WHITEPAPER

# PLAYGROUND SURFACES:

## How Playground Grass by ForeverLawn Offers Superior Surfacing Solutions that Address the Problems of Thermal Safety

PLAYGROUND GRASS™

by ForeverLawn®

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# INTRODUCTION

Immense progress has been made in playground safety in the United States over the last decade. This is largely due to newer surfacing technologies, such as Playground Grass™ by ForeverLawn®. Playground Grass is a durable synthetic turf offering superlative cushioning and shock absorption, providing a much safer surface for playgrounds.

Additionally, the temperature of/on playgrounds has been identified as a key safety concern:

- Cases exist in which municipalities using Poured-In-Place (PIP) surfacing options have been sued as a result of children being severely burned on their play areas.
- Playground equipment also presents a burn hazard as it is typically hotter than the safety surfaces utilized and often in direct contact with a user's skin.
- Additional heat/burn hazards can present themselves if climate and environment are not adequately considered during the design process for a playground.

This white paper addresses the risks of thermal burns from high temperatures on playgrounds and how Playground Grass by ForeverLawn offers the best solutions to this issue, as evidenced by external, third-party testing. This paper also presents the four Playground Safety Pillars as defined by the National Program for Playground Safety (NPPS) and how they are integrated into the manufacture, sale, and installation of Playground Grass by ForeverLawn.

# KEEPING PLAYGROUNDS SAFE FROM HEAT-RELATED RISKS

## The Need for Awareness & Education of Heat Safety on America's Playgrounds

It's imperative that parents, school and park administrators, and playground designers and architects understand the increasing risks associated with high temperatures on playgrounds and their contributing factors:

### Playground Burn Documentation and Risks:

Of the reported playground injuries involving burns from 2001 to 2008, 52% involved equipment and 48% involved playground surfacing materials. While the numbers for reported burns were not excessive, there were over 1,200 recorded visits to emergency rooms from 2010 to 2015 due to burns from playground equipment, with many cases likely going unreported. Some recent examples include:

- **Beatrice, Nebraska, July 2021:** 2-year-old toddler suffers 2nd-degree burns on the bottom of his feet after stepping barefoot on hot asphalt.
- **Upper West Side, Manhattan, June 2021:** Family sues city for toddler's 2nd-degree burns, citing city liability for installing a heat-retaining rubber playground surface.
- **Raleigh, North Carolina, August 2019:** 14-month-old girl acquired 2nd-degree burns on her hands from her daycare's playground.

### Climate/Environmental Factors:

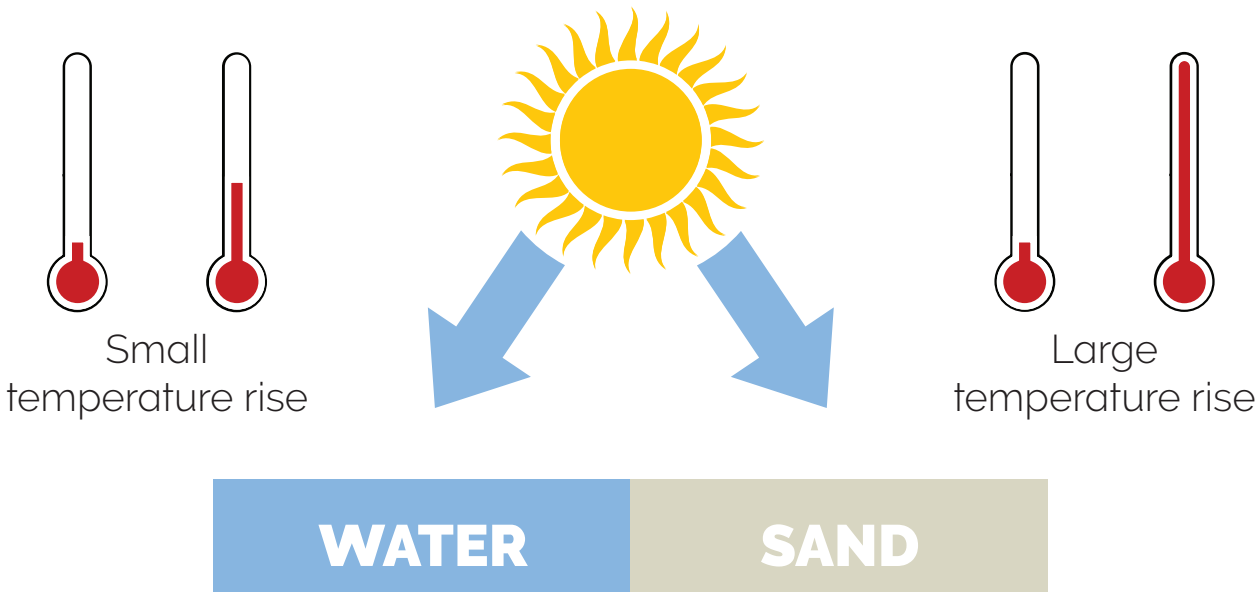
Thermal burn potential is greatly increased depending on geographic location. The vacillating climate and environmental factors in recent years have increased concern regarding these potential risks.

# BEYOND "HOT" OUTDOOR TEMPERATURES

## Specific Heat and What it Means for Playgrounds

Each playground surfacing material reacts to sun and heat in different ways. The Specific Heat Capacity of a substance or material is fundamental in understanding how it reacts to sunlight and heat:

- Specific heat is the heat required to raise a material's temperature by one unit of measurement. It is calculated utilizing the mass of the substance and the change in temperature.
- Essentially, a HIGHER specific heat capacity indicates that MORE heat is required to change the temperature of the substance. A higher coefficient indicates that a substance will remain cooler when exposed to heat and/or sunlight.
    - E.g., water has a specific heat capacity of 4.816 joule/gram-degree Celsius (4.816 J·g·°C). For comparison, sand has a specific heat capacity of .19 J·g·°C. Accordingly, it requires much less heat to change the temperature of sand than it does to change the temperature of water. The diagram below further explicates the significance of specific heat capacity.




Putting the same amount of heat into some materials gives a larger temperature rise than in other materials.

- Considering specific heat capacity is imperative when selecting playground equipment and safety surfaces. As previously stated, playground equipment often presents a higher burn risk due to raised temperatures and more direct skin-to-surface contact. The following test results are significant, as a burn can occur within five seconds of contact at 165 degrees:
    - A Texas study determined that a dark green plastic slide reached temperatures of 162 degrees in direct sunlight and 111 degrees in shade.
    - Rubber cushioning can reach 170 degrees in direct sunlight, even when outdoor temperatures measure only 80 degrees. (Source: ABC News).
    - The chart below shows the specific heat capacity of various playground surfacing options. Higher specific heat coefficients represent safer surfaces:

| Specific Heat Capacity by Surface Type | |
|---|---|
| ***Surface Type*** | ***Specific Heat*** |
| ***Loose-Fill Materials:*** | |
| Sand | .19 |
| Pea Gravel | .24 |
| Engineered Wood Fiber | .5 |
| Rubber Mulch | .3 |
| ***Unitary Surfaces*** | |
| Cement | .21 |
| Asphalt | .22 |
| Rubber Tiles and Poured-in-Place (PIP): Rubber | .3 |
| Synthetic Turf — Polyethylene | .45 - .52 |

As shown in the chart above, Playground Grass by ForeverLawn, which is made from polyethylene, offers the highest specific heat capacity for the best protection against thermal burns. The closest alternatives in terms of safety (based on specific heat capacity) are engineered wood fiber (EWF) and rubber surfaces, such as rubber mulch, tiles, or Poured-In-Place (PIP) options. However, Playground Grass by ForeverLawn outperforms both EWF and PIP solutions in a number of ways:

- Additional testing by ACE Laboratories, LLC comparing Playground Grass and PIP found the following:
    - Lagoon Blue ForeverLawn Playground Grass remained 36˚ cooler than the PIP sample after 8.0 hours of exposure.
    - The PIP sample temperature increased 122˚ after an hour of exposure, whereas the Lagoon Blue Playground Grass increased only 99˚.

| Heat Gain | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Time of Exposure (mins)* | *0* | *15* | *30* | *60* | *90* | *120* | *240* |
| Playground Grass™ | 70˚ | 149˚ | 165˚ | 169˚ | 174˚ | 174˚ | 176˚ |
| Poured-in-Place | 70˚ | 158˚ | 176˚ | 192˚ | 198˚ | 199˚ | 210˚ |
| *Difference* | ***0˚*** | ***9˚*** | ***11˚*** | ***23˚*** | ***24˚*** | ***25˚*** | ***34˚*** |

- ForeverLawn Playground Grass also cooled down significantly faster than the PIP sample, as shown in the following chart:

| Heat Loss | | | | | | |
|---|---|---|---|---|---|---|
| *Time of Exposure (mins)* | *0* | *5* | *10* | *15* | *30* | *60* |
| Playground Grass™ | 169˚ | 129˚ | 113˚ | 104˚ | 91˚ | 86˚ |
| Poured-in-Place | 208˚ | 169˚ | 153˚ | 145˚ | 127˚ | 120˚ |
| *Difference* | ***40˚*** | ***40˚*** | ***40˚*** | ***41˚*** | ***36˚*** | ***34˚*** |

# ADDITIONAL FOREVERLAWN PLAYGROUND GRASS™ SURFACE COOLING METHODOLOGIES

As shown in the previous charts, both PIP and Playground Grass by ForeverLawn can accrue significant heat in high temperatures. However, unlike PIP and other rubber surfaces, Playground Grass by ForeverLawn allows for and recommends that cooling infill be considered in high-heat climates.

- T˚Cool® is a recommended infill solution for hotter climates. It was specifically designed to reduce heat on turf materials using evaporative cooling. Laboratory tests of turf with T˚Cool vs. a control turf without T˚Cool show that:
  - Synthetic turf surfaces utilizing T˚Cool are 33-42 degrees cooler than the synthetic turf (control) without T˚Cool.
  - This lowers synthetic turf temperatures from over 160 degrees to below 120 degrees.
- ForeverLawn Playground Grass has a proprietary backing that provides superior drainage, allowing sprinkler systems to be used as an additional surface cooling method.
- ForeverLawn Playground Grass also comes in a variety of blade configurations and colors for optimum temperature control.

## Comparison of the Top 3 Safety Surface Options

### Loose-Fill (EWF & Rubber Mulch)

- Displaced easily – requires diligent maintenance (in random testing, 74% of all loose-fill playground surfacing materials had been displaced)
- Dirty & potentially toxic
- Not mold or mildew resistant
- Attracts insects, snakes, rodents, etc.
- Can hide sharp or undesirable objects
- Design-limiting

### Unitary Rubber Surfaces (Tile & PIP)

- High initial outlay
- Shrinks & fades over time
- Unnatural look & feel
- Can become stiff over time
- Weather dependent installation – must cure on site
- Surface can feel somewhat abrasive – causes cuts and scratches
- Not recommended for fall heights over nine feet

**PIP:**

- Can de-laminate in high heat if not maintained (resealed regularly)
- Warranty typically only five years

### Playground Grass By ForeverLawn

- High initial outlay
- Low lifetime costs
- 15-year warranty
- Minimal maintenance after installation
- Will not shrink or fade
- Antimicrobial and antistatic technology manufactured into the blade
- Exceptional drainage – extends outdoor play
- Exceeds ASTM fall height requirements up to 15'
- Does not require ongoing topcoats/sealer treatments

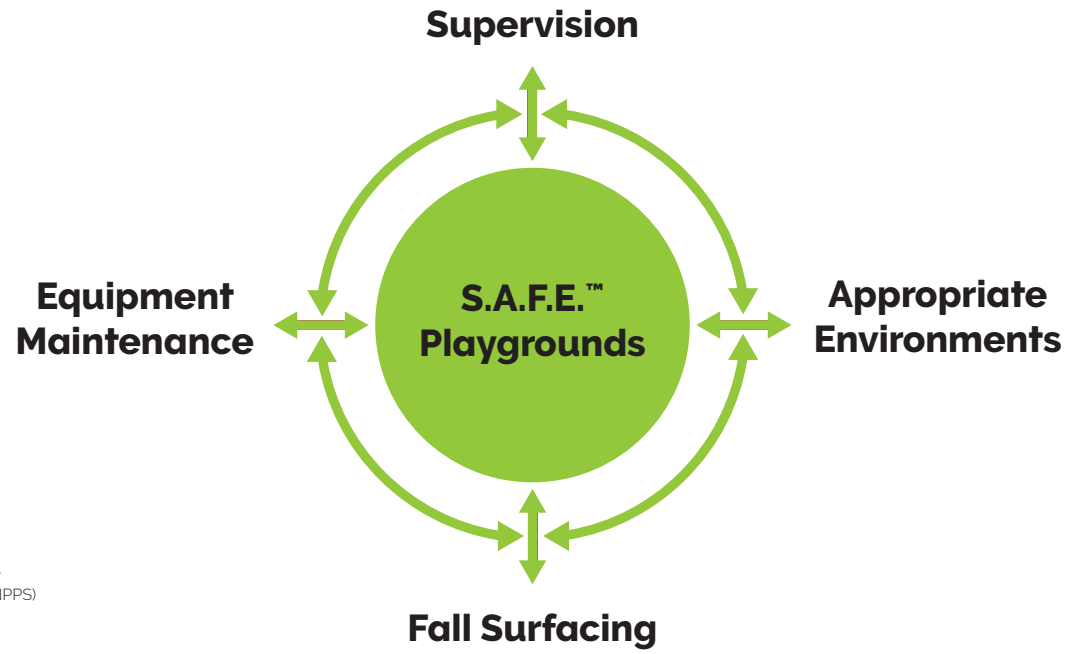
Sources: The National Study of Playground Equipment and Surfacing as well as multiple industry sources including websites and white papers of playground equipment manufacturers, playground surfacing manufacturers and suppliers.

# SOLUTION: PLAYGROUND GRASS AND THE PLAYGROUND INJURY PREVENTION FRAMEWORK

## Keeping Playgrounds Cooler And Safer

### The Playground Injury Prevention Framework:

The Playground Injury Prevention framework consists of four elements that lay the groundwork for safe play areas. ForeverLawn utilizes this framework to guard against thermal burns and their contributing factors, devoting specific attention to each individual element and how they function practically. These four pillars are foundational in developing suitable spaces for children and create focal points for accessibility and safety across all facets of playground planning and implementation.




Source:
National Program for Playground Safety (NPPS)

### Supervision:

Even with a myriad of safety protocols in place, adult supervision is necessary on any playground while children are at play. Playground Grass by ForeverLawn champions the following supervision guidelines for all play spaces:

- Do not gauge the safety of playground equipment and surfaces based solely on the outdoor temperature. Always check equipment and surface temperatures before letting children play.
- Ensure children are dressed in appropriate clothing. Less exposed skin presents fewer burn risks. Shoes should always be worn, regardless of surface material.
    - Children under two years of age are more susceptible to thermal burns, as their skin is delicate and burns easier.
- If it is especially hot, consider visiting parks and playgrounds in the morning or late afternoon when it's cooler.

## Top 3 Safety Surface Options for Reducing Risk of Thermal Burns

Additional Considerations:

### Playground Design

- Shade Structures
- No hot surfaces next to water attractions
- Sprinkler Systems
- Posted Safety Rules

### Turf Considerations

- Best Turf for Environment
- Color as well as turf type
- Fall Safety Padding
- Turf Backing for Superior Drainage
- T-Cool Infill

### Equipment Decisions

- Proper Equipment Height for Safety Padding Installed
- Light colored plastics vs. dark

### Appropriate Environments:

Playground Grass by ForeverLawn is shown to be safer and cooler than EWF and rubber surfacing solutions. ForeverLawn also takes additional precautions to ensure that children are provided appropriate play environments:

- Aside from offering premium cooling and cushioning factors, ForeverLawn also works with park and school administrators, playground designers, and equipment manufacturers to impact every facet of playground safety and design.
- ForeverLawn consistently consults with their customers, staying involved during project planning, implementation, and follow-up phases.
- As Kevin Kinsley, Playground Grass Brand Leader for ForeverLawn states"We are a leader in playground surfacing because we are dedicated to improving play for kids of all abilities and providing continual service to our customers."

### Fall Surfacing:

The primary safety issue concerning playgrounds, aside from thermal burns, is fall safety and attenuation. While synthetic turf offers a large improvement over EWF and PIP surfaces in this regard, industry standards often focus more on cost-saving methods than providing superlative cushioning. Playground Grass by ForeverLawn, however, is distinguished in this area:

- Playground Grass exceeds the ASTM F1292 impact attenuation specification due to the various sub-surface padding options.
- Playground Grass meets the ASTM F1951 surface accessibility standard, complying with ADA specifications and regulations.
- The proprietary tertiary backing system provides additional cushioning that is absent in other synthetic turf products.

### Equipment & Surface Maintenance:

While it is the responsibility of playground owners and administrators to maintain playground equipment, Playground Grass by ForeverLawn offers annual service programs (through local dealers) for their playground surfaces. These programs include regular inspection and maintenance of the surface and infill systems to ensure integrity and longevity. In general, synthetic turf is very low-maintenance and only requires a couple of things:

- Occasional brushing or blowing to clear debris.
- Infrequent watering to clear more permanent dirt or dust.

Synthetic turf also requires none of the constant replacement or treatment fees associated with EWF and PIP.

## CONCLUSION:

With many factors impacting the safety and playability of play spaces, synthetic turf offers the best playground surfacing solution, increasing safety and enhancing children's state of play. As previously presented, there are numerous advantages and minimal disadvantages to utilizing synthetic turf in playground surfacing applications. Technologies such as EWF and PIP offer inferior options from financial, functional, and regulatory standpoints, requiring constant maintenance and sacrificing safety.

Within the synthetic turf industry, Playground Grass by ForeverLawn is the superlative turf option, offering a surfacing solution that provides incomparable durability, aesthetics, and safety for playgrounds. As shown, the measures taken to reduce thermal burn risks far exceed industry standards and provide environments that eliminate prevalent safety concerns from playgrounds. ForeverLawn is also heavily involved in the planning, installation, and maintenance of playgrounds and parks for children, incorporating the NPPS's four Playground Safety Pillars to ensure that play spaces are S.A.F.E. and enjoyable.

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