CANADIAN PLAYGROUND ADVISORY Inc.
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Poured-In-Place Protective Playground Surfacing

Poured-in-place protective surfacing is one of the most misunderstood types of surfaces with regard to compliance to ADA and various international Standards. Failure to meet the stipulated standards and other requirements of the ADA could cause the playground to be noncompliant. With poured-in-place surfacing being one of the highest capital cost surface currently available in playgrounds, a failure of this surface will have a significant financial impact on the owner/operator of the playground. Premature replacement (less than 10 years) of playground surfacing may affect the building of new playgrounds and purchasing of playground equipment.

The success of a poured-in-place surface will depend upon a number of elements; the rubber, the binder, the multiple layers and their makeup, the weather conditions during and just after the installation. The installation techniques will affect the performance as an impact absorbing surface as well as its long-term durability. An understanding of the interaction of these elements, the requirement for clear specifications, field testing and warranties are important to the owning of a poured-in-place surface with good functional longevity.

For this purpose a task group of the ASTM F08.63 sub-committee for playground surfaces has been working for a number of years to develop a Standard Guide for the Specification, Purchase, Installation and Maintenance of Poured-In-Place Playground Surfacing. This work has received tremendous industry support and will be of great assistance to the person interfacing with the poured-in-place surface supplier or manufacturer. The document lays out problems and concerns that must be addressed to ensure a successful installation. It is anticipated that this will be an educational document that will allow issues related to the poured-in-place surfaces related to other ASTM standards and requirements such as the ADA be discussed.

It is anticipated that the task group will take portions of the guide to a standard providing a number of performance tests that must be complied with to be considered a poured-in-place system.

Poured-In-Place – What is it?

Poured-In-Place surfaces are any surface where the upper layer of the surface consists of granulated or crumb rubber that is mixed with a polymer binder at the location of the playground and placed, smoothed and compressed into place. This surface system can be a single layer of a single density or multiple layers. In the case of the multiple layered systems the lower layers can consist of foam sheets, bonded shredded rubber or crumb.

What goes wrong?

At the time of installation there can be a number of factors that can lead to an immediate or long-term failure of the system and therefore a potential closing of the playground.

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Poured-in-place surfaces can be affected by any of the following at the time of installation;

- Temperature issues
    1. Installing in temperatures that are colder than recommended by the binder manufacture
    2. Changes in temperature during the installation
    3. Changes in temperature from the time of installation to the time of cure

- Humidity issues
    1. Extremely dry or humid conditions during the installation
    2. Changes in humidity during installation
    3. Changes in humidity between installation and the time of cure
    4. Rain at any time during installation to the time of full cure

- Binder issues
    1. The binder is not UV stable and will be yellow and/or hard over time
    2. There is too little binder used in the mixture with the rubber causing failure
    3. There is too much binder used in the mixture with the rubber making it hard

- Installation issues
    1. Failure to install the appropriate thickness of any of the layers
    2. Failure to make the surface to the appropriate slopes

Maintenance of Poured-In-Place Surfaces

Once the poured-in-place surface is installed it will need to be maintained.

Every playground surface, including poured-in-place surfaces will require maintenance. The minimum will be the removal of debris from the surface. In areas such as beaches, child cares with sand boxes or combination surfaces with sand and gravel, there will be the need to clean small particles out of the system with a vacuum. Leaving particulate mater inside the system will cause the surface to get hard and fail to ASTM F1292. For this reason a poured-in-place surface should never be pressure washed.

The poured-in-place supplier/manufacturer/installed must provide a maintenance procedure at the time of installation to allow the owner/operator to protect their purchase. Other issues of maintenance will be the need to apply a UV resistant lacquer on surfaces that have been installed with binders that are not UV stable. Failure to continually replace this coating as traffic wears it off could lead to a premature failure to ASTM F1292.

Repairs of Poured-In-Place surfaces

Most poured-in-place surfaces are generally durable, but still will require repairs. Repairs may be required due to shrinkage around the edges, cracking, vandalism of the surface,

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vandalism of a structure component that requires access through the surface, or replacement of the surface after a failure to ASTM F1292, F1951 or other requirements of the Accessibility Guidelines. The latter could be the collapse of the surface at the edge of the playground to the sidewalks or other access points to the playground. Generally when the surface is broken, children will be able to make a small hole into a major disaster and getting to the repair in a timely manner will be critical. In some cases this is an even greater problem when the surfacing supplier is not geographically located in the same area as the required repair. This may result is a long delay, requiring the closure of the playground or greater damage. During this time it may be prudent to treat the affected playground the same way damage to a component to the structure would be dealt with, by closing of that part of the playground. In any event the hole or crack will be an opening in a horizontal surface greater than ½" and a change in level greater then ¼" or even ½" with a bevel, more than likely not firm or stable and since there is material removed it likely does not comply with ASTM F1292.

Some poured-in-place system manufactures provide repair kits that can be used to keep small repairs small. It is important to understand that unless the repair is tested it can only be a stop gap measure and the original surface manufacture need to return to the site and make a repair that complies with all Standards and Guidelines.

Poured-In-Place and Accessibility

It is considered that poured-in-place surfaces are accessible. This is not necessarily true. We will investigate two installation circumstances. The first is the surfacing of the entire site and the second is the poured-in-place walkway representing the accessible route traveling through an otherwise loose fill protective surface.

For the playground that is entirely poured-in-place there are a number of issues that the specification and ongoing maintenance must consider for compliance to the Accessibility Guidelines. Other than failure to pass ASTM F1292, there is the issue of seams between colors and at the edge with the hard surfaces not meeting the < ½" gap in section 302.3. The compaction of the granular base, especially if it collapses at the junction between the edge and the surface will be a failure of sections 303.2 or 303.3.

The playground that utilizes the poured-in-place surface as a low maintenance accessible route will have all of the previous problems with an addition of consideration of the running and cross slope as required by section 403.3 and how the edge is to be treated. At both sides of the accessible route there will be a termination of the poured-in-place and the beginning of the loose fill. The problem is that the loose fill material will not be consistently at the edge or level with the top of the poured-in-place surface. As a result there must be a bevel that provides a transition from the one surface to the other and this would suggest a slope not greater than 1:12. The length of the transition may well be significant as the fluctuation in the level of the loose fill at the edge may well be more than 3-4 inches, which would require the bevel to extend as much as 3 feet before it can be terminated vertically. The width of the accessible route including bevel may well be 11-13 feet. This width can be reduced if the level of the loose is maintained at the edge. This may well require considerable maintenance on the part of the owner/operator. An

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assessment will have to be conducted as to the cost of maintenance and the installation of the wider poured-in-place walkway that requires less maintenance.

Warranties of Poured-In-Place systems

Unfortunately anecdotal and field data have shown that poured-in-place surfaces do not always remain complaint to ASTM F1292 for the anticipated life by the owner/operator. Data from Ontario, Canada and California has shown that some of these surfaces do not comply with ASTM F1292 at the time of installation, or in some cases in as little as 2 years after installation. The only way for an owner to protect their interest is to have a warranty for the surface.

The warranty should stipulate the following;

- The drop height for the field test such as the tops of barriers and guardrails
- The Gmax and HIC values acceptable on the initial test, with the Gmax not being greater than 200 and the HIC not being greater than 1000. Lower values do reflect a better surface.
- State any limitations, exclusions or preconditions that will limit a warranty claim
- The duration of the warranty
- The remedies available to the owner/operator
- How a warranty claim is made
- The frequency of field testing and the pass/fail allowed

Documentation to be kept

Where compliance or an injury is an issue, documentation will be required by regulators, insurers and lawyers. The longest requirement for maintenance of records will be in the case of an injury where the statue of limitations will set the time. In some jurisdictions, the statute of limitations for an injury to a child in a playground is 6 years beyond their 18th birthday. This will vary, however it is indicative of the need for comprehensive documentation.
Some of the documentation that should be kept is;

- Certificate of Compliance with ASTM F1292 – laboratory test
- Certificate of Compliance with ASTM F1292 – post installation field test
- Certificate of Compliance with ASTM F1292 – periodic field testing
- Certificate of Liability Insurance for the surface installer
- Certificate of Compliance to ASTM F1951 or rotational penetrometer test
- Layout of the playground surface
- Maintenance instructions for the installed poured-in-place surface
- Warranty for the poured-in-place surface.

An example of best practice

The Standard Guide for Poured-In-Place surfaces is anticipated to further compliance to the existing ASTM Standards and the encourage owner/operators to adopt “best

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practices" for their own facilities. The concept of a "best practice" recognizes that ASTM Standards set minimums and the user is to use the documents to their best use.

The City of Detroit, Recreation Department, Planning and Capital Development, headed by Vincent Anwunah, revamped their poured-in-place surface specification using the provisions for more stringent performance of the ASTM F1292. The outcome was that poured-in-place surfaces installed in Detroit will be tested in the field to ASTM F1292 from the tops of barriers and guardrails and the initial Gmax must not exceed 150 and the HIC shall not exceed 800. The contracts also require a 5 year written warranty, with annual field testing from the same drop heights, and the Gmax shall not exceed 200 and the HIC shall not exceed 1000. It was determined that these changes did not materially increase the cost of surfacing to the City when compared to the previous year's purchases.

Conclusion

Poured-in-place surfaces have merit as a viable surface in the playground provided the appropriate specifications, installation, testing, supervision, maintenance and warranties should result in a successful playground. The publishing of the ASTM Standard Guide for the Specification, Purchase, Installation and Maintenance of Poured-In-Place Playground Surfacing should raise the quality of these surfaces and the long-term function of the playground.