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Designation: C919 – 19

Standard Practice for Use of Sealants in Acoustical Applications[1]

This standard is issued under the fixed designation C919; 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 provides information for the use of sealants to reduce sound transmission characteristics of interior walls, ceilings, and floors by proper application of sealants to joints, voids, and penetrations normally found in building construction, which are commonly referred to as "flanking paths."

1.2 The committee with jurisdiction over this standard is not aware of any comparable standards published by other organizations.

1.3 This standard does not purport to address fire stopping or safing requirements for joints, voids, and penetrations through fire-rated wall, ceiling, and floor assemblies. Additional requirements may be necessary for fire-rated assemblies to meet the applicable building code provisions.

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]

C634 Terminology Relating to Building and Environmental Acoustics

C717 Terminology of Building Seals and Sealants

C834 Specification for Latex Sealants

C920 Specification for Elastomeric Joint Sealants

C1193 Guide for Use of Joint Sealants

C1520 Guide for Paintability of Latex Sealants

C1620 Specification for Aerosol Polyurethane and Aerosol Latex Foam Sealants

C1642 Practice for Determining Air Leakage Rates of Aerosol Foam Sealants and Other Construction Joint Fill and Insulation Materials

C1852 Guide for Product Selection/Delivery Systems for Aerosol Foam Sealants and Adhesives

E90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

E336 Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings

E413 Classification for Rating Sound Insulation

2.2 *HUD Standard:*[3]

HUD Minimum Property Standards for Housing, Section 4910.1

2.3 *IBC Standard:*[4]

International Building Code (IBC), Section 1206

3. Terminology

3.1 *Definitions*—For definitions of terms used in this recommended practice, see Terminologies C717 and C634.

4. Significance and Use

4.1 Walls, ceilings, and floors in building construction, especially those that are of lightweight construction, and that are designed to reduce or limit sound transmission, can have undesirable sound transmission characteristics if care is not taken to seal joints, voids, and penetrations that typically occur. Unsealed joints, voids, and penetrations will substantially increase the sound transmission characteristics of these types of construction. By sealing them the transmission of sound can be substantially diminished by eliminating "flanking paths."

5. Sound Transmission Requirements

5.1 The construction industry has adopted Sound Transmission Class (STC) units, as defined in Terminology C634, to rate

[1] This practice is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.10 on Specifications, Guides and Practices.

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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.

[3] Available from Superintendent of Documents, U.S. Government Printing Office.

[4] Available from International Code Council (ICC).

the sound transmission properties of walls, ceilings, and floors. The STC is determined in accordance with Classification E413. The test data are obtained in accordance with Test Methods E90 and E336.

5.2 Various building and other governmental adopted codes include requirements for sound transmission.

5.2.1 For example, the International Building Code (IBC), Section 1206.2, has requirements for the amount of sound that is allowed to be transmitted through common interior walls, partitions, and floor and ceiling assemblies between adjacent dwelling units or between dwelling units and adjacent public areas of a building, such as halls, corridors, stairs, or service areas. This Section also includes requirements for penetrations or openings in these assemblies, including piping and electrical devices, to be sealed, lined, insulated, or otherwise treated to maintain the required ratings.

5.2.2 Additionally, the department of Housing and Urban Development (HUD) has the following standard for STC limitations for various housing units: HUD Minimum Property Standards for Housing, Section 4910.1.

6. Why Seal Openings?

6.1 The sound transmission of a wall, ceiling, or floor, no matter how well built, can be substantially defeated by the presence of unsealed joints, voids, and penetrations. Fig. 1 illustrates examples of how sound travels through unsealed joints, voids, and penetrations in walls and how sealing them with liquid-applied sealants or precured sealants will minimize sound transmission. Other alternatives for sealing joints, voids, and penetrations include the use of adhesive backed tapes, films, membranes, or aerosol foam sealants.

6.2 The effect of unsealed joints, voids, and penetrations on the STC rating of partition walls is illustrated in Fig. 2. For the sample wall example, with an STC rating of 40 that has openings that total 9 cm^2 (1.4 $in.^2$) will have its STC reduced to 36, a 10 % difference. However, that small difference results in a change to the apparent loudness of sound transmission to that which is twice as loud.

7. Positioning of Sealants

7.1 Fig. 3 illustrates placement of liquid-applied sealants to improve the STC rating from a value of 29 to a value of 53. Note that two properly placed sealants are sufficient and sealing beyond that is unnecessary.

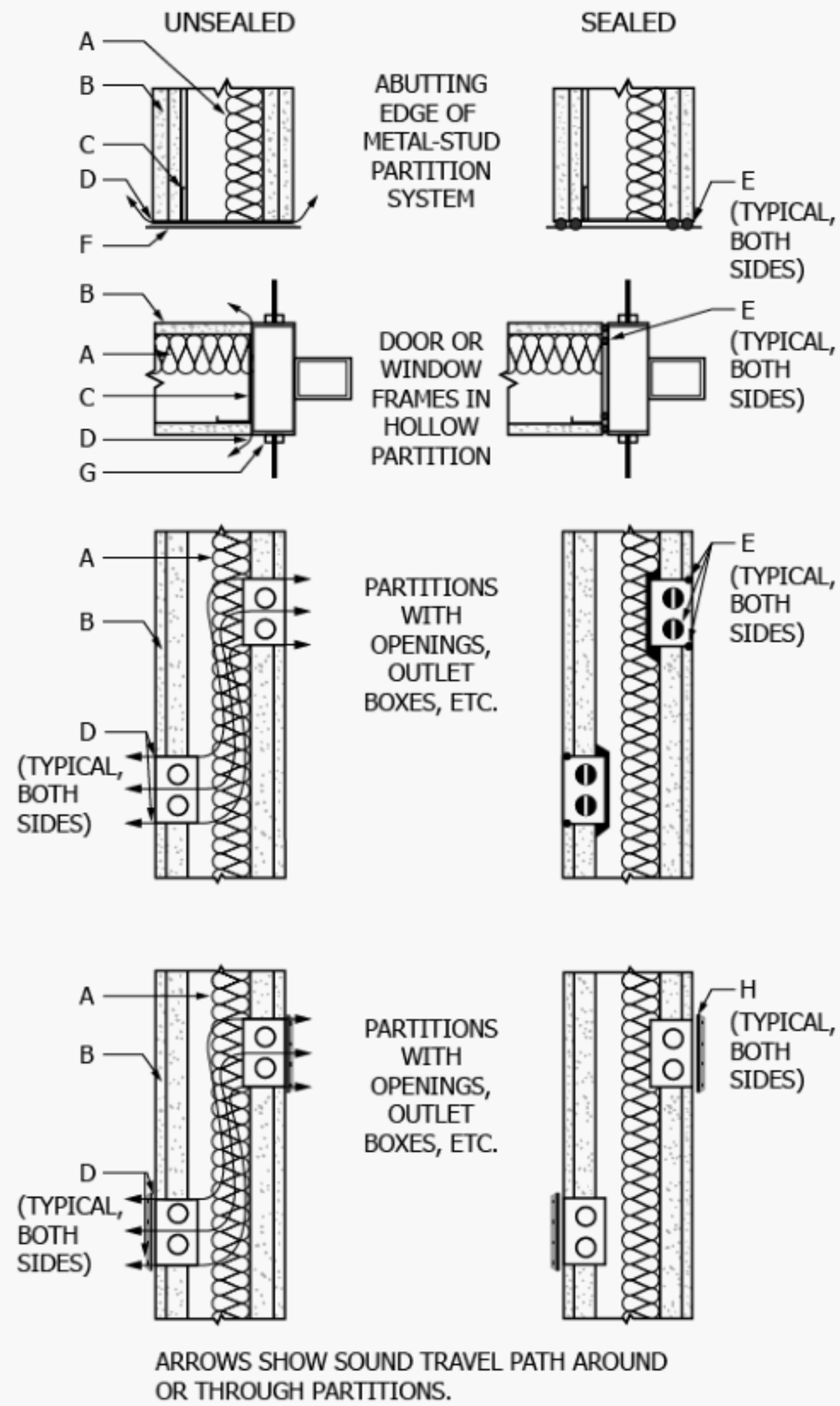
8. Application of Sealants

8.1 Fig. 4 illustrates typical liquid-applied sealant applications. Additional sealant application information can be obtained from Guide C1193 and manufacturer's literature for specific products and applications.

9. Types of Sealants

9.1 *Precured Sealants*—Precured sealants include a wide variety of gaskets and tapes, and foamed shapes that have constant dimensions. These materials are effective sound seals when the tolerances for joint, void, or penetration opening can be accurately predicted and installed within those tolerances. A varying opening width along its length, which exceeds those tolerances, will cause the gasket, tape, or foamed shape to have difficulty in maintaining a proper seal at all points with the constant compression that is necessary to effect a seal. Precured sealants in the form of pads have proven to be effective for sealing electric, telephone, television, and other types of jack and back boxes.

9.2 *Non-Sag Sealants*—These liquid-applied sealants can conform to the wide range of sizes encountered in joints, voids,



Legend:

A.	Sound Insulation
B.	Partition Sheathing
C.	Metal-Stud Partition
D.	Unsealed Gap or Penetration
E.	Acoustical Sealant
F.	Floor Assembly
G.	Door or Window Frame
H.	Precured Acoustical Sealants

FIG. 1 Examples of Achieving an Effective Sound Barrier and Maintaining the Designed STC Value of Partition Systems

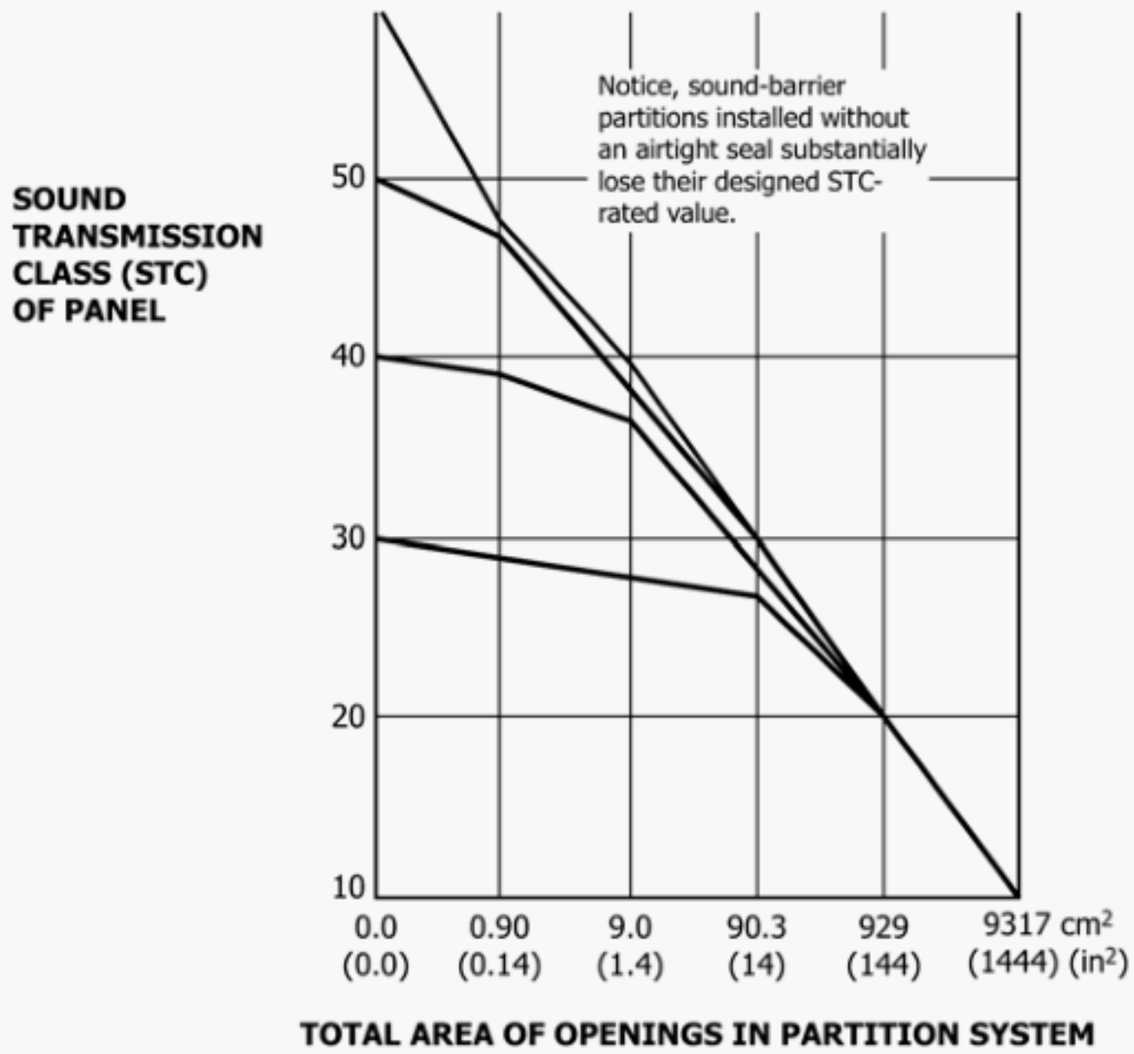


FIG. 2 Effect of Unsealed Hole Openings on STC-Rated Test Wall, 3.8 by 2.4 m (12 ft 6 in. by 8 ft)

and penetrations especially those that have tolerances exceeding those applicable for precured sealants. The following types are available:

9.2.1 *Nondrying, Nonhardening, Nonskinning Sealants*—These types of sealants have proven to be effective in reducing sound transmission. By remaining flexible as well as permanently adhesive, they can maintain an effective seal. These types of sealants, for acoustical applications, normally are nonbleeding and will not stain walls. The nonskinning materials should be used only in concealed areas. If however, they are exposed to view they are not paintable and may stain adjacent paint and other surfaces or pick up dirt.

9.2.2 *Skinning Sealants*—Liquid-applied sealants that cure in-place, develop a surface skin, retain flexibility, and maintain adhesion can be effective in reducing sound transmission. These sealants are preferred in exposed applications and certain types can readily accept paint and other finishes. The following types are available:

9.2.2.1 *Latex-Based Sealants*—Latex-based sealants that retain flexibility and maintain adhesion can be effective in reducing sound transmission. Specification C834 references these sealant types. Guide C1520 refers to their paintability characteristics and requirements. These sealants are primarily used for joints, voids, or penetrations that are static and do not experience movement.

9.2.2.2 *Aerosol Foam Sealants*—Polyurethane and latex based formulations are available for the sealing of irregular joints, voids, and penetrations to limit sound transmission. Specification C1620 references these sealant types. Guide C1852 provides guidance for selection and delivery of aerosol foam sealants and adhesives. Only those foams that have very little or no leakage after installation as described by Test Method C1642, as referenced in C1620 and C1852 should be used. These sealants are primarily used for joints, voids, or penetrations that are static.

9.2.2.3 *Elastomeric Sealants*—While normally used for sealing joints on the exterior of buildings, they can be effectively used for interior sound reduction especially for joints that will be subject to movement. Specification C920 references these sealant types, which can include latex, polyurethane, polysulfide, polyether, and silicone based formulations. A C920 Type S or M, Grade NS, Use NT sealant should be used for these applications. C920 sealants are available in the following movement classes 12½, 25, 35, 50, and 100/50, which represent sealant movement capability. For example, Class 25 indicates ±25 % movement capability. For example, a sealant in a joint, void, or penetration, that will experience movement, and that is ¼ in. wide has the ability to compress to 3⁄16 in. or extend to 5⁄16 in. without failure if properly installed.

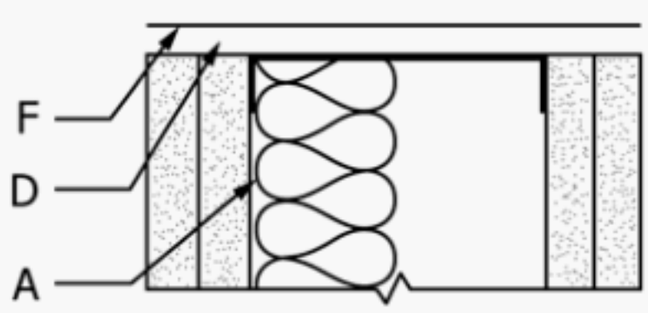
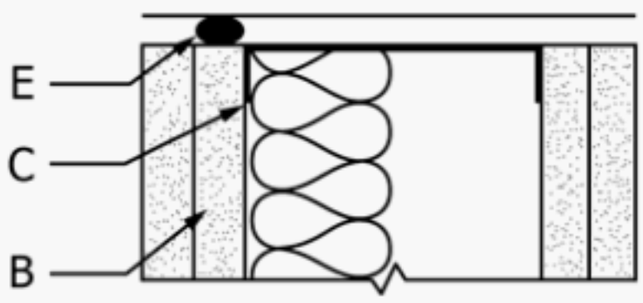
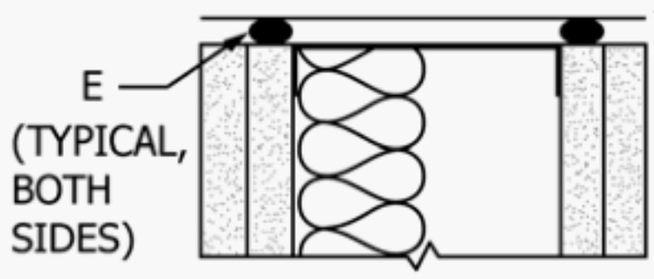
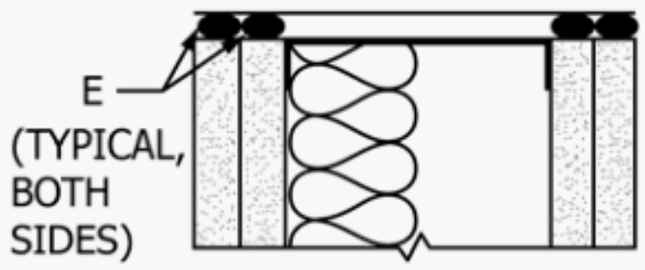
10. Paintability of Exposed Sealants

10.1 Sealants are usually painted if they are exposed on the interior of buildings. Because of the wide variety of types and brands of interior paint and the equally wide variety of types and brands of sealants both the paint and sealant manufacturers should be consulted relative to paintability of a particular combination of products. On-site paintability and stain tests are recommended once paint and sealant product recommendations have been made. Paintability of latex-based sealants is described by Guide C1520. In general, silicone-based sealants will not provide an acceptable surface for paint application; however, they can be used by being of a color compatible with adjacent surfaces.

10.2 Paint applied before a sealant has cured may crack during the curing of the sealant. It should also be realized that structural or other building movements that affect the sealant may cause paint to crack or delaminate from the sealant surface. A reasonable sealant cure time should occur before painting. Sealant and paint manufacturers should be consulted regarding a recommended cure time prior to painting.

11. Keywords

11.1 acoustical; sealants; sound transmission

	Edge Detail	STC Value	Comments
	unsealed	29	the open-edge track gave the STC value of 29 through direct leakage
	single sealant at the perimeter of one base layer	49	this bead closed the void but did not seal leakage around the joint between the wall-board and track
	two sealants, one for each base layer of gypsum board	53	the beads closed the void and sealed leakage around track
	four sealants, one for each base and face layer of gypsum board	53	the void is closed; no leaks around track and wallboard

Legend:

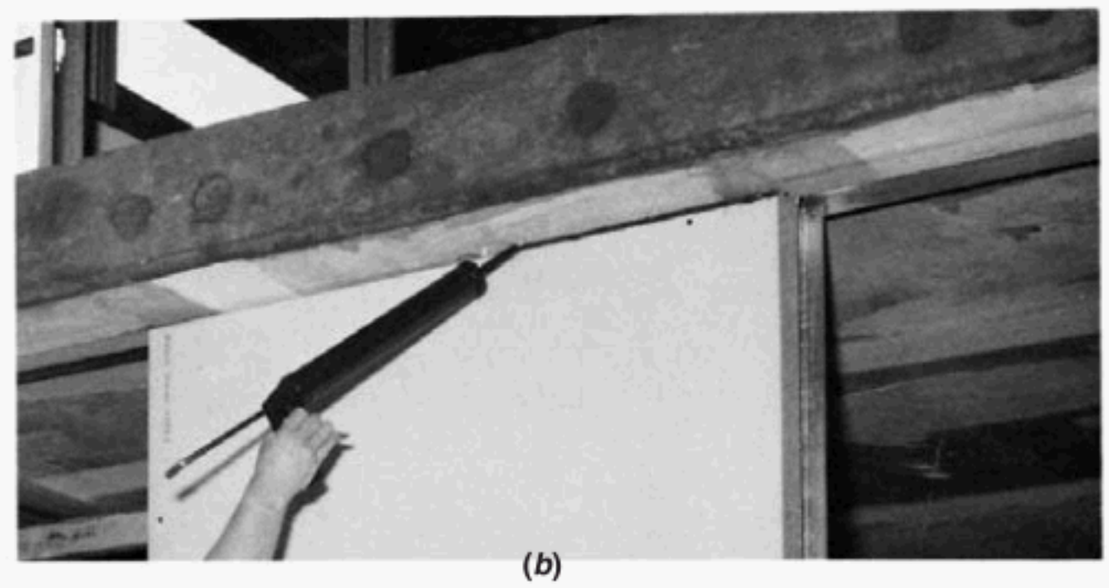
A.	Sound Insulation
B.	Partition Sheathing
C.	Metal-Stud Partition
D.	Unsealed Gap or Penetration
E.	Acoustical Sealant
F.	Adjacent Assembly

NOTE 1—The test partitions consisted of metal studs, 610 mm (24 in.) on center, with double layers of 13-mm (0.5-in.) wallboard screw-attached to each side. Sound insulation blanket, 38 mm (1.5 in.), was placed in the void. The partition panels were erected, shimmed out 3 mm (0.125 in.) at the periphery: top, bottom, and edges.

NOTE 2—Data were obtained from the United States Gypsum Co. Round Lake Acoustical Research Facilities from a study conducted in accordance with Test Method E336.

FIG. 3 Performance of a Partition System Sealed with Single or Multiple Beads

(a)



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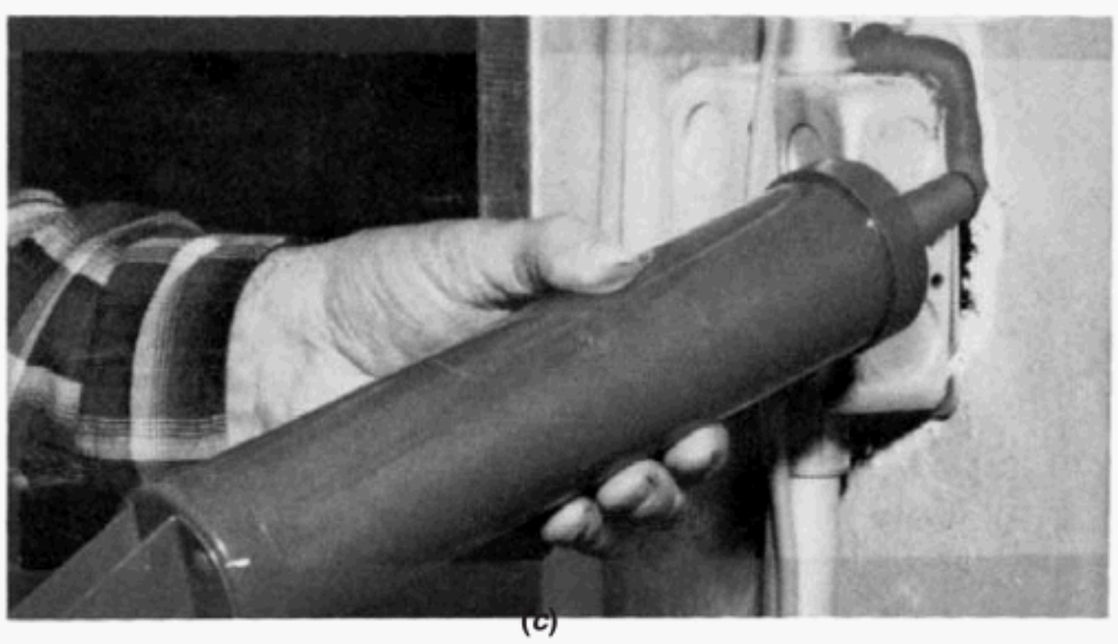
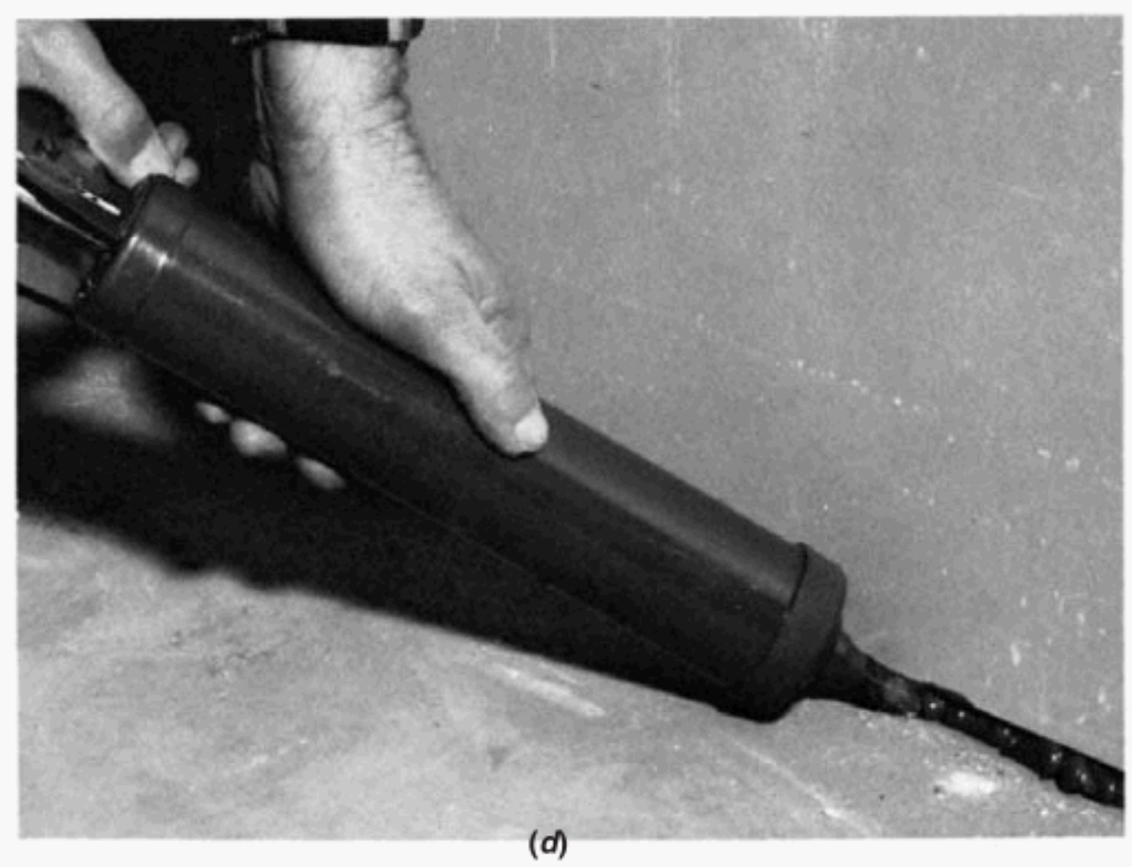


(c)



(d)

FIG. 4 Typical Sealant Application

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