



## Splash Pads Need Safety Surfaces

a proposal by

**LIFE**  <sup>TM</sup>  
**FLOOR**

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Dedicated to our children.

# Everyone loves splash pads

Over the last 25 years, splash pads have appeared everywhere. From commercial water parks to public parks, these recreation areas have lowered water bills, prevented drownings, and provided exciting places for children to cool off in the summer heat.

Splash pads have many other names, including: splash deck, spray ground, aquatic play pad, rain deck, spray deck, spray pad, spray pool, and spray zone. To create a broad definition based on our experience, **splash pads are discrete areas that contain water-play features and may contain play structures, but do not permit water to accumulate to any real depth.** Splash pad users can walk, run, and jump through jets, streams, cascades, sprays, bucket dumps, and similar features that utilize recirculated water. Climbing apparatuses and play structures may also be included, but splash pads are always designed so that users interact with the water coming from the features in a zero-depth environment.

Splash pads are especially popular with families, and so cities are racing to build them in response. There are likely somewhere between 5,000 and 10,000 commercial or public splash pads in the U.S., a number that is growing by an estimated 5-10 percent per year. With this impressive rate of growth, the splash pad is transforming from a novelty into a standard public amenity.



## The Current Challenge

Unfortunately, in the rush to meet the growing demand, key safety elements and regulations have yet to be created for splash pads. While the Model Aquatic Health Code does address some issues related to splash pad surfacing—specifically regulation 4.12.8.2, “INTERACTIVE WATER PLAY VENUES shall have a slip-resistant and easily cleanable surface,”—the standards it chooses for slip-resistance are not designed for bare feet, and the regulation does not address impact attenuation at all. In many regards, the code is a placeholder waiting for a comprehensive standard to be created.

Without such a standard, splash pads are not as safe as they should be, and people are being injured. **According to the National Electronic Injury Surveillance System database, in 2014 alone, there were an estimated 20,000 injuries on pool decks, splash pads, or water parks resulting in an emergency room visit.** In addition, over the past four years, we have tracked articles publicizing prolonged closures of splash pads due to injuries. Relying solely on what is reported by local news sources, **we identified at least 20 splash pads that have been closed due to injuries.** This is likely a significant underestimate.

## Splash Pads Need Safety Surfaces

The common denominator in all these splash pad injuries and closures is the surfacing. At this time, the most common splash pad surface is broomed concrete, often treated with an abrasive coating. **These splash pad injuries and closures likely could have been prevented by using a different surface—namely, a safety surface that is both cushioned and slip-resistant without being abrasive.**

**In response to these concerns, Life Floor has proposed that a section be added to NSF/ANSI Standard 50, setting rigorous, performance-based safety requirements for aquatic recreation surfacing.** NSF Standards are some of the most respected standards in the recreational aquatic industry. NSF Standards, published by NSF International, can smooth the way for new and innovative technologies to come into the industry and improve safety. The NSF can further help to define testing and certification requirements that health departments can turn to and depend upon.

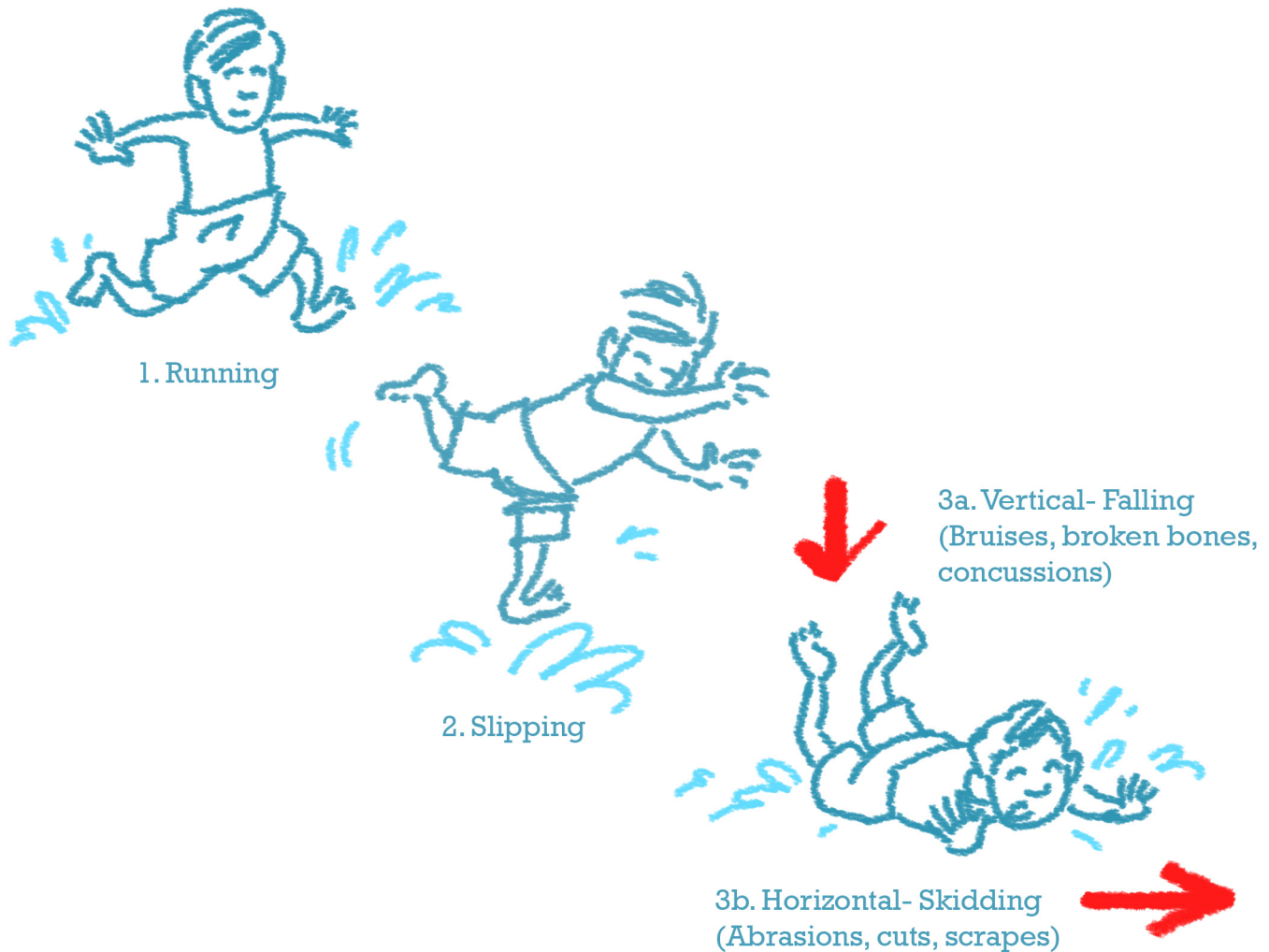
If successful, this new section could revolutionize the splash pad, securing a safer future for the communities and families that play on them.

# How are children actually injured on splash pads? How would a safety surface prevent or minimize these injuries?

Playgrounds and splash pads are used in remarkably similar ways: children climb, run, and jump as they interact with play features. The major difference between splash pads and dry playgrounds is the presence of water. In other words, **splash pads are simply playgrounds + water**. As a result, they share some similar safety concerns.

The first—and perhaps most obvious—cause of injury on both dry playgrounds and splash pads is falling. For this reason, as previously discussed, playgrounds universally require a cushioned surface to minimize injuries from falls, including falls from elevated play structures like monkey bars, ladders, and climbing walls. On splash pads, injuries typically occur when children slip and fall, so the fall is generally from standing height only. For this reason, splash pad surfaces can have a lower critical fall height than their dry counterparts, but cushioning is still needed. When children fall on splash pads, even if only from standing height, hard surfaces increase the risk of impact injuries like bruises, concussions, and broken bones, including skull fractures. **As a result, we believe a critical fall height of at least 1 foot should be required for any splash pad surface material.**

However, unlike playground injuries, splash pad falls often feature an additional, horizontal injury component. When children fall forward on a splash pad, it is not uncommon for them to skid before stopping, similar to a baseball player sliding into a base. This is due to the presence of water. Depending on the texture of the surface, skidding can be either unremarkable or incredibly dangerous. Children are especially vulnerable to abrasive injuries on splash pads, because they are usually wearing bathing suits, leaving much of their skin exposed. This increases the health risk both to the injured child, who is now bleeding from open wounds, and to the rest of the children using the pad, as they may be exposed to the injured child's blood.



Given the likelihood of horizontal skidding injuries on a splash pad, it is not enough that splash pads simply be slip-resistant. **Instead, it is absolutely essential that a splash pad surface be slip-resistant without being abrasive.** Incredibly, it is now common to use hard surfaces on splash pads, such as concrete, and to increase traction by covering them with something abrasive, such as a grip sealant or brushed texture. While such abrasive surfaces are intended to reduce falls by increasing traction, they may do more harm than good, since they increase injuries when falls inevitably occur.

As we have shown, a hard surface with an abrasive coating will actually maximize injuries in both dimensions, as the child will slip and fall onto the hard surface and then skid across the cutting texture. This is why splash pad injuries could be mitigated or prevented by using a different surface—namely, a surface that is both cushioned and slip-resistant without being abrasive.

# Pools already use concrete floors. Aren't splash pads just low-depth pools?

**They are not.** From the beginning, splash pads have often been built adjacent to, or even on top of, public pools and wading pools, and so they have traditionally maintained the hard concrete “floors” of these pools. However, the practice of treating splash pads as a literal extension of the pool category is both inaccurate and dangerous. Even if splash pads began in the pool and fountain space, they have developed beyond those categories and now require a different set of safety regulations.

The first movements toward public splash pads likely began when municipalities started adding Rain Drop’s “mushrooms” to pre-existing wading pools. Then, in the 1990’s, Vortex, Water Play, and Water Odyssey (The Fountain People) were formed. Simultaneously, with drowning being the leading cause of accidental death for children ages one to four according to the CDC, wading pools became much less attractive from a safety perspective. Requiring significant volumes of water, and suffering from a lack of interest, wading pools were increasingly phased out as the public became more interested in fountains.

Eventually, fountains transformed into themed play features and steps and platforms were introduced. Significantly, both wading pools and fountains typically had concrete or other hard floors. Since water volume could break a fall in a wading pool, and fountains weren’t initially designed for play, builders continued to use concrete. Thus, as wading pools and fountains gave way to splash pads, the depth of the water continued to decrease while the features were enhanced. Through it all, the concrete floor remained.

Standard swimming pools are an especially poor analogy to splash pads. Pools are basically containers designed to hold a volume of water that is used for swimming and immersion. For this reason, the main risk for pools is drowning. Because the primary risk for pools is drowning, concrete is an acceptable (if not ideal) surface for the bottom of the container. It is difficult to run on the floor of a pool, and if you slip and fall while immersed in a pool, the water generally stops you from receiving serious impact injuries.

**If the first splash pads were designed today, independent of the custom of concrete pool floors, we believe concrete—and other similarly hard materials—would never have been considered for surfacing.** Concrete may be an invaluable construction material, but as a play surface it is essentially a legacy technology, a hold-over material from public pools that increasingly demonstrates its obsolescence, inadequacy, and sheer menace to public health when used on splash pads.

Despite the shared presence of water, pools and splash pads are two fundamentally different kinds of venues, with different uses, designs, and safety concerns. **In short, while some pool floors may not need safety surfacing, all splash pads absolutely do.**



## What can be done to require safer surfacing?

**We need a standard for Aquatic Recreation Surfacing in NSF 50.**

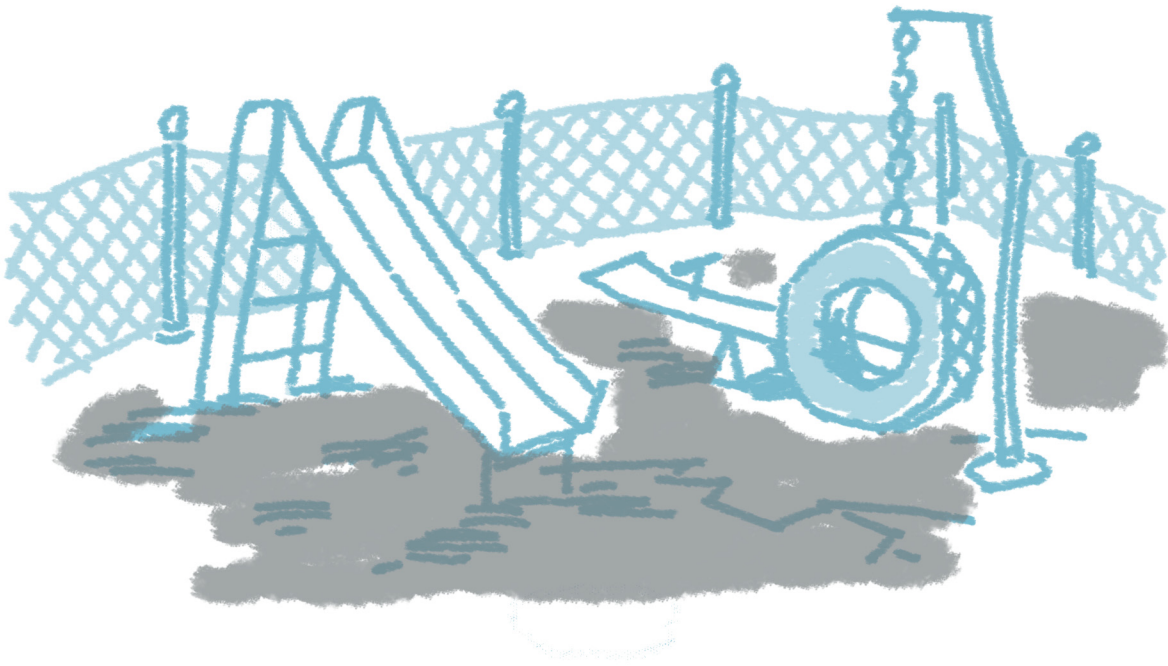
There is not currently a section in NSF 50 for splash pads surfaces, or indeed for any active aquatics area surfaces, including pool decks and water parks. As a result, we are proposing that a new section be added to NSF 50 that addresses the above concerns.

**The new section should stipulate that any aquatic recreation surface must absorb impact from a vertical fall while also preventing injury during a horizontal skid, and must provide a dynamic coefficient of friction of  $>40$  without being so abrasive as to cut skin.** The section should also ensure that the surface is easily cleaned by requiring imperviousness (to avoid microorganism growth within or underneath the floor) and durability (to avoid dangerous breakdown of the material, the surface should also possess chemical resistance and UV stability).

# Is such sweeping change even possible in public recreation?

**Yes. In fact, it's already happened for conventional playgrounds.**

Over the past quarter-century, the splash pad industry has blossomed while the playground industry has experienced both consolidation and significant safety improvement. There are somewhere between 70,000-100,000 public playgrounds in the U.S., and hundreds of thousands more private playgrounds. As the industry grew, playground manufacturers formed a trade association (IPEMA) and created standards for safety surfacing. The need for better safety surfacing became apparent when the CDC, through the NEISS database, began tracking playground injuries during the late-1970s and early-1980s. When the data revealed that nearly 200,000 children per year experienced playground injuries that necessitated emergency room visits, the playground industry responded with dramatically improved safety regulations.



Playgrounds 50 years ago

As one example of these new regulations, in 1991, IPEMA created ASTM standard F1292, which measures “impact attenuation.” Impact attenuation estimates the height from which someone could fall onto a surface and still avoid a significant impact injury (e.g., concussion, broken bones). During the 1990s, while the splash pad industry was still in its infancy, this standard was widely adopted for public and commercial playgrounds.

As a result, playgrounds that had once been surfaced with gravel, concrete, or asphalt were resurfaced with materials with greater cushioning, such as poured-in-place rubber, rubber tiles, engineered wood fiber, rubber mulch, or sand. Because these new playground surfaces have greater impact attenuation, now when children trip—or fall from elevated play structures—they hit a cushioned surface and have a much lower chance of being seriously injured. Meanwhile, lacking a similar safety standard, splash pads continue to be built with hard, unforgiving surfaces like broomed concrete.

**The safety revolution that transformed dry playgrounds is long overdue for splash pads.** We believe that creating similar standards for splash pads will reduce injuries and provide a significant benefit to public health, thereby creating a safer future for aquatic recreation, for our families, and for our communities.



Playgrounds today

# Endnotes

1. Splash pad company websites that were investigated to come up with that estimate: Aquatic Recreation Company [arc4waterplay.com](http://arc4waterplay.com/); Empex Water Toys <http://www.watertoys.com/>; My Splash Pad <http://mysplashpad.net/>; Nibro <http://nirbo.com/>; Rain Drop <http://rain-drop.com/>; Rain Deck <http://www.raindeck.com/>; Water Odyssey <http://waterodyssey.com/>; Water Play <http://www.waterplay.com/>; Water Splash <http://www.watersplashnet.com/>; White Water [www.whitewaterwest.com](http://www.whitewaterwest.com/); Vortex International [www.vortex-intl.com/](http://www.vortex-intl.com/)
2. Estimated using codes 1284, 3221, 3251, 3262, 3293, 3294, 3295, 5043 and examining all injury notes looking for impact, slip-and-fall, or other injuries related to aquatics surfacing
3. While this is 10% of playground industries, recognize that outdoor aquatics facilities can be used  $\frac{1}{3}$  to  $\frac{1}{4}$  of the days per year that playgrounds can be used and there are 5-10x as many playgrounds as there are splash pads.
4. [https://www.google.com/maps/d/u/0/viewer?mid=1HwUJXcSWWDYe74XtYVDqI\\_Empjg](https://www.google.com/maps/d/u/0/viewer?mid=1HwUJXcSWWDYe74XtYVDqI_Empjg)
5. <http://www.tpl.org/2016-city-park-facts> assumed an average parks per 100,000 number across the country based on this city data, would not include private playgrounds at churches, daycares, and homes
6. <http://www.playgroundprofessionals.com/magazine/issues/2014/12/history-ipema112>
7. Although they absolutely must be slip-resistant. What defines slip-resistance has become increasingly up for debate and interpretation. For almost 40 years, slip-resistance for surfacing had been defined by ASTM C1028, or static coefficient of friction using a pull-meter. This standard was referenced by the ADA and most health/building codes around the country. However, in February 2014 the ASTM withdrew the standard without replacement, which left a significant hole in slip-resistance testing and regulation. In our experience, performance on C1028 was not very effective at determining slip-resistance in aquatic recreation applications, specifically because most aquatic recreation injuries occur during movement (dynamically) as opposed to while standing (statically). Utilizing the British Pendulum test method, we have seen that a dynamic coefficient of friction of >40 more closely aligns with a reduction in the number of slip-and-fall accidents in aquatic environments.
8. <http://www.cdc.gov/homeandrecreationalsafety/water-safety/>
9. Unfortunately, in some situations, falls can lead to drowning, near-drowning, or even death, especially if you actually dive into shallow water and impact with the concrete pool-bottom.



We welcome and value all feedback as we develop and put forth a standard that makes aquatic recreation safer for everyone.

Please email [splashpadsafety@lifefloor.com](mailto:splashpadsafety@lifefloor.com) with anything that you believe will help us on that path, and keep an eye on [Lifefloor.com/blog](http://Lifefloor.com/blog) and [Lifefloor.com/splashpadsafety](http://Lifefloor.com/splashpadsafety) for updates over the coming months.



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