



Designation: F2049 – 11 (Reapproved 2017)

Standard Safety Performance Specification for Fences/Barriers for Public, Commercial, and Multi-Family Residential Use Outdoor Play Areas¹

This standard is issued under the fixed designation F2049; 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 specification provides the recommended minimum requirements for denoting various types of fences/barriers for the protection of children's outdoor play spaces in public, commercial, and multi-family residential use locations. This specification excludes individual single family residential use play equipment locations. Interior fences located in a play area that has a perimeter fence established shall only have to comply with the latch height requirement indicated in 7.6.2.

1.2 This specification provides for the safety of occupants in play areas or zones as it pertains to vehicular intrusion as well as other participant intrusion, and for children containment or entry/exit. This specification has the intent to also keep children inside a predetermined area in an effort to enhance supervision; to keep children from running out of the area into water and other hazards; to minimize the likelihood of facial lacerations on low gate and fence hardware; to minimize the likelihood of abduction; and to restrict access to railroads, highways, roads, and other such hazards.

1.3 This specification does not choose the product components for the fence system, the choice of which should be made by the operators of the play space and their specification writers or drafters based upon their determination of the merits of the products that could be used.

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

1.5 *This specification does not purport to address the aspect of safety within a play area or zone. It is the responsibility of the user of this specification to establish appropriate safety practices as related to the play area and determine the applicability of regulatory requirements prior to use.*

1.6 *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

[A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric](#)

[A491 Specification for Aluminum-Coated Steel Chain-Link Fence Fabric](#)

[F552 Terminology Relating to Chain Link Fencing](#)

[F668 Specification for Polyvinyl Chloride \(PVC\), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric](#)

[F1043 Specification for Strength and Protective Coatings on Steel Industrial Fence Framework](#)

[F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated \(Galvanized\) Welded, for Fence Structures](#)

[F1183 Specification for Aluminum Alloy Chain Link Fence Fabric](#)

[F1345 Specification for Zinc-5 % Aluminum-Mischmetal Alloy-Coated Steel Chain-Link Fence Fabric](#)

2.2 Research Reports:³

[National Cooperative Highway Research Program Report #54](#)

3. Terminology

3.1 See Terminology [F552](#) for definitions of terms relating to chain-link fencing.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *fence, n*—type of containment that surrounds and obstructs primarily people passage to or from the play area.

3.2.2 *barrier, n*—type of containment or deflector system that surrounds and obstructs primarily vehicle passage into a play area, such as bollards and posts. Barriers must pass impact

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 Colcote, L. R., and Mitchie, J. D., "Location, Selection, and Maintenance of Highway Guardrails and Median Barriers," *National Cooperative Highway Research Program Report #54*, S. W. Research Institute, San Antonio, TX.

¹ This specification is under the jurisdiction of ASTM Committee F14 on Fences and is the direct responsibility of Subcommittee F14.10 on Specific Applications.

Current edition approved April 15, 2017. Published July 2017. Originally approved in 2000. Last previous edition approved in 2011 as F2049 – 11. DOI: 10.1520/F2049-11R17.

tests for the highest speed limit allowed and posted on the street, road, or parking lot adjacent to the outdoor play area.

3.2.3 *continuous barrier, n*—type of traffic barrier designed to prevent vehicular intrusion into a play area and that also impedes pedestrian passage to and from the play space.

3.2.4 *curb, n*—permanent, continuous structure made of concrete, asphalt, or other structural material presenting a 6 to 8 in. (15.24 to 20.32 cm) elevation change at the curbline.

3.2.5 *curbline, n*—pavement elevation change defining the edge of a fire lane, vehicular travel lane, or contiguous or individual parking spaces with depressions meeting the requirements of the Americans with Disabilities Act.

3.2.6 *debris fence, n*—shield used to prevent flying post-crash or other debris from entering a play zone.

3.2.7 *discrete barrier, n*—barrier designed to prevent vehicular intrusion that allows for pedestrian passage to and from the play space.

3.2.8 *guardrail, n*—an example of a continuous barrier.

3.2.9 *play zone or area, n*—environment for public, multi-family residential, or commercial play use containing recreation equipment intended for activities by children where entry or egress access is intended.

3.2.9.1 *Discussion*—This may be through its adjacent apartment or home decorative lattice work, public or commercial building door, or via a controlled gate. Examples include, but are not limited to, the following: fast food establishments, day-care centers, shopping malls, apartments, parks, and schools.

3.2.10 *structural bollards, n*—steel pipe structure filled with concrete installed in the ground with a concrete footing.

3.2.10.1 *Discussion*—A structural bollard is an example of a barrier and discrete barrier.

3.2.11 *traffic, n*—movement of vehicles for purpose of driving-through or parking motions.

3.2.12 *vulnerable play zone, n*—play zone in the proximity (as outlined in 8.3) of vehicular traffic, railroad tracks, bodies of water, streets, parking lots, roads, electrical and other utility features, and other similar life-threatening or debilitating features.

4. Site Covered

4.1 A play zone shall be protected in accordance with this specification in locations that are vulnerable to vehicular traffic, from activity and game conflicting uses, and for the control of entering or exiting the play zone or area. Protection from vehicular intrusion shall be placed as specified in Sections 6 and 7. Barriers shall protect the perimeters of the play area that are adjacent to the direction of traffic, and only apply to those perimeters that are parallel and perpendicular to the direction of traffic. Playground enclosures, such as fences, walls, or buildings, shall be on all sides of the play zone.

5. Significance and Use

5.1 This specification sets forth minimum standard requirements for use in local codes and ordinances relating to public,

multi-family, residential, and commercial outdoor play areas or zones and their environments.

5.2 This specification does not have the effect of law, nor is it intended to supersede local codes and ordinances of a more restrictive nature.

5.3 Playgrounds that intentionally incorporate water into the play area are exempt from this specification.

6. Methods of Protection

6.1 *Discrete and Continuous Barriers*—These methods of protection shall be determined by the vulnerable play area or play zone requirement for protection for vehicle intrusion and adjacent traffic circumstances. If a fence itself complies with the impact tests described in 7.1, then a barrier is not required.

6.1.1 *Continuous Barrier*—If a vulnerable play area has no exterior exit gate on the traffic side of the play zone, then the play area shall be protected with a continuous barrier on the traffic side as specified in the following sections. If pedestrian access through this continuous barrier is necessary, it shall meet applicable sections. Continuous barrier methods include, but are not limited to, guardrails, concrete or brick reinforced walls, and concrete Jersey barriers.

6.1.2 *Discrete Barrier*—If a vulnerable play area has an exit gate on the traffic side of the play zone, then pedestrian access through a barrier is necessary and a discrete barrier should be provided on the traffic side as specified in the following sections. Discrete barrier methods include, but are not limited to, the following: structural bollards, trees, posts, and other vertical structures.

6.1.3 *Fences*—All vulnerable play areas shall have fences with gates as described in 7.6. This method of protection may include chain link and other materials of a minimum height of 4 ft (1.22 m) above grade.

6.1.4 *Building*—Where a building may abut or is adjacent to a play area or play zone, it may be used as part of the containment. If the building wall contains a door for ingress and egress into the play area, it shall comply with subsequent sections. If the building wall contains windows for viewing, it shall contain glazing that is unbreakable and shatter-proof.

6.2 *Buildings*—The fence shall completely surround the play zone or area environment except where a building or dwelling or portion thereof is utilized as part of the play environment enclosure. If the exterior wall or walls of that portion of the building contains doors, or other openings, it shall comply with the following provisions.

6.2.1 *Doors*—Doors in the wall of a building or dwelling that allow direct access through the wall to the play environment shall be provided with the following:

6.2.1.1 An alarm capable of detecting unauthorized entry or exit through the gate or opening into or from the play environment area when not in use and which, when activated, emits a sound of sufficient volume to be heard in the building or dwelling as a means of outdoor area security when deemed necessary. The audible warning shall commence not more than 7 s after the door, or its screen, if present, or both are opened and shall sound continuously for a minimum of 30 s. The alarm shall have a minimum sound pressure rating of 85 dB at 10 ft

(3.4 m) and the sounds of the alarm shall be distinctive from other sounds such as auto alarms, smoke alarms, telephones, and door bells. The alarm shall automatically reset after 2 min under all conditions.

7. Requirements

7.1 Continuous Barrier:

7.1.1 *Strength and Deflection Limits*—The barrier used shall be able to withstand a one-time 10,000 lb (4535.9 kg) concentrated, point-load located 2 ft (0.61 m) above ground with permanent deformation less than 0.1 in. (2.54 mm) after a single load when tested in accordance with the U.S. Department of Transportation specifications.

7.1.2 *Maintenance*—If any permanent deformation or damage is done to a continuous barrier, the play area facility shall be closed until a new barrier has been installed.

7.1.3 *Inspection*—A visual check shall be done by the owner or operator on a regular basis to note damage. A sign should be posted with the name and owner to be notified if damage occurs.

7.1.4 *Distance*—Minimum unobstructed distance between the continuous barrier and the play area perimeter fence protection shall be no less than 2 ft (0.61 m).

7.1.5 The continuous barrier shall be placed edge to edge unless passage through is required, which shall be no more than 48 in.

7.2 Discrete Barriers:

7.2.1 *Strength and Deflection Limits*—The barrier system used shall meet the requirements of 7.1.1.

7.2.2 Discrete barriers shall be placed a maximum of 42 in. (1.07 m) apart from each other (edge to edge).

7.2.3 *Maintenance*—Maintenance shall comply with 7.1.2.

7.2.4 *Distance*—The distance from discrete barrier to fence shall be in accordance with 7.1.4.

7.2.5 *Inspection*—Shall comply with 7.1.3.

7.3 Curbs:

7.3.1 Curbs, in order to minimize casual contact with cars, shall be placed at a minimum distance between the travel lane and the play area zone as follows:

7.3.1.1 2 ft, 6 in. where there is no parking.

7.3.1.2 4 ft for angled parking.

7.3.1.3 5 ft where there is perpendicular parking.

7.4 Fences:

7.4.1 *Fence Height*—The top of the fence shall be a minimum of 4 ft (1.22 m) above grade measured on the side of the fence that faces away from the play environment.

7.4.2 *Visibility*—The fence shall be designed and constructed so that it allows for a visibility to conform to the level of surveillance necessary from a designated supervising area outside or inside the play environment area to inside the play environment.

7.4.3 *Ground Clearance*—The maximum vertical clearance between grade and the bottom of the fence shall be no more than 4 in. measured on both sides of the fence around the play environment and of a minimal distance to prevent toys from rolling under.

7.4.4 Solid barriers that do not have openings, such as masonry or stone walls, shall not contain indentations or protrusions except for normal construction tolerances and tooled masonry joints when used as both barriers and fences. Such indentations shall not be deeper than 0.375 in. (9.5 mm).

7.5 Fence Types:

7.5.1 *Horizontal and Vertical Design*—Where the fence is composed of horizontal and vertical members, and if the distance between the tops of the horizontal members is less than 45 in. (1.143 mm), the horizontal members shall be located on the side opposite the play environment to prevent egress over it and the spacing between the vertical members shall not exceed 1¾ in. (44.4 mm). If the distance between the tops of the horizontal members is 45 in. (1.143 mm) or more, the spacing between the vertical members shall not exceed 4 in. (102 mm). Where there are decorative cutouts, the spacing within the cutouts shall not exceed 1¾ in. (44.4 mm).

7.5.2 *Chain Link Mesh*—Mesh opening for fences shall be a nominal 1¼ in. (3.2 mm) measured between the parallel sides of the mesh, and a maximum of 1¾ in. (44.4 mm) measured horizontally between the corners of the installed mesh, unless the fence is provided with privacy slats fastened at the top or the bottom, in which case no opening in the mesh shall exceed 1¾ in. (44.4 mm).

7.5.2.1 If the tolerance of +⅛ in. (3.175 mm) indicated in Specifications A392, A491, F668, F1183, and F1345 is rigidly applied to an ordered nominal mesh size of 1¼ in. (31.75 mm) measured between the parallel sides of the mesh, the result could be a dimension exceeding the specified maximum of 1¾ in. (44.4 mm) measured horizontally between the corners of the installed mesh. The degree of tension applied to the fabric during installation could also affect this horizontal dimension. In all cases, the horizontal opening between the corners of the fabric mesh after tensioning shall not exceed 1¾ in. (44.4 mm). Privacy slats shall not violate the requirements of 7.4.2 regarding visibility.

7.5.3 Fence Framework:

7.5.3.1 Fence framework shall be structurally sound, of industrial/commercial grade, designed to withstand the local wind and ice load, possible climbing and abuse. Chain link framework shall comply with Specification F1043, Table 2.

7.5.4 Lattice:

7.5.4.1 Where the fence is composed of diagonal members, such as in a lattice fence, any opening created by the diagonal members shall be a maximum of 1¾ in. (44.4 mm) measured in its largest direction.

7.5.4.2 Diagonal bracing members extending from one corner to the opposite corner creating a ladder effect on all styles of fences and gates are not permitted where spacing of vertical members in any area between posts exceeds 1¾ in. (44.4 mm).

7.6 Access Gates:

7.6.1 Double leaf access gates for maintenance service or emergency shall comply with the requirements of 7.1.2 and shall be equipped with a locking key-operated locking device that is always locked but where the key location is noted.

7.6.2 Single leaf pedestrian access gates shall open outward away from the play environment, shall be self-closing, and shall have a self-latching device. The hand activated release

mechanism of the self-latching device shall be not less than 48 in. (1219 mm) above grade. The latch/locking device of the self-closing latching device must comply with the protrusion test as outlined in 7.10 or be placed at a height of no less than 54 in. (1372 mm) above grade. Protruding fork, yoke and fulcrum lever type latches of the self-latching device shall be installed at a height of no less than 54 in. (1372 mm) above grade.

7.6.2.1 To reduce the chance of creating a finger crush/shear point for square frame gates and square gate posts, the opening between the hinge side of the square frame single leaf pedestrian gate and the square gatepost shall not close to a dimension less than ½ in. (15.9 mm). A safety covering guard shall be installed over openings less than ½ in. (15.9 mm).

7.7 Buildings:

7.7.1 *Buildings Structures*—The fence shall completely surround the play environment except where a building or multi-family dwelling or portion thereof is utilized as part of the play environment enclosure. If the exterior wall or walls of that portion of the building contains doors, or other openings, it shall comply with the following provisions.

7.7.2 *Doors*—Doors in the wall of a building or dwelling that allow direct access through the wall to the play environment shall be provided with the following:

7.7.2.1 A self-latching device on a self-closing door at a minimum height of 4 ft (1.22 m), and

7.7.2.2 A latch at any convenient height that uses a key, electronic opener, or integral combination lock, so long as it does not negate the function of the door.

7.8 *Wall*—A wall may be the continuous barrier and the fence if the play environment structure is on grade and the wall is at least 4 ft (1.22 m) in height. Other types of barriers and fences can surround the play environment at ground level. Where the barrier is mounted on another structure, the opening between the top surface of the frame and the bottom of the fence shall be no greater than 2 in. (51 mm).

7.8.1 The wall, when provided, and the top rail of a fence when mounted on the top of the barrier, which is in conformance with other sections, shall be a minimum of 4 ft (1.22 m) above the play area surface.

7.9 Picket or Ornamental Fence:

7.9.1 A picket or ornamental type fence, when provided, shall comply with the requirements of prior appropriate sections.

7.10 Protrusions:

7.10.1 There shall be no parts of the fence or gate that is a protrusion hazard located less than 54 in. (1372 mm) above grade. Three projection test gauges (shown in Fig. A1.1) are required to determine whether projections are protrusions. Their use is described in this section.

7.10.2 *Accessible Projections*—A projection is not accessible and is not a protrusion when it is recessed or located in such a manner that will not allow any of the projection test gauges to be placed over it.

7.10.3 *Determining Whether a Projection is a Protrusion*—Any of the conditions described in this section constitute a protrusion hazard. Successively place each of three gauges (see Fig. A1.1) over each accessible projection in all orientations (see Fig. A1.2). Determine whether the projection extends beyond the face of any gauge. The projection fails the test and is a protrusion if it extends beyond the face of any of the three gauges.

8. Vulnerable Locations

8.1 Fences shall be located so as to prohibit the use of permanent structures, equipment, or similar objects to aid in climbing the fence or climbing the adjacent structure.

8.2 *Clear Zone*—There shall be a clear zone of at least 72 in. (1.829 m) between the fence and any structures to prohibit climbing the fence or the adjacent building.

8.3 *Vulnerable Play Zone*—Three levels of concern for the placement of fencing are based upon the levels of exposure depending upon the distance the play area is from the hazards. The hazards are railroad tracks, bodies of water, streets, highways, roads, parking lots, electrical and other utility fixtures, and other similar life-threatening or debilitating features. The distance that any of these hazards are from the play equipment or its use zones will determine whether or not a fence is required and which areas are to be addressed before others. Therefore, the levels of hazard concern can be defined by clarifying the distance. Level I (top priority) is where the hazard is less than 30 ft from play equipment or its use zone. Level II is where the hazard is 30 ft up to 100 ft from play equipment or its use zone, and Level III is where the hazard is over 100 ft up to 200 ft from play equipment or its use zone. Any hazard more than 200 ft away is not necessarily within a vulnerable play zone requiring a fence unless the owner/operator or its representative deems it as being required.

9. Maintenance and Inspection

9.1 It is the responsibility of the property owner, occupant, or tenant to maintain the integrity of the barrier, or fence, or both and to regularly inspect the gates, doors, and so forth, for proper closing and locking operation.

9.2 The area outside and inside the fence should be free of furniture or other objects that could be moved by a child and used to climb the fence into or out of the play zone.

10. Keywords

10.1 barriers; fence; fences

ANNEX**(Mandatory Information)****A1. RATIONALE**

A1.1 The presence of a fence, or barrier, or both around a play zone, play space, or play apparatus environment is in addition to adult or parent supervision.

A1.2 For these reasons, this specification is intended to limit or delay a child from gaining unsupervised access to or from the play environment. The recommendations consider anthropometric and developmental characteristics of children under twelve. A fence should not have footholds and handholds, and spaces should be limited in size and location to preclude a child from climbing over or passing through the fence. Latches on gates should be shielded or out of reach at least 4 ft high.

A1.3 This specification's provisions for a minimum 48 in. (1.22 m) fence height above grade is based on the ability of children to climb fences and on appropriate anthropometric and developmental characteristics of children.

A1.4 This specification is based on the head breadth and chest depth of a 13 to 18-month-old and is intended to preclude passing through an opening of a type not otherwise specified in the remaining subsections of Section 6.

A1.5 This specification is intended to reduce the potential for gaining a foothold. If horizontal members are less than 45 in. (1.143 m) apart, a child may gain both a handhold and a foothold. The 1 $\frac{3}{4}$ in. (44.4 mm) space requirement is based on the foot width of a 13 to 18-month-old and is intended to preclude his gaining a foothold. The 45 in. (1.143 m) horizontal member spacing is intended to prevent young children from using the horizontal members as a ladder. The

1 $\frac{3}{4}$ in. (44.4 mm) maximum horizontal opening in the chain link mesh is based on the foot width for young children and is intended to reduce the potential for gaining a foothold.

A1.6 This specification is intended to reduce entry or exits. The 4 in. (102 mm) space requirement is intended to preclude young children from passing through the fence.

A1.7 This specification is intended to reduce the potential for a vehicle to enter the fenced play zone; to keep children inside a predetermined area in an effort to enhance supervision; to also keep children from running out of the area into water and other hazards; to minimize the likelihood of facial lacerations on low gate and fence hardware; to minimize the likelihood of abduction; and to restrict access to railroads, highways, roads, and other such hazards.

A1.8 This specification provides an emergency access gate that should open outward and be supervised. If a child pushes the gate unsupervised, they should not gain immediate access to or from the play zone. Emergency access gates are required to have a self-closing and latching device. Any such emergency gate should be secured with a suitable device. The 48 in. (1.22 m) height of the release mechanism is intended to keep children under five years old from reaching it based on the reaching height of a 4.5-year-old child.

A1.9 This specification is to have fences, or barriers, or both that are manufactured to protect against electrical shock hazards from ungrounded or improperly grounded systems.

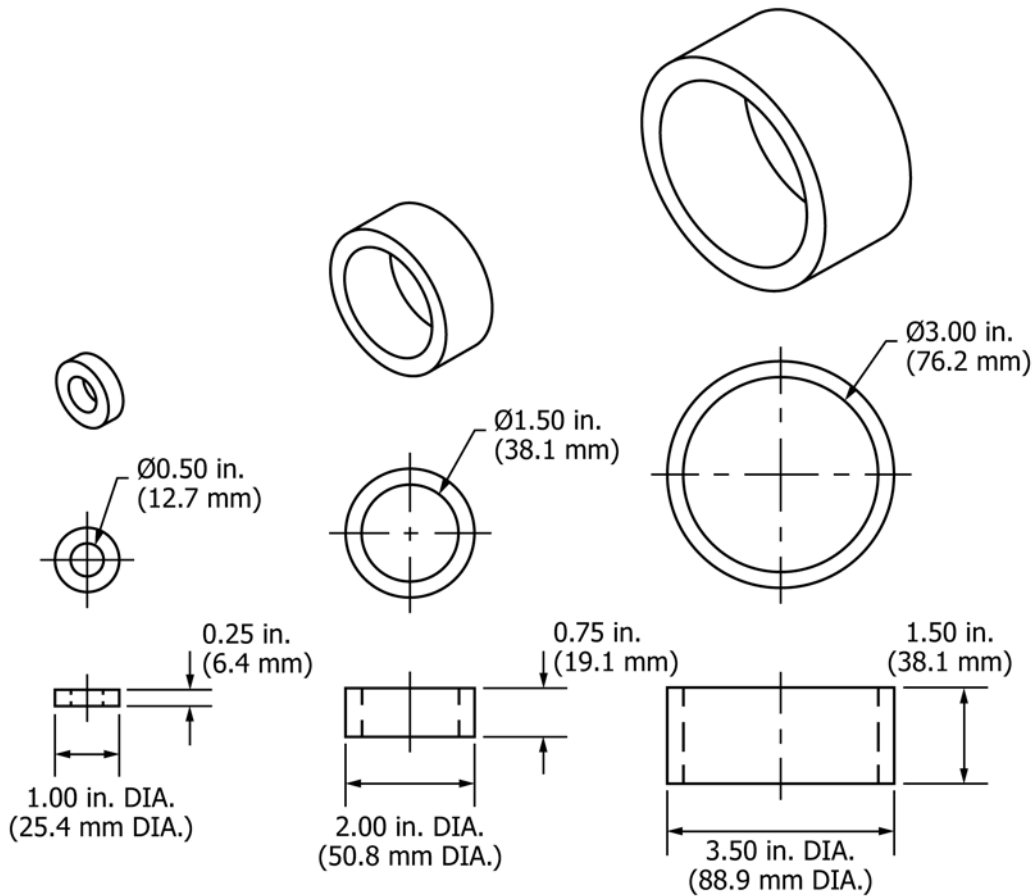
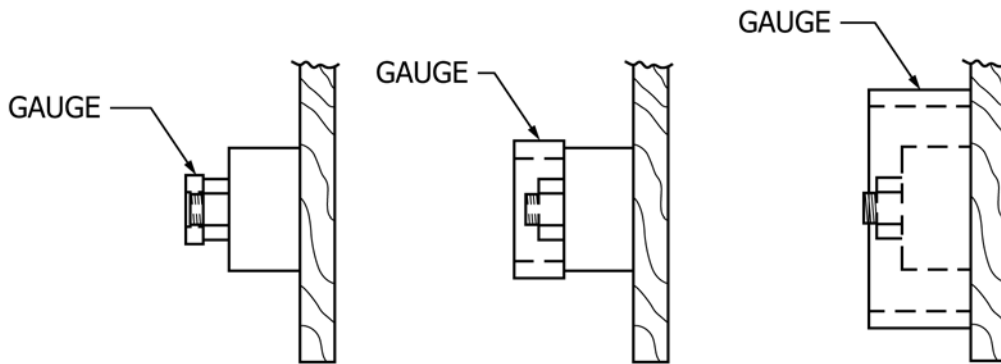


FIG. A1.1 Protrusion Test Gauges



NOTE—For compound protrusions, successively place gauges over increasing diameters to determine compliance.

FIG. A1.2 Compound Protrusion Test

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/