

PLAYGROUND SURFACES NEED TO PROVIDE FALL PROTECTION 24/7/365

# Playground Surface Specification Examples



FACTS

## Key properties of playground safety surfaces

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It is well known within the playground design community that all playgrounds need a 'safety surface' beneath and around the equipment. The ability of these surfaces to reduce impact forces is specified by referencing the Gmax and HIC properties within ASTM F1292.

However, specifying limits for Gmax and HIC is only a first step to creating a safer play space, the surface that is installed must meet or exceed the specified impact reduction levels. This article is designed to provide owners and architects with tools to tailor specifications to the needs of individual projects or installations.

### Preventing Deaths or Injuries?

The limits that are established within ASTM F1282 for playground surfaces were not developed to prevent injuries, rather they were developed to prevent fatalities due to head trauma. Significant head and brain injuries can occur at Gmax and HIC values well below those in F1292.

### Greater Chance of Fatality

Exceeding the maximum limits established in F1292 does not simply mean that the surface is at a great chance of injuring a child, rather it means that there is a greater chance of a fatality due to a child's head impacting the surface.

### Safety does not stop with a new playground

Many owners do not understand that the limits within F1292 apply to the playground surface at all times. That means that regardless of age the playground surface must comply with the required Gmax and HIC values. This applied equally when the surface is new and when it is 10 years old.

Commission testing of new surfaces is the only way to ensure the specified protection levels are delivered to the playground. Follow-up testing ensures that the playground continues to properly protect those using the playground.

ASTM F1292 focuses on preventing serious head trauma by establishing maximum limits for Gmax and HIC.

The Gmax/HIC limits established in F1292 do not prevent head injuries *instead those levels prevent fatalities.*

The Gmax/HIC limits from F1292 apply for the life of the surface, many owners erroneously think they only apply to new surfaces.

In order to prevent injuries, owners and architects need to specify Gmax and HIC levels well below those in F1292.

Commission testing of new surfaces is quick quality control, deviations in thickness, installation and raw materials can be impossible to visually detect.

## Key reasons why your new safety surface may not perform or protect as promised.

Playground surfaces are like every other sport and play surface in that there are numerous reasons why your new surface may not perform or protect as promised. This is just a partial list of some of those reasons.

- ➔ **Installed too thin:** Poured in place surfaces can easily be installed too thin. Often as little as ¼" can cause a system to exceed specified performance levels.
- ➔ **Improper components were used:** Poured in place systems can be installed using the wrong binder, or the manufacturer can ship improper rubber crumbs that are too hard.
- ➔ **Improper installation:** Many systems rely on the right ratio of components. If they are installed with too much or

too little of a component the performance will be altered.

- ➔ **Weather related problems:** Poured in place systems are relatively sensitive to the weather. If the weather is too

dry, the binders used can flow to the bottom of the system before starting to cure. If it is too humid they can start to set up too quickly and trap air and create a surface that is too hard.

### Commission Testing

Detecting most of the causes listed above is almost impossible to do using only visual evaluations. Commission testing is often a quicker and more affordable option than establishing quality control evaluations on individual components and installation methods. Commission testing discourages installers to deviate from submitted materials and installation practices.



*This photo was taken at a playground in downtown Chicago. The hill was covered with a poured in place safety surface.*

## Introducing 'True Performance' Playground Surface Specifications

The most common sources of playground surface specifications are manufacturers and installers, and the boilerplate specifications they provide don't clearly address the actual or 'True Performance' of the installed surface. Furthermore, corrective actions are never addressed in these specifications. Far too few specifications account for the fact that many of these surfaces become harder over time.

Here are two different philosophies with more rigorous requirements than required by ASTM F1292. These examples can help owners and architects guide the development of 'True Performance' specifications that fit their project's needs.

- ➔ **Nothing but full compliance with the specification will be accepted** and there will be no allowances for differences in between field and lab environments. This applies to specifications that use the limits within F1292 and to those that require surfaces to have even greater than required impact attenuation properties.
- ➔ **Establish optimal, acceptable, and unacceptable performance levels:** In this case, there may be relatively minor corrective actions for missing the optimal performance level, but performance that falls outside of predefined acceptable levels will not be accepted.

*Commission Testing of a newly installed poured in place safety surface.*



*If performance is important enough to specify, shouldn't it be important enough to verify?*



## Example Specifications:

The following examples are from projects that ASET Services has provided on-site testing. They have been provided not to be copied directly, but as a starting point for architects and owners to develop their own 'True Performance' specification.



Field Testing  
at the  
Indianapolis  
Children's  
Museum

### Full Compliance Specification Example:

For many years the city of Chicago adopted Gmax and HIC limits well below the levels required in ASTM F1292. There were no allowances for performance given, and failures had to be brought into compliance before final payments were made.

#### 1.8 WARRANTY

##### A. Playground Safety Surfacing System:

###### 1. Surfacing Tiles:

- Materials and Workmanship: Playground safety surfacing tiles shall be warranted for defects in materials and workmanship for 10 years from date of completed installation.
- Performance: Playground safety surfacing tiles shall be warranted to meet drop height performance requirements of ASTM F 1292 for 10 years from date of completed installation.
- Playground tiles, materials and workmanship warranty for the connection system for 10 years.

###### 2. Poured-in-Place Surfacing:

- Materials and Workmanship: Poured-in-place playground safety surfacing shall be warranted for defects in materials and workmanship for 5 years from date of completed installation.
- Performance: Poured-in-place playground safety surfacing shall be warranted to meet drop height performance requirements of ASTM F 1292 for 5 years from date of completed installation.

##### B. Test Results (In field – post installation):

###### 1. Impact Attenuation: ASTM F 1292.

- g-max Score: Less than 150.

###### 2. B. Test Results (In field – post installation):

###### 1. Impact Attenuation: ASTM F 1292.

- g-max Score: Less than 150.
- Head Injury Criteria (HIC) Score: Less than 850.

*Note: The system submitted will need to exceed these values in order for the manufacturer and installer to maintain some factor of safety.*



Field Testing to determine the  
Gmax/HIC levels in a kick-out  
area that has been repaired

### Establish Optimal, Acceptable and Unacceptable Performance Levels

The Wheaton Illinois Parks Department took a unique approach to specifying performance of new playground surfaces. It shows that a 'True Performance' specification can have different levels of corrective actions defined.

- In the event the surface does not meet the performance requirements for impact attenuation the Contractor may pursue one of the following options:

- Contractor may accept a reduction to final contract amount according to the table below:

Range	% Reduction to final contract
G-Max 161-173 or HIC 701-800	5% reduction
G-Max 174-187 or HIC 801-900	10% reduction
G-Max 188-200 or HIC 901-1,000	15% reduction
G-Max > 200 or HIC > 1,000	Remove, Replace & Re-test

- The Contractor may remove, replace and re-test areas that failed in order to achieve specified performance. Such repair shall not detract from the aesthetics of the finished surface and shall satisfy the Owner.
- The Owner reserves the right to engage a qualified third party testing company at the Owner's expense any time during the warranty period. The results of the test shall yield G- max less than 200 G-Max and less than 1,000 H.I.C at the maximum fall height for each piece of equipment where the surface is to be installed. In the event the surface exceeds these numbers, the Owner shall notify the Contractor in writing. The Contractor shall have 30 days to make any necessary repairs to bring the surface into compliance again.

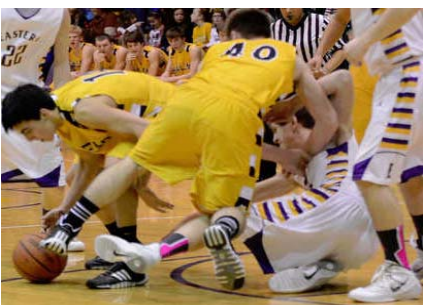
*Note: In all cases the contractor has the option to repair and retest the surface to determine if it meets the optimal performance levels. The first two options also allow a financial corrective action to be taken by the installer.*

## ADDITIONAL SERVICE



### Synthetic Turf

Head injury prevention is critical for synthetic turf field owners. Our on-site Gmax and HIC testing can verify that turf fields conform to specified levels and to ASTM safety standards.



### Courts

Wood and synthetic court surfaces are defined by several performance properties. They include properties intended to reduce injuries, to improve playability and to ensure surface durability.



### Tracks

Joint health is affected by impact forces and the injuries accumulate over time. We can verify that elastic tracks of all types (walk, jog, run) provide the specified performance levels.



### Tennis

While some tennis surfaces claim to be resilient, often the most important property of a tennis court is the friction or traction level provided by the court. Our pendulum friction test equipment allows us to determine friction levels in the field and the lab.



### Dance

Properly performing dance floors enhance the comfort and performance of the dancer. We can verify that installations perform to specified levels.

### Other

**Padding:** We provide impact attenuation testing on a variety of padding and landing mats. Examples include wall padding, wrestling mats, pole vault pits, and sports equipment padding.

**Sports Equipment:** We provide testing of key pieces of sports equipment. Currently, we are providing tests of basketball rims, backboards and support structures.

**ASET conducts field testing for numerous reasons. New surfaces are tested for compliance with the specification, and existing surfaces are tested to compare the current performance to new systems. Field testing is conducted to evaluate damage from events like flooding, and to validate that repairs restored not only appearance but also safety and performance properties.**

## About ASET Services, Inc.

ASET Services was founded in 2002 and we celebrated 15 years of providing testing, research, consulting and inspection services in 2017. We service indoor, and outdoor courts (natural and synthetic), tracks, artificial turf, and playground surfaces, padding and sports equipment.

Our clients include architects, owners, manufacturers, installers, lawyers and insurance companies, and our focus is always on helping to ensure that every surface provides an attractive, safe place for athletes, kids

The founder, Dr. Paul W Elliott, PE, CPSI received his Doctorate in Engineering from Purdue University for work related

to the design and computer simulation of sports surfaces, served as the Research and Design Engineer for a sports surface manufacturer, is a licensed engineer in Indiana and Ohio, and is actively involved in ASTM Standards development.

ASET provides testing to several international sport and play surface and equipment manufacturers. ASET has also inspected and tested sports surfaces for high schools and universities across North America, as well as at several locations around the globe, including the United Kingdom, Qatar, and South Korea.



For Information on 'True Performance' Specifications visit:

[www.aset-true-performance.com](http://www.aset-true-performance.com)

For General Information visit:

[www.aset-services.com](http://www.aset-services.com)

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