This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: F2647 – 07 (Reapproved 2023)

Standard Guide for Approved Methods of Installing a CVS (Central Vacuum System)[1]

This standard is issued under the fixed designation F2647; 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 guide demonstrates proper methods for installing a central-vacuum system.

1.2 Appendix X1 contains additional sources of information that may be helpful to the user of this guide.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E814 Test Method for Fire Tests of Penetration Firestop Systems

E2174 Practice for On-Site Inspection of Installed Firestop Systems

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

F2158 Specification for Residential Central-Vacuum Tube and Fittings

3. Terminology

3.1 *Definitions:*

3.2 For definitions of terms used in this guide, see Terminology F412.

4. Significance and Use

4.1 The suggestions of this guide are intended to provide proper installation materials and practices to be used during the installation of a central-vacuum system.

5. Materials

5.1 *Plastic Materials*—For information on plastic materials used for installing a CVS system, see Specification F2158.

[1] This guide is under the jurisdiction of ASTM Committee F11 on Vacuum Cleaners and is the direct responsibility of Subcommittee F11.30 on Durability-Reliability.

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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.

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APPENDIXES

(Nonmandatory Information)

X1. STORAGE

X1.1 *Outside Storage*—Plastic tube should be stored on a flat surface or supported in a manner that will prevent sagging or bending. Do not store tube in direct sunlight for long periods. To prevent damage, tubing and fittings should not be stored where the temperature exceeds 130 °F (54 °C).

X1.2 Inventories of plastic tube should be used on a first-in, first-out basis.

X2. JOINTS AND CONNECTIONS

X2.1 PVC tubing and fittings shall be joined by the solvent-cement method.

X2.2 Metal tubing and fittings shall be joined according to Appendix X4.

X3. SOLVENT CEMENT JOINTS

X3.1 *Tube Cutting*—Cut the tube square with the axis, using a fine-tooth handsaw and a miter box. A rotary cutter may be used if the cutting blades are specifically designed for cutting plastic tube in such a way as not to raise a burr or ridge (flare) at the cut end (see Fig. X3.1). Remove all burrs with a deburring tool, knife, file, or abrasive paper.

X3.2 *Dry Fit Test*—The solvent cement joint is designed so that there will generally be interference of the tube wall with the fitting socket before the tube is fully inserted. Insert the tube into the fitting and check that the interference occurs about ⅓ to ⅔ of the socket depth (Fig. X3.2).

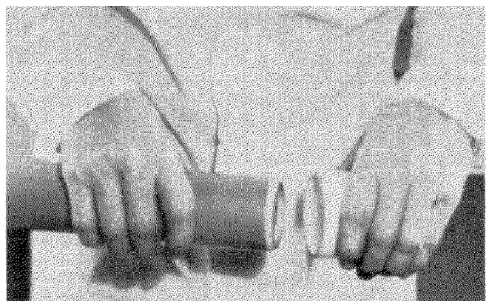

FIG. X3.2 Tube Entering Dry Fitting

X3.3 *Cleaning*—Surfaces to be joined must be cleaned and be free of dirt, moisture, oil, and other foreign material. If this cannot be accomplished by wiping with a clean, dry cloth, a chemical or mechanical cleaner must be used. If a chemical cleaner is used, apply with an applicator. (**Warning—**Skin contact with chemical cleaners should be avoided.)

X3.4 *Application Procedure:*

X3.4.1 *Handling Cement*—Keep the cement can closed and in a shady place when not actually in use. Discard the cement when an appreciable change in viscosity takes place or at the first sign of gelation. The cement should not be thinned. Keep the applicator immersed in cement between applications. (See Practice F402 for proper handling procedures.)

X3.4.2 *Application of Cement*—PVC solvent cement is fast drying, and, therefore, the cement shall be applied as quickly as possible, consistent with good workmanship (see Fig. X3.3). The surface temperature of the mating surfaces should not exceed 110 °F (43 °C) at the time of assembly.

X3.4.3 Apply cement lightly but uniformly to the outside of the tubing, taking care to keep the use of cement to a minimum. (**Warning—**Application of cement to fitting socket is not recommended and can cause drippings or an excess amount of

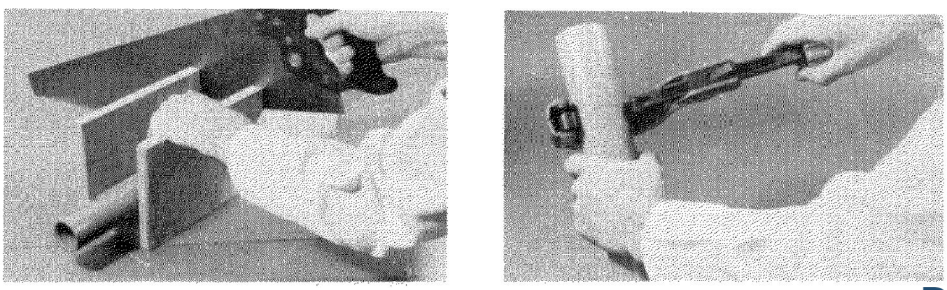

FIG. X3.1 Apparatus for Cutting Tube

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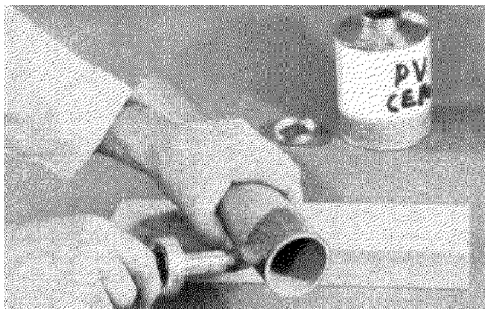

FIG. X3.3 Uniform Application of Cement to Outside of Tube

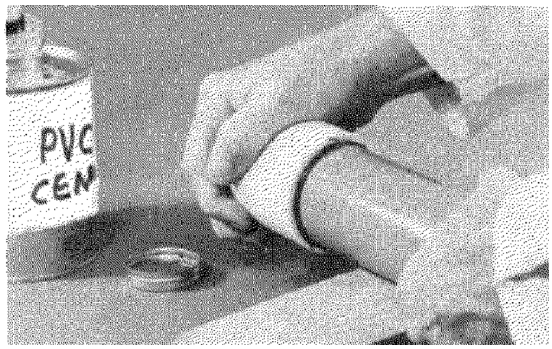

FIG. X3.4 Assembly of Joint

cement to be pushed to the inside diameter of the connection that can possibly snag debris and eventually create a clog.)

X3.4.4 *Low-Temperature Applications*—At temperatures below freezing, 32 °F (0 °C), solvents penetrate and soften the PVC surfaces more slowly than in warmer weather. For this reason, it is recommended that testing be done on a piece of scrap tube to determine if satisfactory penetration of the surfaces can be achieved.

X3.4.5 *Assembly of Joint*—Immediately after applying a coat of cement to the tube, forcibly insert the tube into the socket. To distribute the cement evenly, turn the tube or fitting a ¼ turn during the process (see Fig. X3.4).

X3.4.6 Assembly should be completed within 20 s after the application of cement. (**Warning—**Until the cement is set in the joint, the tube may back out of the fitting socket, if not held in place for approximately 1 min after assembly. Care should be taken during assembly not to disturb or apply any force to the joints previously made, as early rough handling can destroy fresh joints.)

X4. METHODS OF JOINING METAL TUBING AND FITTINGS

X4.1 *Tube Cutting*—Cut the tube square with the axis, using a metal cutting blade in a chop saw or band saw. A rotary cutter may be used if the cutting blades are specifically designed for cutting metal tube in such a way as not to raise a burr or ridge (flare) at the cut end. Remove all burrs with a deburring tool, file or abrasive paper.

X4.2 *Cleaning*—Surfaces to be joined must be cleaned and free of dirt, moisture, oil and other foreign material. If this cannot be accomplished by wiping with a clean, dry cloth, a chemical or mechanical cleaner must be used. If a chemical cleaner is used, apply with an applicator. (**Warning—**Skin contact with chemical cleaners should be avoided.)

X4.3 *Assembly of Joint*—There are three popular and recommended methods of joining metal tubing and fittings for use in low vacuum and pressure systems under 16 psig (Adhesive, Compression Couplings and Shrink Sleeves). All of these methods provide secure connections eliminating the need for welding or brazing.

X4.3.1 *Adhesive*—The best proven adhesive to bond metal tubing and fittings together is industrial contact cement. For best results, apply coatings of equal thickness on each clean surface to be joined. Do not join immediately. When both surfaces are tacky to touch, insert the tubing the full depth into the fitting socket. Make sure excess adhesive has not been pushed to the inside diameter of the tubing (if any has be sure to remove it to prevent any future obstruction areas).

X4.3.2 *Compression Couplings*—A mechanically fastened coupling that connects straight end tubing or fittings within the ID of the coupling. These couplings offer an easy "tear down" or "repair" function (see Fig. X4.1 and Fig. X4.2).

X4.3.3 *Shrink Sleeve*—A heat shrinkable polyolefin band literally shrinks and encircles the connection giving it mechanical strength and a positive seal. This joining method can be used in conjunction with slip couplings, expanded tubing or fittings. Depending on weather conditions, shrink sleeves typically can be installed in as little as 1 min to 2 min each (see Fig. X4.3).

X4.3.3.1 *Equipment Needed to Apply Shrink Sleeve:*

(1) A propane or butane torch, having a broad 12 in. or 15 in. soft billowy orange flame.

(2) Or a commercial heat gun with 500 °F (14 amp) capability.

X4.3.3.2 *Applying Shrink Sleeve*:

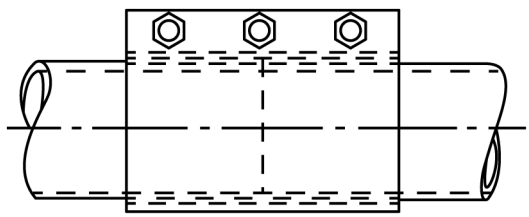

FIG. X4.1 Compression Coupling

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