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# 10 Reasons why your floor may not perform as advertised.

*The following article is a summary of a presentation given at the 2006 NIRSA Facilities Institute in Columbus Ohio. The topics are focused on indoor court surfaces. It explores some of the reasons why preliminary performance results used in bid specifications and the actual performance of individual installations commonly differ. Portions of the presentations which provided an overview of the performance characteristics from DIN 18032-2 have been omitted and can be found in other documents posted in the ASET Services' online library.*

## Introduction:

If the performance of your sports surface is important to you, and your clients, then you should know that preliminary or suitability testing is only an '*indication*' of the performance your new floor will deliver. Preliminary performance levels are obtained in a laboratory (perhaps even ours) under nearly ideal conditions.

This flyer is a brief overview of some of the variables that are commonly controlled during suitability testing. Some of these variables can produce dramatic differences between your installation and a sample tested in a lab.

## Definitions

*Preliminary Performance*: For the purposes of this flyer, preliminary performance will refer to the performance levels obtained during testing of relatively small samples under laboratory conditions.

*Actual Performance*: For the purposes of this flyer, actual performance will refer to the performance levels that a new installation actual delivers.

## 10 Reasons for performance differences

**1: Laboratory Conditions:** Laboratories and manufacturers know that the conditions of the facility can effect results. One example is slab flatness. The flatness of a slab within most laboratories is far superior to those required in project specifications.

**2: Slab Flatness**: Ways of measuring flatness vary greatly within the industry. Some installers use a straight edge, while others measure individual points with a transit or laser. The specifications for your project probably state that the floor will be flat with a tolerance of 1/8" (3mm) in 10' (3m). This term is not universally defined within the industry. Lastly not all 1/8" peaks/valleys are equal. A 1/8" peak over 3 ft will not cause the same result as a 1/8" peak over 10 ft.

**3: Human Factor:** Mistakes happen. There will be times when the wrong pads are shipped and installed. There will be times when compounds are mixed or applied improperly. Sadly, there will be times where cheaper components are switched in order to increase job profits.

**4: Anchoring Effects:** Anchored sports surfaces are becoming more common in North America. Over-anchoring can be caused from not attending to details during installation, and from the quality and strength of the concrete. Over-anchoring produces a floor that his harder than it should be. Under-anchoring can lead to increased vibrations and even to hard-spots.

**5: Prototype vs. Production**: Preliminary samples are often prototypes. Thus they often use temporary anchors, and hand made components. The effects of mass produced components and variation in installation methods on performance are rarely if ever validated through follow-up testing.

**6: Installation**: A job-site may have 5 to 10 installers. Each one will have a different nailing technique, nailing force and even a different fastener spacing. Each installer will also have a different definition for and commitment to installation quality. During actual installation, quantity is usually the motivating factor for installers. Typically a prototype sample is constructed by one individual.

**7: Strip Flooring Grade**: Almost without exception, a system is tested using a single grade of strip flooring. However actual installations typically choose one of 3 common grades.

**8: Materials Grade / Quality:** Companies may source materials close to the testing labs for the sake of cost control. The differences in the properties can vary significantly by region, North America versus Europe as example.

**9: Manufacturer Drift:** From time to time components may experience small manufacturer changes or drifts. The result of an individual drift is often negligible. However, when manufacturers fail to have adequate quality control methods in place the drift can become significant enough to alter the performance of the finished system.

**10: Finish:** Nearly all preliminary performance testing is conducted on unfinished surfaces. This speeds up testing and reduces the expense of obtaining preliminary performance levels. Furthermore, water based systems have a reputation in the industry of bonding boards and layers of the system together, reducing the ability of the system to move.

## Critical Effects

For the purpose of this paper, Critical Effects are defined as factors that typically effect four or more performance values. These effects are typically spread throughout the entire surface.

Obviously, human factors (reason 1) can cause the actual performance of your installation to vary greatly from preliminary performance levels.

Slab flatness (reasons 2) and Laboratory Conditions (reason 3) will affect the range of results. A more uneven slab will result in a wider range of performance values. This may cause the participant to feel hard and soft spots, or to perceive 'dead-spots' with respect to ball rebound. It will effect every performance property other than friction and strength.

Anchoring Effects (reason 4) can have critical effects on the performance of your installation. When anchoring effects produce critical effects they are typically also caused by a production part not duplicating the function of a prototype part, and a function of installation training.

Prototype vs Production (reason 5) can be a very critical effect. If manufacturers have a stringent development program that ensure that their production products and installation methods duplicate their prototype performance this factor can be controlled.

Manufacturing Drift (reason 9) can often result in widespread performance differences between actual and preliminary results.

## Significant Effects

For the purpose of this paper Significant Effects are defined as factors that typically effect two or three performance values. These effects are typically localized but can be wide spread through out the entire surface.

Installation (reason 6) can result in localized performance deficiencies if adequate training and management are not provided.

The finish system (reason 10) effects have been placed in the significant effects category. Often finish effects are marginal effects, but there are documented cases where the finish has critically altered four performance values.

## Marginal Effects

For the purpose of this paper Marginal Effects are defined as effects that would typically be most noticeable only in the area indentation characteristic of a sports surface. These effects might go unnoticed in other characteristics.

The effect of the Flooring Grade (reason 9) and Materials Grade and Quality (reason 10) are limited for the most part to small changes in area indentation. While they may cause only small differences, you should know that the difference between 'passing' and 'failing' this performance criteria of DIN 18032 can be as little as 0.001". So if you selected floor that was complied fully with this standard, even a slight difference between your installation and the levels submitted during the bid process could mean that the floor no longer complies with the standard.

## Field Validation

Field validation of performance is now common on newer 'in-filled' style artificial turf. This is a system where a filler is loosely inserted between the synthetic blades of grass. Field validation helps to ensure that the field was properly installed.

While field validation of indoor sports surfaces is not yet common, it is an option. In most cases, field testing of the force reduction property alone is probably sufficient. However, if one or more performance characteristics was important enough to specify then it is important enough to validate.

## Compensation

If a specification fails to include performance based compensation clauses, your facility and your athletes are the only ones who will experience any penalties for the actual performance not living up the preliminary performance levels submitted during the bid process. However, by choosing to include field validation of your installation, you and your architect can establish compensation clauses performance of your installation failing to meet advertised levels.

There are a few general guidelines for establishing compensation levels and clauses.

- First, the clauses need to be included in the bid specification. If the clauses are not included in your the specification provided at the time of bidding you will have a very limited ability, at best, to enforce them.
- Unreasonable tolerances will result in significant installation cost increases. Therefore it is important to work with a professional to help establish appropriate levels.
- Every sports surface that has included performance characteristics in the bid specifications should include compensation clauses.
- Include compensation clauses even if you do not anticipate conducting performance validation tests. This provides protection in the event that you feel your installation does not perform as it was presented to you during the bidding process.
- Owners should take be responsible for scheduling and paying for field validation. This allows you to control the costs and it helps to ensure that the tests are obtained by an independent third party testing lab.
- If you choose to have the installer/manufacturer cover the costs of field validation, you should include in your contract that you have a legal right to receive the test report as issued by the testing house.

The following are provided as examples for compensation clauses. Once again these are merely examples, your goals will help to determine exactly how your projects compensation clauses will be written. These examples have been developed for a single performance criteria, Force Reduction (FR), but similar clauses can be developed for other performance criteria.

*Nominal Deviation and Compensation:* Actual FR varies by more than 3% from specification.

- Extended Warranty: you manufacturer/installer will extend the warranty period on the system from 1 year to 5 years

*Marginal Deviation and Compensation:* Actual FR varies by more than 5% from specification.

- Extended Service Contract: your installer providing a certain number and type of annual maintenance services free of charge. Collection may be difficult. Consider deducting from payment.

*Significant Deviation and Compensation:* Actual FR varies by more than 10% from specification.

- Partial Refund: the manufacturer and/or installer providing you a partial refund of you installation costs. Withholding 10-20% of be bid price could be appropriate.

*Extreme Deviation and Compensation:* Actual FR varies by more than 20% from specification.

- Replace or Repair: require the manufacturer/installer to replace or repair the system so that performance meets expectations. Carefully define what repairs are allowed; holes, plugs, patches, etc. Also include a loss of use compensatoin.

A compensation strategy is usually developed to achieve a goal. Compensation clauses can be used individually or in combination to achieve those goals. The following are example goals that would typically utilize different compensation clauses.

As an example, a goal could be simply to help to ensure that poorer performing components are not intentionally switched by the contractor. Deviations in this event would be expected to be very large, and thus including either a single significant or extreme deviation compensation clause may be sufficient. Inclusion of the compensation clauses may prevent this intentional switch and may not even require that performance validation be tested.

Another example might involve a competitive arena or high profile practice facility where athlete comfort and safety is of paramount concern. In this case, compensation clauses for two or three deviation levels and for multiple performance criteria would be appropriate. Mandatory performance validation should be considered for at least two performance criteria.

**Additional Information:**

If you are not familiar with performance testing of indoor sports surfaces, you may want to visit ASET Services' online library at www.asetservices.com, where you can find additional information.

**Further Information**

Please contact us by any of the following methods to learn more about how we can assist you. ASET Services offers both pre-installation post-installation testing services as well as educational services.