" (4.8 TO 6.3) 4-IN. DIA. THRU 8-IN. (10.2 THRU 20.3)

1/4" TO 5/16" (6.3 TO 7.9) 10-IN. DIA. & LARGER (25.4 & LARGER)

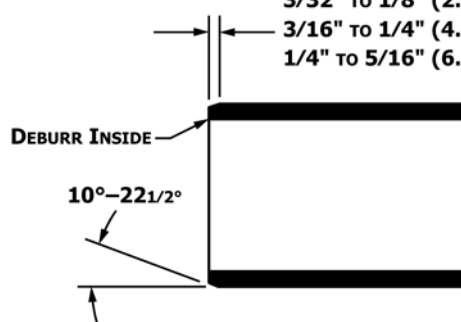


FIG. 6 Chamfer and Deburr the Pipe End

cleanly and uniformly. Chamfering minimizes the potential for a leak path. A chamfering tool or a file is suitable for this purpose. Do not use handheld disc type side grinders to chamfer pipe.

7.2.2 *Deburring*—If burrs are present on the inside edge of the pipe, remove with a deburring tool.

NOTE 8—It is important to remove the burrs from the interior (water-way) to prevent obstructions and to enhance fluid flow.

7.3 *Dry Joint Tightness Test*—Prior to applying primer and solvent cement, insert the pipe gently and slowly into the socket until the first sign of resistance is detected to determine the point of interference. Check that an interference fit between the pipe and fitting occurs at approximately 1/3 to 2/3 of the socket depth. Do not force components together.

NOTE 9—Pipe and fittings are designed to have an interference fit. An interference fit occurs when the outside pipe diameter contacts (interferes) with the inside diameter of the fitting. An interference fit is essential to make a strong and leak-free joint and indicates an acceptable dimensional conformance between the components. If the fit between the pipe and fittings is loose, replace the pipe or fittings in order to obtain a proper interference fit between the components. Do not attempt to join pipe and fittings that do not have an interference fit.

7.4 *Cleaning*—Use a clean, dry cloth to clean the surfaces of pipe and fittings and to remove all foreign materials.

NOTE 10—Proper surface preparation is required to maximize the integrity of the joint. Foreign materials can impede the chemical joining process. Surfaces to be joined must be free of foreign materials (for example, oil, dirt, grease, hydraulic fluid, paint, etc.). If joining surfaces cannot be cleaned by wiping with a clean, dry cloth, a chemical cleaner must be used.

NOTE 11—Check chemical cleaners for compatibility with plastic material. Chemical cleaners only clean the pipe and fittings and will not soften the joining surfaces. Softening of surfaces is only accomplished by primer and solvent cement. If pipe and fittings are not properly cleaned, primer and solvent cement will not soften the joining surfaces. Follow the



FIG. 7 Deburr and Chamfer the Pipe End



FIG. 8 Dry Joint Tightness Test for an Interference Fit



FIG. 10 Mark the socket depth on the pipe end and place a second mark 2 inches (50.8 mm) from the first mark

proper handling procedures provided by the chemical cleaner manufacturer.

7.5 Mark the Pipe: Measure the socket depth and transfer this measurement to the pipe O.D. with a mark. From this mark, place a second mark 2 in. (50.8 mm) further up the pipe, where possible.

NOTE 12—The first mark is the primer and solvent cement application area. The second (“witness”) mark is a reference point used after joint assembly to verify that the pipe has fully bottomed out in the socket and has not backed out.

7.6 Applicator Size—Use an applicator that is approximately half ($\frac{1}{2}$) the size of the nominal pipe diameter being joined. (Example: Use a 1- $\frac{1}{2}$ in. (38.1 mm) applicator on nominal pipe size 3 and fittings.)

NOTE 13—Use of an applicator that is properly sized for the pipe will completely coat the surfaces of the pipe and fittings with primer and solvent cement in a timely manner. Dauber-type applicators will give adequate coverage on pipe diameters that are approximately twice the diameter of the dauber-ball up to nominal pipe size 3. Swab applicators are required on larger diameter pipe surfaces of nominal pipe size 4 and above (See 7.7.1.10 for large diameter).

NOTE 14—The can-lid dauber included in the can may not be of appropriate size for the specific diameter of pipe and fittings being joined. A variety of applicator sizes are commercially available.

NOTE 15—The purpose of a primer is to penetrate and soften the surfaces so they can properly fuse together. Ambient temperature has a

large effect on the ability of primer to soften and penetrate. Colder temperatures require longer application time for primer, whereas warmer temperatures require less application time. Because ambient temperature plays a large role in the amount of time required for primer penetration it is a good idea to test under actual conditions prior to making the first joint. This will tell the operator if a primer has been applied for a long enough period of time to soften the pipe and fitting. Apply primer to a spare piece of pipe. Use a knife or other sharp object to drag its edge over the primed surface. Proper penetration has been achieved if a few thousandths of an inch (a few tenths of a millimeter) of the softened surface is seen to ‘ball up’ on the blade. Under warm conditions it may only require 10-15 seconds of primer application to obtain proper softening. Conversely, under cold conditions it may require a minute or more to achieve the same depth of softening and penetration. Once the proper amount of application time for the primer has been determined under the given conditions, a clock or timer can be utilized to obtain consistent results.

7.7 Methods of Assembly for Joining Plastic Pipe and Fittings with Primer and Solvent Cement:

7.7.1 Application Method for Joining PVC or CPVC Plastic Pipe and Fittings:

7.7.1.1 Apply primer to the inside of the socket (see Fig. 11). Use an aggressive scrubbing motion to work the solvents into the socket surface to break down the surface tension and to soften the surfaces.

(1) Use a primer that meets Specification F656.



FIG. 9 Clean the pipe end and the fitting socket.



FIG. 11 Apply primer to the fitting socket.

7.7.1.2 Apply primer to the pipe end, beyond the mark delineating the depth of the fitting socket. (See Fig. 12.) Again, use an aggressive scrubbing motion.

7.7.1.3 Again apply primer to the inside of the socket. (See Fig. 11.)

7.7.1.4 While the primer is still wet and the surfaces are soft, apply a full, even layer of solvent cement, beyond the mark delineating the depth of the fitting socket, to the pipe end. Be sure to apply enough solvent cement to fill the gap between the pipe and fittings. (See Fig. 2 and Fig. 13.)

(1) Use PVC solvent cement that meets Specification D2564.

(2) Use CPVC solvent cement that meets Specification F493.

7.7.1.5 Apply a thin and even layer of solvent cement to the inside of the socket. (See Fig. 2 and Fig. 14.)

(1) This will prevent puddling of the solvent cement inside of the pipe or fittings. Excessive puddling of solvent cement can cause unwanted waterway restriction and can weaken the wall of the pipe or fittings.

7.7.1.6 Apply a second layer of solvent cement to the pipe end. (See Fig. 2 and Fig. 13.)

7.7.1.7 Without delay and while the solvent cement is still wet, assemble the pipe and fitting by forcefully bottoming the male end of the pipe in the socket.

NOTE 16—Where possible, rotate the pipe or fitting a ¼ turn during the assembly, but not after pipe has bottomed. Sometimes assembly constraints (that is, pipe pullers) prohibit the ability to rotate the pipe or fitting. In addition, rotation is often not possible on diameters of 3 in. (76.2 mm) and larger. With diameters of 3 in. (76.2 mm) and larger, it is more important to bottom the pipe in the socket than it is to attempt to rotate.

7.7.1.8 Hold the pipe and fitting together, taking care not to move or disturb the joint, for an adequate length of time to avoid push out of the pipe from the socket. (See Fig. 15.) Hold times will vary with pipe diameter and ambient temperature.

7.7.1.9 A properly made joint will display a continuous bead of solvent cement around the entrance of the socket. This is an indication that an appropriate amount of solvent cement was applied to the pipe end. Once a continuous bead of solvent



FIG. 12 Apply primer to the pipe end beyond the mark delineating the depth of the fitting socket.



FIG. 13 Apply a full, even layer of solvent cement to the pipe end beyond the mark delineating the depth of the fitting socket.



FIG. 14 Apply a thin and even layer of solvent cement inside the socket.

cement is observed at the entrance of the socket, immediately remove excess solvent cement by wiping with a clean, dry cloth. (See Fig. 16.)

7.7.1.10 *Instructions for Large Diameter Pipe and Fittings*—The procedure in 7.7.1.1 – 7.7.1.9 must be followed in the case of large diameter joining (4-in. diameter (101.6 mm) and above) bearing in mind that the following instructions are necessary.

(1) The use of proper size applicator (swab) is necessary to ensure that enough solvent cement is applied to fill the larger gap that exists between the pipe and fittings.

(2) A heavy-bodied solvent cement must be used on sizes up through 12-in. (304.8 mm) diameter and an extra heavy-bodied solvent cement must be used on sizes greater than 12-in. (304.8 mm) diameter (See Table X2.1).

(3) The end of the pipe must be cut square and chamfered as described in 7.2.1.

(4) For pipe joints of 6 to 8-in. (152.4 to 203.2 mm) diameter, use 2 to 3 people per joint and for pipe joint of 10 to 30-in. (254 to 762 mm) diameter, use 3 to 4 people per joint, excluding factory or mechanically assembled joints.



FIG. 15 Insert the pipe to the socket bottom, hold for an adequate length of time to avoid push out, and verify that there is a continuous bead of solvent cement around the entrance of the socket

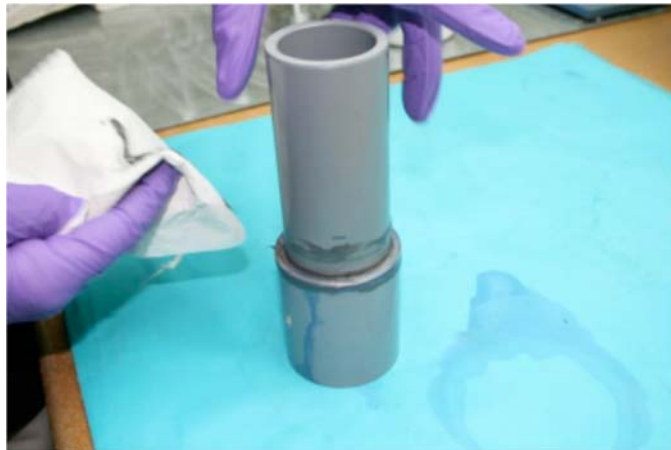


FIG. 16 Remove the bead of solvent cement from the entrance of the socket.

(5) It is important in large diameter joining that a multi-person crew must synchronize the application the primer to the pipe and fittings, then the application of solvent cement immediately to the pipe and fittings.

(6) Large diameter pipe is heavy and bulky. It can develop significant resistance during insertion before reaching the socket bottom. Therefore, the use of a pipe puller or other mechanical assist device shall be used to assemble joints of 4-in. (101.6 mm) diameter and above.

(7) Large diameter pipe and piping components require longer set times and cure times. In cold temperatures, an industrial heating blanket may be used to speed up the set times and cure times. Adhere to 8.4 and 8.5 for cold and hot temperature joining.

(8) Prefabricate as many joints as possible.

(9) If pipe is to be buried, make as many joints as possible above ground, then after the joints have cured, carefully lower it in to the trench.

(10) Follow the manufacturers' recommendation for joining their particular products.

7.7.1.11 *Instructions for Bell End Pipe*—The procedure in 7.7.1.1 – 7.7.1.9 must be followed in the case of bell end pipe. Care must be taken not to apply an excess of solvent cement in

the bell socket. Solvent cement must not be applied to the transition area of diameter change from the socket to the inside diameter of the pipe at the socket bottom. This precaution is particularly important for installation of bell end pipe with a wall thickness of less than 1/8- in. (3.1 mm).

7.7.1.12 *Instructions for Valves and Other Appurtenances*—Care must be taken when joining pipe to valves to prevent damage inside the valves. When joining pipe to ball valves, be sure that the ball valve is in the open position. Follow the manufacturers' recommendation for joining their particular products.

8. Installation

8.1 *Set time*—is the time required before the joint can be carefully handled. Refer to the solvent cement manufacturer for recommended set times.

8.2 *Cure time*—is the time required before the system can be hydrostatically pressure tested. Refer to the solvent cement manufacturer for recommended cure times.

NOTE 17—Set and cure times are dependent upon pipe diameter, viscosity of the solvent cement, ambient temperature and humidity, and the dry joint tightness (interference fit). As a general rule, relatively short

cure periods are satisfactory for high ambient temperatures with low humidity, small pipe sizes, quick drying solvent cements, and tight fitting joints. Longer cure periods are required for low temperatures, large pipe sizes, slow drying solvent cements, and relatively high humidity.

8.3 The test pressure and duration shall meet the requirements of the applicable local, state, and federal regulations. In absence of such regulations, the test pressure and duration shall be as directed by the contract documents or the engineer (See **Note 3**).

8.3.1 When backfilling buried piping, leave all joints exposed so that they can be examined during pressure test.

8.3.2 If a leak is found, the joint must be cut out and discarded. A new section can be installed using a coupling, a mechanical repair joint, or a union.

NOTE 18—Mechanical repair joints or unions must be used in accessible areas only.

8.4 *Cold Temperature Joining:*

8.4.1 Successful joints can be made at temperatures as low as -15°F (-26°C). The primer and solvent cement should be stored above 40°F (5°C) or follow manufacturer's recommendations. Take special care to remove moisture, including ice, frost, and snow, and to dry the pipe and fitting surfaces. In cold weather, solvents penetrate and soften the surfaces of the thermoplastic pipe and fittings more slowly than in warm weather. Thermoplastic surfaces are more resistant to solvent penetration in low temperatures. Therefore, it becomes important to soften surfaces of the pipe and fittings with a primer for a length of time adequate to penetrate the surfaces. The penetration of the surfaces by the primer is proven by performing a scrape test which is defined in **Note 15**. In cold temperatures, longer set time and cure time are necessary because the solvents evaporate slower.

8.5 *Hot Temperature Joining:*

8.5.1 Primer and solvent cement are fast drying. The primer and solvent cement should be stored below 110°F (43°C) or follow manufacturer's recommendations. The surface temperature of the mating surfaces shall not exceed 110°F (45°C) at the time of assembly. Therefore, they shall be applied as quickly as possible, consistent with good workmanship. Under conditions

of high relative humidity, quick application is important to minimize condensation of moisture from the air on the solvent cement surface. In direct sunlight or in ambient temperatures above 110°F (45°C), the pipe surface may exceed 110°F (45°C). Avoid applying primer and solvent cement in direct sunlight. Use natural shade from trees or buildings or if this is not possible, provide manmade shade, such as tarps or umbrellas. The pipe surface temperature may be reduced by wiping with a clean, damp cloth on the surface of the pipe end which will be joined. Then, ensure that the pipe and fitting surfaces are thoroughly dried before applying the primer and solvent cement. To minimize the effects of the heat of the day, assemble the pipe joints in cooler morning hours.

9. Safe Handling of Solvent Cement

9.1 Solvent cements, primers, and cleaners for plastic pipe are made from flammable liquids and must be kept away from all sources of ignition.

9.1.1 Flammable solvent vapors from uncured joints linger within and around the piping system.

9.1.2 Flammable solvent vapors are heavier than air and will travel to sources of ignition at or near ground or lower levels and flash back.

9.1.3 Good ventilation must be maintained to reduce fire hazard and to minimize the breathing of solvent vapors. Use a NIOSH-approved respirator in confined spaces. Avoid contact with skin and eyes.

9.2 Refer to ASTM Practice F402 for additional information on the safe handling of solvent cements and refer to the cautionary notes contained in the Safety Data Sheets (SDS) supplied by the material supplier.

NOTE 19—SDS sheets were formerly known as Material Safety Data Sheets (MSDS) which may still be in use in some countries.

10. Keywords

10.1 bevel; chamfer; cleaner; cold water pipe; CPVC piping; fittings; hot water pipe; joining; pipe; pipe joint; primer; PVC piping; safe handling; solvent cement; water distribution

APPENDIXES

(Nonmandatory Information)

X1. STANDARDS FOR PVC PIPING COMPONENTS

X1.1 Standards for joining PVC and CPVC pipe and piping components with tapered sockets with primer and solvent cements:

X1.1.1 *ASTM Standards*²:

D1600 Terminology for Abbreviated Terms Relating to Plastics
D1784 Specification for Rigid Poly(Vinyl Chloride)(PVC) compounds and Chlorinated Poly(Vinyl Chloride)(CPVC) Compounds
D1785 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

D2241 Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

D2466 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

D2467 Specification for Socket-Type Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

D2564 Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings

D2665 Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fitting

- D2672 Specification for Joints for IPS PVC Pipe Using Solvent Cement
- D2729 Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- D2949 Specification for 3.25-in. Outside Diameter Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
- D3034 Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- F402 Practice for Safe Handling of Solvent Cement, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
- F412 Terminology Relating to Plastic Piping Systems
- F438 Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
- F439 Specification for Socket-Type Chlorinated Poly(Vinyl Chloride)(CPVC) Plastic Pipe Fittings, Schedule 80
- F441/F441M Specification for Chlorinated Poly(Vinyl Chloride)(CPVC) Plastic Pipe, Schedules 40 and 80
- F442/F442M Specification for Chlorinated Poly(Vinyl Chlori-

- de)(CPVC) Plastic Pipe (SDR-PR)
- F480 Specification for Thermoplastic Well Casing Pipe and Coupling Made in Standard Dimension Ratios (SDR), SCH 40 and SCH 80
- F493 Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride)(CPVC) Plastic Pipe and Fittings
- F512 Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Conduit and Fittings for Underground Installation
- F656 Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- F758 Specification for Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
- F789 Specification for Type PS-46 Poly(Vinyl Chloride) (PVC) Plastic Gravity Flow Sewer Pipe and Fittings
- F891 Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core
- F1866 Specification for Poly(Vinyl Chloride)(PVC) Plastic Schedule 40 Drainage and DWV Fabricated Fittings

X2. GUIDELINES FOR PVC SOLVENT CEMENT SELECTION

X2.1 Solvent cement classifications and guidelines shown are an aid to selection, and should not be taken to be the recommendations of all solvent cement manufacturers. Individual manufacturer’s recommendations should be followed, for there are situations where joint fits vary for different applications of the same nominal pipe size. In such cases, variations from the guidelines given in **Table X2.1** may be satisfactory and desirable.

NOTE X2.1—The wet-film thickness of a solvent cement can be measured by using a Nordson Wet Film Thickness Gage or equivalent, available from Nordson Corp., Amherst, Ohio 44001, as Nordson No. 79-0015. To use this gage, dip a short length of 1-in. pipe vertically into the cement at a temperature of approximately 73°F (23°C) to a depth of 1.5 to 2 in. (40 to 50 mm) for a period of 15 s. Remove the pipe from the cement and hold the pipe horizontally for 45 s. Measure the wet-film

TABLE X2.1 PVC and CPVC solvent Cements for Schedule 40 and 80 with Interference Fit (Note X2.2)

Pipe Size Range, in.	Cement Type	Minimum Viscosity		Minimum Wet Film Thickness	
		cP	(mPa·s)	in.	(mm)
1/8 to 2	regular-bodied	90	(90)	0.006	(0.15)
2 1/2 to 6	medium-bodied	500	(500)	0.012	(0.30)
8 to 12	heavy-bodied	1600	(1600)	0.024	(0.60)

thickness on the top surface of the pipe with the end of the gage about 1/4 in. (10 mm) from the end of the pipe. With a little care and experience, the wet cement layer can be readily measured to ±0.002 in. (±0.05 mm).

NOTE X2.2—Solvent cement manufacturer’s recommendations must be followed for set times and cure times when joining pipe.

SUMMARY OF CHANGES

Committee F17 has identified the location of selected changes to this standard since the last issue (F2855–96 (2010)) that may impact the use of this standard.

- (1) Language is added to include CPVC joining method to the standard practice.
- (2) Language in existing F2855 – 96 (2010) Section 7.7 “... Turn the pipe or fitting 1/4 turn during assembly (but not after the pipe is bottomed) to distribute the cement evenly” has been eliminated because as a standard practice all of the surfaces of both the pipe end and fitting socket must be adequately coated with primer and solvent cement which removes the need for the 1/4 turn.

- (3) Cure time charts are removed from the appendix and will be per solvent cement manufacturers’ recommendations.
- (4) This revision significantly updates the wording of the entire Practice F2855.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; <http://www.copyright.com/>