



Standard Guide for Specification, Purchase, Installation and Maintenance of Poured-In-Place Playground Surfacing¹

This standard is issued under the fixed designation F2479; 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 covers information with regard to the design, manufacture, installation, and maintenance of poured-in-place playground surfaces.

NOTE 1—This document is a guide and not intended to be used as a specification; it should be used for educational purposes.

1.2 This guide outlines the issues of compliance with existing standards, durability, and functional longevity.

1.3 This guide reviews issues such as edge treatment, abutting surfaces, and combinations with other surfaces designed for circulation or protective surfaces.

1.4 This guide presents maintenance considerations and general procedures that should be followed by the owner/operator.

1.5 This guide outlines aging considerations such as loss of impact absorption, cracking, shrinkage, heaving, and how to prevent, accommodate, or rectify those issues.

1.6 This guide presents warranty considerations.

1.7 This guide does not imply that an injury cannot be incurred when the surface system is compliant with the standards referred to in this guide.

1.8 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.

1.9 *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

¹ This guide is under the jurisdiction of ASTM Committee F08 on Sports Equipment and Facilities and is the direct responsibility of Subcommittee F08.63 on Playground Surfacing Systems.

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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.

F1292 Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment
F1951 Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment

2.2 CSA Standard:³

CSA Z614 Children's Playspaces and Equipment

3. Terminology

3.1 Definitions:

3.1.1 *aliphatic prepolymer*—prepolymer which does not contain any 1,3,5-cyclohexatrien group.

3.1.1.1 *Discussion*—Generally highly color stable when exposed to UV radiation, no yellowing.

3.1.2 *ambient grinding*—process that takes raw rubber products and processes it to rubber crumb, chips, buffings, and so forth that is at the temperature generated by the grinding equipment or in the location of production.

3.1.3 *aromatic prepolymer*—hydrocarbons that are made from only hydrogen and carbon and contain a prepolymer which contains one or more 1,3,5-cyclohexatriene group.

3.1.3.1 *Discussion*—Aromatic prepolymer are generally susceptible to change when exposed to UV and moisture. These changes can be seen as a yellowish shading or “ambering” of the top surface, especially when encapsulating rubber crumb that is grey, light blue, blue, eggshell, teal, and so forth.

3.1.4 *asphalt, adjacent*—bituminous bound material that is used as a curb or walkway and comes into contact with the poured-in-place surface.

3.1.4.1 *Discussion*—The materials and compaction shall conform to local engineering practices and have a mechanical compaction of no less than 98 % standard proctor density. The edge of the asphalt at the junction with the poured-in-place surface shall be vertical to 30° from horizontal. Consideration should be given to the use of an appropriate primer as recommended by the manufacturer to ensure adhesion of the poured-in-place surface to the asphalt.

3.1.5 *asphalt, base*—hard, bituminous bound surface that is under the poured-in-place surface.

³ Available from Canadian Standards Association (CSA), 5060 Spectrum Way, Mississauga, ON L4W 5N6, Canada, <http://www.csa.ca>.

3.1.5.1 *Discussion*—New asphalt should cure at least 14 days, have no residual surface oils, and be pressure washed or have at least two thorough rainfalls prior to receiving poured-in-place surface. When the surface is flooded with as much as 0.2 in. (5.1 mm) of water, there should be no evidence (rainbow effect) of oils on the surface of the water. A properly prepared asphalt base will be able to effectively remove any water which penetrates the poured-in-place surface. This may be accomplished by sloping the asphalt, installing drainage, or using porous asphalt.

3.1.6 *concrete, base*—concrete surface that is under the poured-in-place surface.

3.1.6.1 *Discussion*—The concrete base should be 4 in. (100 mm) minimum thickness. All new concrete slabs should cure for a minimum of seven days prior to receiving poured-in-place surface. Concrete base should have a medium broom finish. A properly prepared concrete base will be able to effectively remove any water which penetrates the poured-in-place surface. This may be accomplished by sloping the concrete, installing drainage, or using a porous concrete.

3.1.7 *concrete, adjacent*—concrete material that is used as a curb or walkway and comes into contact with the poured-in-place surface

3.1.7.1 *Discussion*—The materials and compaction shall conform to local engineering practices and have a moisture content less than 5 % at the time the poured-in-place surface is installed. The edge of the concrete at the junction with the poured-in-place surface shall be vertical. Consideration should be given to the use of an appropriate primer as recommended by the manufacturer to ensure adhesion of the poured-in-place surface to the concrete. Other strategies to avoid sinking of the final poured-in-place surface would be to provide a “key” or “step” in the vertical face of the concrete to support the poured-in-place surface.

3.1.8 *cryogenic grinding*—process that takes a raw rubber product and processes it to rubber crumb, chips, and so forth, a process that freezes the raw product and the frozen product is ground to the specification.

3.1.9 *gravel, base*—mixture of crushed stone, sand, or both that is compacted to not less than 95 % standard proctor density.

3.1.9.1 *Discussion*—A geotextile may be required between the granular base and poured-in-place surface to ensure that the particles of the granular base do not contaminate the poured-in-place surface. If fine particles from the base migrate into the poured-in-place system the void content of the system is reduced and the ability to attenuate force is reduced.

3.1.10 *drainage, sub-surface*—provision of a method of removing water below the poured-in-place surface.

3.1.10.1 *Discussion*—This can be achieved by sloping the sub-base material where it has a high clay content, using drainage channels or pipes, installing a granular drainage layer for percolation.

3.1.11 *drainage, surface*—sloping of the surface to allow water to travel across the surface to a drain.

3.1.11.1 *Discussion*—The porosity of the poured-in-place surface allows water to pass through more quickly than across it unless it is fully saturated.

3.1.12 *EPDM rubber product*—product comprised of organic and inorganic materials with a minimum of 20 % and a maximum of 26 % of ethylene propylene-diene-saturated polymethylene main chain along with other organic and inorganic components. The rubber can be either peroxide or sulphur cured.

3.1.13 *functional longevity*—ability of the poured in place surface to continue to comply with relevant ASTM standards and not require replacement.

3.1.13.1 *Discussion*—There are circumstances where the poured-in-place surface is physically in place however because of failures with regard to the stated performance criteria, the surface needs to be replaced. The functional longevity can be stated in years or by comparison to the functional life of the play structure as stated in writing by the play structure manufacturer.

3.1.14 *gravel, drainage layer*—open course of granular material that is installed as a layer or in channels to promote removal of water from a location.

3.1.14.1 *Discussion*—The layer should have a slope that promotes the removal of water.

3.1.15 *humidity/moisture effects*—changes in the poured-in-place system caused by fluctuations in absolute humidity or exposure to moisture during the storage of materials, installation, and cure.

3.1.15.1 *Discussion*—Polyurethane binders are reactive to moisture in varying degrees, depending upon formulation. All one-component polyurethane binders will require some degree of moisture to affect a cure of the product. Dramatic changes in moisture or absolute humidity can cause variable finishes in the surface if they are not accounted for. During installation, some poured-in-place surfaces require dry conditions, while others can be installed during a light rain and others can have water applied directly to the surface. Exposure to water may cause the binder to foam and which may reduce the effectiveness of the bond. Moisture in the rubber that is mixed with the binder may also have an effect on the outcome of the project if not accounted for. One strategy to eliminate this problem is to have the rubber stored in a dry place and if this is not possible, the rubber should be covered with tarps or other methods employed to prevent moisture from entering the materials.

3.1.16 *lacquers*—polyurethane-based product that contains solvents applied as a top coat in a spray or roller application.

3.1.16.1 *Discussion*—This product is used to provide color through the addition of a pigment, protection, or both from exposure to ultraviolet light.

3.1.17 *latex binders*—polymer binder that is water-based that has thermoplastic properties.

3.1.17.1 *Discussion*—Generally, the flexibility performance is within a narrow range of temperature. Latex has also been associated with allergic reactions once it has cured. There is a concern for children with exposed skin coming into contact with this binder, as well persons with disabilities who have a propensity to allergic reactions to latex.

3.1.18 *polymer binders*—synthetic binders used in the manufacture of the poured-in-place surface that coat the individual rubber chips, crumb, or buffings.

3.1.18.1 *Discussion*—These binders are to provide flexibility to allow the rubber particles to move in relation to one another and have the strength to stop the bond from breaking at maximum elongation. These binders are man-made from petrochemicals and some of these demonstrate flexibility at a range of temperatures that children are expecting to use the playground and specifically to allow compliance with Specification F1292. Polymer binders with a glass transition temperature above -22°F (-30°C) and with high sensitivity to damage by submersion in water are to be avoided.

3.1.19 *polyurethane*—polymer binder that demonstrates flexibility and strength over a wide range of temperatures.

3.1.19.1 *Discussion*—Polyurethane is manufactured in both one-component (moisture cured) and two-component (mixing part A and part B in a specified ratio). Binders used in poured-in-place surfaces are almost always of the one-component type. Certain polyurethane binders can be damaged through exposure to ultraviolet light and immersion in water. UV-resistant polyurethane lacquers may be applied to the surface following installation of the poured-in-place surface. These lacquers are typically two-component. Once cured, polyurethane produces no known allergic reactions.

3.1.20 *recycled black EPDM rubber*—crumb manufactured through ambient or cryogenic grinding or crushing of post industrial scrap, containing a mixture of types of rubber including EPDM rubber product and varying in size. This rubber must have a minimum of 4 % actual EPDM content.

3.1.20.1 *Discussion*—The actual percentage of EPDM content will be significantly less than new EPDM rubber product due to the inclusion of other industrial scrap rubber that is sourced in the recycling process.

3.1.21 *recycled post consumer or industrial rubber*—rubber crumb that is the result of granulating in an ambient or cryogenic process from a variety of scrap rubber produced as a part of an industrial process or at the end of an industrial or consumer good made of rubber.

3.1.21.1 *Discussion*—This is manufactured into rubber crumb as the feedstock and is often of limited dimension. The variety of rubber can be very large in that this can include any waste rubber from a manufacturing process or post consumer use.

3.1.22 *recycled tire rubber*—rubber crumb, chips, or buffings made from post manufacturing of tires or post consumer tires.

3.1.22.1 *Discussion*—This rubber can vary in its content as a result of the type of tire (automobile, truck, off road, and so forth) that is ground.

3.1.23 *release agents*—materials that prevent the bonding of the polyurethane to other surfaces.

3.1.23.1 *Discussion*—These can be waxes, silicone, or petroleum jelly.

3.1.24 *rubber buffings*—strands of rubber that are product shavings of rubber feedstock, typically tires, ranging in size from 0.079 to 0.87 in. (2 to 20 mm) in length and 0.039 to 0.157 in. (1 to 4 mm) in width.

3.1.25 *rubber chips*—particles of rubber that have been produced by ambient or cryogenic grinding of rubber feedstock to a size of 0.197 to 0.59 in. (5 to 15 mm).

3.1.26 *rubber crumb*—particles of rubber that have been produced by ambient or cryogenic grinding of rubber feedstock to a size of between 0.02 and 0.197 in. (0.5 and 5 mm).

3.1.26.1 *Discussion*—Rubber crumb shall contain less than 2 % rubber dust, fine rubber passing a 0.85 mm screen, as this can consume binder and affect the performance and longevity of the surface. The supplier of the rubber crumb shall be able to supply a sieve curve analysis that stipulates the components and their percentages to the poured-in-place supplier.

3.1.27 *SBR rubber*—styrene butadiene rubber or a rubber compound consisting mainly of styrene butadiene rubber such as tire rubber.

3.1.27.1 *Discussion*—This rubber is generally a major component of the tire manufacturing processes.

3.1.28 *screed*—straight-edged device that is used to provide an even thickness of material.

3.1.28.1 *Discussion*—Screed is generally used to ensure the evenness and thickness of the lower layer of the poured-in-place system.

3.1.29 *solvents*—hydrocarbons and other chemical substances which are normally non-reactive to polyurethanes and can wash off or dilute polymer binders. Cured binders might be swollen by contact with certain solvents that will destroy the chemical structure of the binder.

3.1.29.1 *Discussion*—Solvents are used for the cleaning of tools, equipment and other areas. These materials should be used carefully in conjunction with the polymer binder as inappropriate use can detrimentally affect the performance and longevity of the surface. They are sometimes also used to slow the reaction time of the polyurethane binder or extend the wetting action of the polyurethane.

3.1.30 *storage*—method of holding the various components utilized in the poured-in-place surface.

3.1.30.1 *Discussion*—It is important that the materials be stored both prior to the installation and at the installation site in such a manner as to protect them from damage, especially moisture. The binders will have to be stored in a manner that is consistent with the recommendations of the manufacturer.

3.1.31 *sub-base*—material that is installed under the poured-in-place surface.

3.1.31.1 *Discussion*—This can be concrete, asphalt, or compacted crushed granular stone. The base can be of a single plane or can be shaped to accommodate changes in thickness required to accommodate varying thickness of the installed surface. Sub-base should exhibit positive drainage.

3.1.32 *temperature effects*—changes in the poured-in-place system caused by fluctuations in temperature during the installation process.

3.1.32.1 *Discussion*—During installation the ambient temperature should not be less than or greater than those suggested by the binder manufacturer. High or low temperatures at the time of installation can affect the viscosity of the polyurethane binder causing it to drain down into the surface prior to final cure resulting in a minimal amount of binder directly at the surface. Poured-in-place surfaces are generally stable over a wide range of temperatures after they have been installed. This can be confirmed through the examination of the laboratory test performed in Specification F1292.

3.1.33 *thermoplastic vulcanizate (TPV)*—a thermoplastic elastomeric polymer consisting of two or more polymer systems at least one of which is rubbery (that is, an elastomer) and crosslinked and at least one of which is thermoplastic, with each system having its own phase.

3.1.33.1 *Discussion*—The TPV polymer compositions may contain fillers, reinforcing agents, plasticizers, resins, antidegradants, colorants and other beneficial constituents. TPV materials are used in some poured-in-place systems as an alternative to EPDM rubber to provide long-term color for the surface.

3.1.34 *thinners*—another common name in the poured-in-place industry for solvents. See solvents (above) for the definition.

3.1.35 *trowel*—tool used in the spreading of the poured-in-place mixture.

3.1.35.1 *Discussion*—The trowel is traditionally the method of application of the top layer of the poured-in-place system.

3.1.36 *ultraviolet light effects*—effect of the sun on the poured-in-place surface during installation and once the surface is in use.

3.1.36.1 *Discussion*—Changes in direct sunlight during installation can result in variable finishes to the poured-in-place surface. Exposure to ultraviolet light over time can cause the poured-in-place surface to lose flexibility and impact absorbing properties, crack, or shrink. Exposure to ultraviolet light may also cause a change in the color of the surface.

4. Significance and Use

4.1 Every elevated play structure is required to have a protective surface installed and poured-in-place surfaces are one of the many choices. These surfaces are highly technical in structure, component selection, percentages of components and installation procedures. This guide is intended to assist the playground owner/operator, specification writer, designer, and so forth in determining the properties that can be considered with regard to the poured-in-place surface and set out considerations that the user of this guide should make to ensure a successful installation. This document is a guide and should not be used directly as a performance specification for poured-in-place surfacing.

5. Description

5.1 Poured-in-place is the combination of rubber crumb, chips, or rubber buffing, or all three, with a polymer binder in specific percentages determined by the manufacturer/installer that is mixed proximate to the playground and poured in one or more layers on a prepared base to provide a smooth and seamless surface.

5.2 Surfaces that are greater than 2000 ft² (186 m²) or have distinct changes in color could have a seam or seams. Where seams occur, it is important that the bonding between sections be durable.

5.3 The poured-in-place surface is generally installed in two layers, with the lower layer being a cushioning layer and the top being a wearing course.

5.4 Color may be provided through pigmentation of the polymer binder, use of colored rubber crumb (EPDM) or the

application of a lacquer. A black surface is considered to have no color as this is the black recycled rubber crumb with a non pigmented binder.

6. Standards Compliance

6.1 To comply with Specification **F1292**, the poured-in-place surfacing system shall be tested. Specification **F1292** consists of a laboratory procedure and the field test procedure. The laboratory procedure determines the critical height which is the next full foot below which either the g-max exceeded 200 or the HIC (Head Injury Criterion) exceeded 1000 at any of the three temperatures. The critical height of the surface must always exceed the fall height for the play structure as outlined in the relevant play structure standard.

6.2 The field testing in accordance with the field test procedure of Specification **F1292** of a surface determines the g-max and HIC values at the drop height stipulated by the owner/operator prior to purchase. As long as the playground is in use the g-max must not exceed 200 or the HIC must not exceed 1000 from the drop height stipulated by the owner/operator prior to purchase.

6.3 The surfacing supplier should provide the owner/operator a copy of the laboratory testing results for the test required in Specification **F1292**.

6.4 Consideration by the owner/operator to test the surfacing system in the field after installation and periodic testing thereafter will determine whether the surfacing system is in compliance with Specification **F1292**. The owner/operator is required to stipulate the drop height(s) for the test prior to purchase of the surface. The owner operator may stipulate a higher drop height for testing than the fall height stipulated in the applicable equipment standards.

6.5 Field testing in accordance with the procedures set forth in Specification **F1292** should take place following the total cure of the surface system to provide values that are reflective of the surface as intended. A strategy to ensure the testing of the surface takes place is to build the cost of the testing into the total budget price of the surface from the contractor. The test for Specification **F1292** may be performed by any person or entity using the procedures and instrumentation and have the qualifications required by Specification **F1292**. This could be the contractor or a third party and it might be prudent that the test be performed in the presence of the owner/operator or their representative.

6.6 Failure of the poured-in-place surface to meet the requirements of Specification **F1292** will require that the manufacturer/supplier replace the area(s) that have failed. Any areas that have been replaced will require further testing for compliance. During the time between the determination of a failure of the surface and bringing the surface into compliance, the owner/operator should take the play structure or part of the play structure associated with the failed surface out of service.

6.7 A surface may fail to meet the requirements of Specification **F1292** for a number of reasons, including contamination of the surface with particles which have penetrated the surface. These can include particles such as sand, dust, and so forth that will need mechanical action to remove, or snow and ice that will need weather change or mechanical or chemical intervention. Once a surface is determined to have failed, the owner/

operator shall take the play structure out of service until the surface is brought into compliance.

6.8 To meet the accessibility requirements of the Americans With Disabilities Act (ADA), poured-in-place surfacing systems can be tested in accordance with Specification **F1951**. This guide requires that Specification **F1292** be complied with before this determination can be made. A test report can be provided to the owner/operator confirming compliance. Failure could mean that the surface has lost its firmness or has become unstable with regard to the parameters of the test.

6.9 The owner/operator may request Material Safety Data Sheets (MSDS) on all materials being used on the installation site.

7. Issues Affecting Performance

7.1 A variety of factors can have a positive or detrimental effect on the performance of the poured-in-place surface.

7.2 Polymer binders effectively coat the rubber crumb and this film of binder allows the crumbs to move in relation to each other. It is the elasticity and stretch ability of the binder that allows the rubber particles to move in relation to one another. This consistent flexibility is important at the time of installation and during the life of the play surface.

7.3 The strength of the binder will affect the durability of the surface. The strength should be such as to prevent the bond between individual rubber components from breaking when the surface is stretched or stressed.

7.4 Binders can be detrimentally affected by outdoor conditions, ultraviolet light exposure, moisture and humidity, chemical solvents, and abrasive materials. The quality and raw material components of the binder can limit the detrimental effects of time and outdoor exposure, however the more longevity the binder imparts, the higher the cost of the binders and therefore the surface.

7.5 Contaminants such as excessive dust in the rubber and unaccounted for or inconsistent moisture in the bags of rubber can cause an uneven distribution of the binder, which could cause variations in the surface and premature failure.

8. Issues Related to Installation and Techniques

8.1 The installation crew is responsible for the mixing of chemicals and rubber to exacting percentages, the placing of the mixture in varying thicknesses and determining the density of the final surface. Any variation in the installation technique in any of these aspects can change the surface.

8.2 The installation personnel should be fully trained by the originator/supplier/manufacturer of the surface and be able to consistently install the mixture. The installation crew leader for the poured-in-place surfacing system's installation may have the training and experience to oversee the correct means of installing the surfacing system, following the instructions of the originator/supplier/manufacturer.

8.3 The manufacturer/supplier should have a training program in place in which crew members are able to learn the processes involved in the specific surface and the standards that relate to this work. There are training programs provided by various associations available to crew personnel. Prior to purchase, the purchaser may choose to request references of clients of prior installations of similar size and complexity. The

lists of projects should also cover the time frame of at least the warranty period and potentially the length of time that the manufacturer is suggesting the surface should remain in service.

9. Issues Related to Environment During Installation and Curing Period

9.1 There are two significant environmental considerations during the actual installation process, temperature and moisture. Environmental consideration during the actual installation process and the initial 48 to 72 h curing period include precipitation and significant fluctuations in humidity or temperature.

9.2 Air and ground temperature, or both, at the time of installation and during the cure period may have an important influence on the polymer binders and therefore the finished surface. The poured-in-place surface should be installed between the temperatures of 35 and 90°F (2 and 32°C) and there should not be a fluctuation greater than 15°F (8°C) during the installation or 25°F (14°C) during the curing time. Where the installation takes place outside this range, appropriate precautions should be taken as required by the specific characteristics of the binder used. The manufacturer of the binder would be one source of precautions and circumstances another would be the long-term experience of the supplier of the poured-in-place system.

9.3 Moisture (in the form of air humidity, manually applied mist or rain) has an important influence on the performance of the finished surface. Fluctuations in humidity, temperature, or both, that are not taken into consideration can cause the surface to shrink prematurely or crack or the granules may not be well bonded and flake off prematurely. Installations outside of the recommended parameters should require special chemical or installation intervention and should be noted on an installation log.

10. Accommodation of Loose Fill Surfacing Adjacent to a Poured-In-Place Surface

10.1 A poured-in-place surface is often utilized in to provide the accessible route within the playground. In some cases there will be a loose fill (sand, gravel, loose rubber, engineered wood fibre, etc) placed adjacent to the poured-in-place surface. The loose fill material level is to be maintained at the level of the poured-in-place surface; however dynamic activity of play will change the level of the loose fill and potentially present a problem of falling off the poured-in-place and into the loose fill. To prevent this falling, a transition should be provided that will take into consideration the movement of the loose fill.

10.2 The sub-base of the poured-in-place surface shall consist of asphalt, concrete or granular compacted to 95 % Standard Proctor Density. The depth of the sub-base shall be such as to allow for the appropriate depth of poured-in-place and loose fill material for all protective surfacing to meet the requirements of Specification **F1292** from the drop height stipulated by the owner/operator prior to purchase.

10.3 The running slope of the sub-base for the length shall not exceed 1:16 and the cross slope of the sub-base shall not exceed 1:48 for the width of the accessible route.

10.4 In the area of the transition from poured-in-place to loose fill material, the sub-base shall slope down at an angle determined by the owner/operator from the height required for the poured-in-place for a minimum length determined by the owner/operator taking into consideration the need for and frequency of maintenance of the loose fill material before turning down to the depth required by the loose fill material.

10.5 The cushion layer of the poured-in-place system shall be installed to a depth required for the poured-in-place system to comply with Specification F1292.

10.6 The cushion layer for the poured-in-place shall follow the slope of the sub-base on the angle and slope determined by the owner/operator at which point it can turn down to the depth required by the loose fill material (see Fig. 1).

10.7 The cap for the poured-in-place shall be installed to a minimum depth of $\frac{1}{2}$ in. to provide a wear surface and abrasion resistance in relation to the playground user and the loose fill material.

11. Accessibility Recommendations for Poured-In-Place surface systems utilized in Playgrounds

11.1 Summary of the requirements for a ground level accessible route within a playground as set out by the US Access Board.

NOTE 2—This section reflects the requirements of the US ADAAG for accessible routes on playgrounds in the United States. Other jurisdictions and countries may have different playground accessibility requirements.

11.2 Where rubber poured-in-place surfacing is used to meet accessibility provisions, these areas should have minimum widths, running, and cross slopes as well as minimal changes in vertical levels to facilitate travel.

11.3 The clear width of the accessible route should be a minimum of 60 in. (1524 mm) except for the following:

11.3.1 In play areas less than 1000 ft² (93 m²), it is acceptable to reduce the clear width of the accessible route to

44 in. (1115 mm) provided there is at least one 60-in. (1524-mm) diameter turning radius when the route exceeds 30 ft (9144 mm) in length.

11.3.2 In a play area of more than 1000 ft² (93 m²) of protective surfacing, it is acceptable to reduce the clear width to 36 in. (1115 mm) for a distance not greater than 60 in. (1524 mm) provided that there is a minimum 60- by 60-in. (1524- by 1524-mm) clear width area between reductions.

11.4 The width of the accessible route is physically measured, and any points of noncompliance should be noted for corrective action.

11.5 The running slope of the accessible route should not exceed 1:16 (6.25 %). The cross slope of the accessible route should not exceed 1:48 (2.08 %). The running and cross slope for the turning space and transfer space should not be greater than 1:48 (2.08 %).

11.6 The slopes of the surface are measured with a minimum 60-in. (1524-mm) straightedge and level to measure the degrees of any slope. Areas that do not comply with the guidelines in 6.5 should be recorded on a plan of the site and corrective action should be taken.

11.7 A vertical change in level could be the result of a change in level at the entrance to the playground, a deterioration of the surface through scuffing or vandalism, or an area with patterns of wear in highly traveled sections. As a result, there are two measurements that should be taken. There should be no direct changes of vertical level greater than $\frac{1}{2}$ in. (12.7 mm) in which the first $\frac{1}{4}$ in. (6 mm) is permitted to be vertical, and the upper $\frac{1}{4}$ in. (6 mm) may have a beveled edge with a slope no greater than 1:2. The distance under the 60-in. (1524-mm) straightedge when measured in any direction should not be greater than the $\frac{1}{2}$ in. (12.7 mm). Areas of noncompliance should be noted on a plan of the playground and corrective action should be taken.

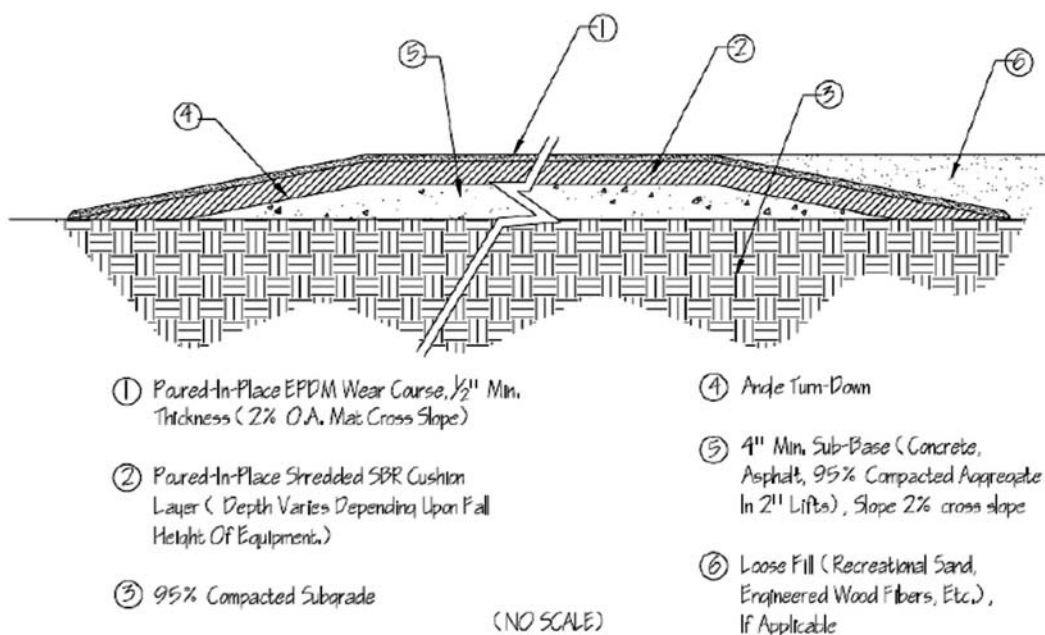


FIG. 1 Turn-Down Detail

11.8 The surfacing provider should be able to provide a certificate from a test agency for compliance to Specification **F1951**.

12. Maintenance

12.1 Poured-in-place surfacing is considered to be very low maintenance in that it will generally be kept clean with wind and rain, however every poured-in-place surface will require maintenance. The manufacturer/supplier/installer should be able to provide maintenance procedures specific to the surfacing system that has been installed.

12.2 The maintenance procedures and costs should be known and provided for prior to purchase to ensure the performance and longevity of the surface and playground. Budgeting for maintenance should take place prior to installation in order to facilitate the longevity of the system.

12.3 The ease of maintenance of the poured-in-place surfaces is a major positive feature of this type of surface. Generally the maintenance involved is the removal of contaminants from the surface. Removal of objects, including hazardous materials such as animal feces, needles, or condoms is much easier than with a loose fill surfaces since these cannot get inside the surface. When the objects/debris on the surface are larger than the pores of the poured-in-place product, the surface may be cleaned with a broom, blower, or street pressure hose. Other smaller objects/debris such as particles of sand, mud, pea gravel, and so forth will need to be removed to prevent loss of impact attenuation. These particles will require the use of a vacuum with sufficient strength to penetrate the depth of the surface. At no time should the surface be pressure washed to remove small particles such as sand or dirt as this will force the particles deeper into the Poured-in-place system and detrimentally affect the impact absorbing properties of the surface. This packing of the particles deeper in the system will also reduce the likelihood of removal with a readily available vacuum system.

12.4 Poured-in-place systems will eventually have the binder worn off of the exposed part of the granule due to the abrasion associated with foot traffic. This may affect the performance, durability, or color of the surface. The maintenance procedures for the poured-in-place system should include a guide as to the applicable issues and the option to apply a topcoat or rejuvenator to limit degradation. The owner/operator may want to know the materials that are used in the rejuvenation and if this would require a skilled professional to apply. The method of application, roller or spray, would also be information that would be of assistance in the purchase and maintenance decision. Where there is a rejuvenation process required (as may be the case when a pigmented polymer binder is utilized) as part of the poured-in-place surfacing system or a condition of warranty, the cost of this process should be known prior to the purchase of the system to allow for budgeting decisions to be made.

13. Repairs

13.1 Since the poured-in-place system is proprietary to the manufacturer/supplier, it may not be within the ability of the owner/operator to conduct an adequate repair.

13.2 Failure to repair the surface in a timely manner may cause the failed or damaged area to get larger and increase the cost of the repair. This may also detrimentally affect the use of the playground. The owner/operator should contact the surfacing manufacturer/supplier regarding any repair items as making alterations to the poured-in-place surface without written authorization may result in termination of the warranty agreement or cause injury.

13.3 It may be determined that the surface can be repaired through the use of a “repair kit” which should include instruction/training in its use. Any chemicals in a repair kit should be accompanied with appropriate labelling.

13.4 Alternatively the repair may be of such a nature that the surfacing supplier/installer will be required to perform the repair. These repairs should be performed as promptly as possible.

13.5 The owner/operator should take into account that the repair process may be delayed due to environmental factors which could limit the execution of the repair. It is the owner/operator’s responsibility to close the playground until the surface can be properly repaired, if the repair item causes a detrimental affect to the playground (for example, tripping hazard and so forth).

13.6 The owner/operator is responsible for securing the damaged area of the surface until the repair can be completed properly.

14. Warranty

14.1 Each poured-in-place surface should consider having a warranty that stipulates compliance with Specifications **F1292** and **F1951**. Any other conditions and stipulations that have been made in the purchase documents including those related to durability and functional longevity.

14.2 Field testing for compliance with Specification **F1292** should be a consideration in the warranty. A strategy to ensure that the testing of the surface takes place is to build the cost of the testing into the total budget price of the surface from the contractor. The test could be performed by the contractor using the procedures and instrumentation of Specification **F1292** or a third party and it might be prudent that the test be performed in the presence of the owner/operator or their representative.

14.3 Any limitations, exclusions or preconditions required should be clearly stated in the warranty.

14.4 The duration of the warranty should be clearly stated.

14.5 The remedies available to the owner/operator should be stated.

14.6 The method of making a claim under the warranty and the time frame for a response and conditions and time frame for repairs should be clearly stated.

14.7 The owner/operator should consider providing photos and tests reports, as available, to substantiate a warranty claim and assist the manufacturer/supplier in determining the cause and validity of the claim. This information will also be of assistance to the manufacturer/supplier in determining the extent of the repair required and the materials and skills that will have to be used to satisfy their obligation.

15. Documentation

15.1 The owner/operator should receive and maintain a number of documents from the supplier of the poured-in-place system. These could include:

15.1.1 Certificate of Compliance with Specification **F1292**—laboratory test;

15.1.2 Certificate of Compliance with Specification **F1292**—post installation field test;

15.1.3 Certificate of Compliance with Specification **F1292**—periodic field test;

15.1.4 Certificate of Liability Insurance;

15.1.5 References of projects;

15.1.6 Maintenance instructions for the poured-in-place surface system; and

15.1.7 Warranty for the poured-in-place surface system installed.

16. Keywords

16.1 accessibility; impact attenuation; playground; poured-in-place

RELATED MATERIAL

ASTM Test Method D2859 for Ignition Characteristics of Finished Textile Floor Covering Materials²

ASTM Consumer Safety Performance Specification F1487 for Playground Equipment for Public Use²

ASTM Specification for Synthetic Surfaced Running Tracks²

ASTM Guide for ASTM Standards on Playground Surfacing²

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