International Standardization of Sports Surfaces

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Sports Surfaces in this presentation:

- Synthetic Track Surfaces
- Synthetic Turf Surfaces
- Playground Surfaces
- Sports Hall Surfaces

Goal of Presentation

- Overview of Relevant Bodies of Standards
- Design Principles
  of Sports Surface Standards
- Remarks on Actual Developments

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National Public Authorities

- **ASTM**
  American Society of Testing and Materials
- **DIN**
  Deutsches Institut fuer Normung
- **BSI**
  British Standards Institution

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Although these standards are the product of public standard writing bodies, they are only relevant if mandated in the job or project specifications. In Germany, compliance with the relevant DIN Standards is mandatory for all state subsidized projects.

Whether mandated or not, most standards represent the state of the technology (state of the art) when written. This can be an important legal issue, however, all standards may not be up-to-date and may contain errors. It is therefore advisable that users employ all available knowledge and experience and do not rely on the standards alone.

International Public Authorities

- **ISO**
  International Standards Organization
- **EN** (CEN)
  European Standard
  CEN = Comité Européen de Normalisation

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In the hierarchy of standards, an EN is above a National standard in Europe and an ISO is superior to both the EN and ASTM standard.

It is agreed among the European standards organisations that national standards have to be withdrawn as soon as the equivalent EN standard has been published.

Duplicate or similar standards exist as both ASTM and EN documents. Duplication of work and standards is avoided through the development of an appropriate ISO standard.

Sports Governing Bodies

- **FIH**
  Federation de Hockey
- **IAAF**
  International Association of Athletic Federations
- **UEFA / FIFA**
  Union of European Football Associations
  Federation International de Football Associations

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Commercial Groups

- **STC**
  Synthetic Turf Council
- **EATP**
  European Association of Textile Polyolefins
- **MFMA**
  Maple Flooring Manufacturers Association

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- **ASTM F 1292**
  Impact Attenuation Playgrounds
- **ASTM F 1551**
  Comprehensive Characterization of Synthetic Turf
- **ASTM F 2157**
  Synthetic Track Surfaces
- **ASTM F 2117** Ball Rebound
- **ASTM F xxx** Force Reduction (in prep.)

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ASTM F 1292 =

Genuine American standard, derived from automotive testing. Tests Gmax+HIC

ASTM F 1551 =

Collection of various technical standards available at the end of the 80ies; was not much used in practice; now outdated

ASTM F 2157

Was derived from DIN 18035-6 and IAAF; follows these references regarding test procedures; thus: no re-invention of the wheel

ASTM F 2117

Copy of part of DIN 18032-2, but with major increase of uncertainty including scientific errors

ASTM F xxx

Duplication of a well specified European developed test method for Force Reduction. The CEN is about to publish an EN standard on this that will be generic to any surface and therefore could be specified by ASTM with their own requirements for results rather than duplicating it. Better yet, an ISO standard on the test method could be produced. This will be addressed at the November 2004 ASTM committee meeting.

•These DIN standards are the genuine documents which dealt with test procedures and requirements of sports surfaces. They are set examples for several other national and international standards including EN, ASTM, FIH, IAAF, UEFA etc.

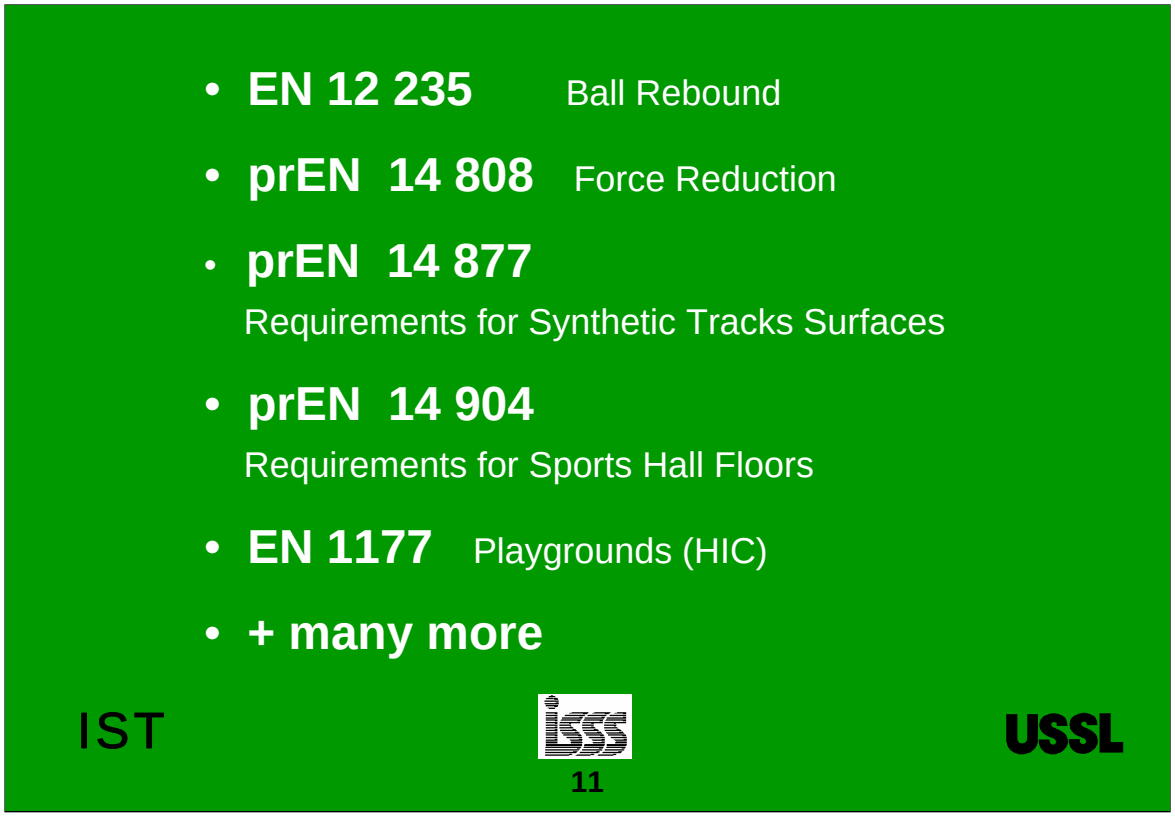
•These standards are a combination of testing and performance standards. This style/structure is impractical because if one detail of the testing procedures changes the whole standard needs to be re-issued.

•DIN 18035-7 was re-published in 2002. However, some test procedures are outdated and some requirements are ridiculous: aging (see www.isss.de/....) after half a year of exposure to UV the Melting/Viscosity Index is determined; the requirements accept up to 100% deviation from original values.

•DIN 18032-2 was re-published in 2001. Unfortunately, it contains methodological errors. Those may be errased with the new EN standard.

BS 7044 contains a collection of test procedures and requirements for several kinds of sports surfaces. The Rotational Resistance test, the Ball Roll test and the British Road Tester RTTL for determination of the sliding behavior was published herein.

ISO 17025 is vital for Labs in Europe. This accreditation is provided in Switzerland by the government authority for metrology. It is not a general certificate: it is conferred on specified conditions such as the location and the rooms of the laboratory, the staff, and specified test procedures. It requires documentation and tracebility of all calibration and testing activities.



•The EN standardization process began in 1989. It was extremely slow for the first 15 years. No results were achieved. In 2003 CEN set a deadline of December 2005 for completion. Now the standardization activities have received an incredible momentum.

•**EN 12 235** is a final version of the standard. It covers various kinds of balls. Unfortunately, the test with basket balls seems to contain an error. The definition of the ball for the test differs from the definition given by the Basketball Federation. This issue is reported to CEN and will hopefully be clarified soon.

•**prEN 14 808** is a draft standard with final comments currently under review for final publication. It specifies a test method which is independent of the surface being tested.

•**prEN 14 877 + 14 904** are pure performance standards. Publication of the final versions is expected next year.

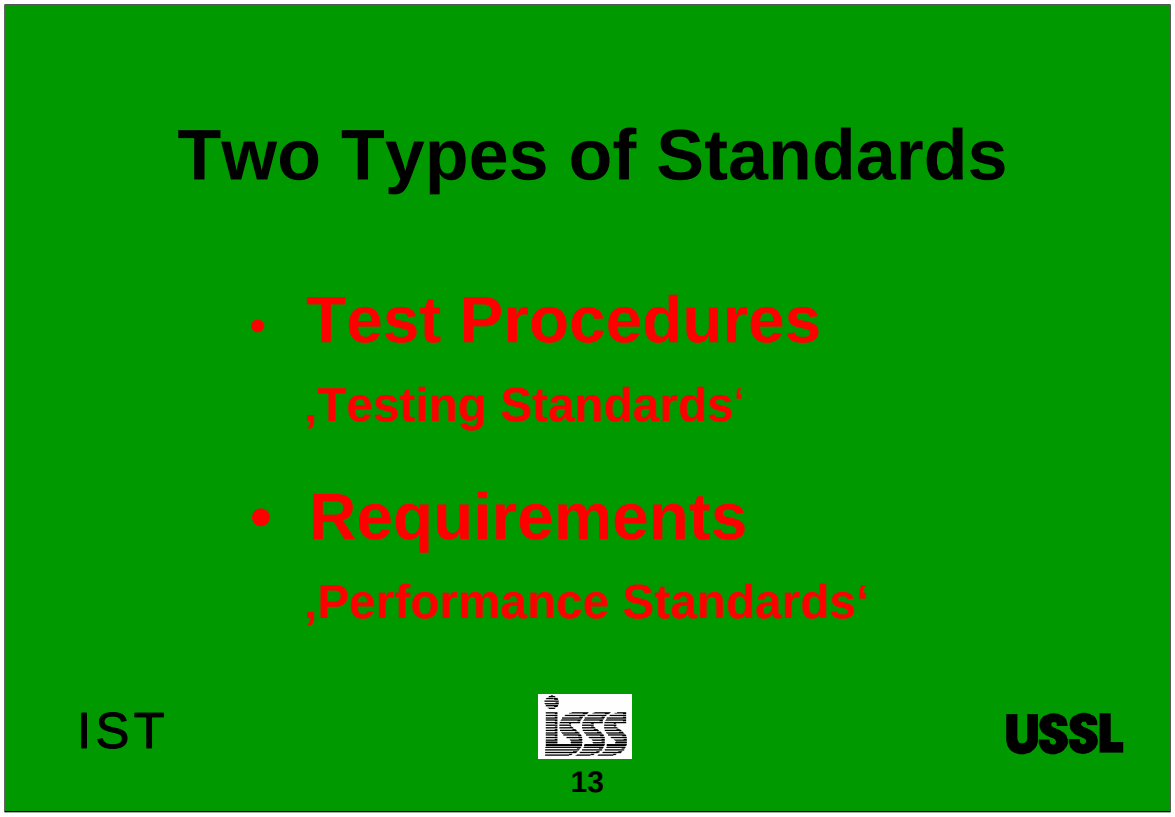
•**EN 1177** is a duplicated effort by Europe which resulted in a concept similar to the existing ASTM standard which was based on automotive studies. An unexplained difference is that the EN changed the weight of the headform from 5.0 kg (ASTM) to 4.6 kg. The differences should be discussed on either side. An ISO standard should be prepared.

•Regarding the **IAAF** Specifications one should be aware of the new requirements published in January 2003. Especially thickness is critical. The average thickness shall equal or exceed the thickness reported in the lab report IAAF received for Certified Product acknowledgement/listing. At no location the thickness shall be less than 10% of this number. This needs to be carefully observed.

•The **FIH** manual was the first time a sports governing body prepared its own rules for the surfaces of its game. This document should now be updated and the reference to the Leroux pendulum tester should be removed.

•The **UEFA** manual seems to be the best edited document in this field and should be the master for further international standardization. Even though, it contains a few flaws in the test procedures which may be eliminated soon. The requirements also need to be reconsidered in a few cases. However, this is at the discretion of UEFA.

•The **FIFA** document is similar to the UEFA one but is thought to contain a higher number of uncertainties. The two groups, EUFA and FIFA, have not found a way to reach a common position which often leaves the public confused.



This dinstinction is important for effective standardization. In the past (DIN standards, ASTM 2157) the mixture of test procedures has produced an over-proportional amount of editorial work since if one detail of a test was changed the whole standard needed to be reissued.

The distinction also allows for reasonable adjustment of standards acc. to national interests and needs: the test procedures should internationally be the same as 2 + 2 equals 4; adjustments may be made in performance standards.

Types of Standards according to their use

- Standards for Users/Players/Athletes
- Standards for Product Checks
- Standards for Product Development

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•**Standards for Users**
such as:
Force Reduction, Sliding Behavior, Ball Rebound, Permeability, Thickness, Aging Tests, Wear Tests, Ball Roll

•**Standards for Product Checks**:
used to control identity, quality and compliance of delivered/installed products compared with their specifications (manufacturer's data sheet or job contract documents)
such as:
Tensile Strength, Sieve Analysis of Granules, Thickness, Number of Tufts, Weight per Unit Area, DTA Differential Thermal Analysis, IR Infrared Analysis

•**Standards for Product Development**:
to help manufacturers and suppliers of material components to design and manufacture sports surfacing products
(This is the internal testing of companies and not the field of the Sports Labs)
such as:
Viscosity Index, Melting Point, Glas Transition Temperature,

Design of Standards (1)

- independent of specific product design
- use relevant
- selective power
- accurate
- simple and inexpensive

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•In order to avoid unreasonable advantage for specific products (players and athletes assess sports surfaces based on the playing performance of the entire system with no reference to surface design)

•Skip non-use relevant tests

•Tests should be capable of producing results which can be classed as poor, average or above average. Tests with a high degree of variability (some as much as ±50% or more) are of a low reliability and therefore of no value. The accuracy of many tests as far as comparability and reproducibility, especially on the inter-laboratory level is questionable. In the future accuracy must be given particular attention before a standard is passed.

•Cost and simplicity of the test method will lead to quick and regular use and thereby more consistent products.

Design of Standards (2)

- useful in job specifications
- tests = simulation of sportive actions
- tests = technical but based on biomechanical considerations
- requirements derived empirically

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•Standards may be used in job specifications to establish an unbiased description of the product desired and achieve a fair competition between products based on their performance and technical identities.

•Tests try to simulate typical sportive actions in order to produce relevant results: therefore ‚Performance Characteristics'.

•The tests are technical but based on biomechanical considerations.

•The requirements were derived empirically based on systematical tests and questionaires filled in by athletes of various sports using that type of surfacing (Germany, England, Switzerland).

Design of Standards (3)

- requirements need update acc. to ongoing experience and product development
- requirements do not guarantee products beyond question
- requirements not too loose and not too tight

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•The requirements do not guarantee that surfaces are beyond question. However, they are likely to weed out non-suitable products.

•If requirements are too loose test does not have selective power. If requirements are too tight, good products may be suppressed (e.g. Ball Roll Length 4-6m for synthetic turf is too tight since natural turf/grass surfaces vary between 4 and 12m acc. to geografical region and climate.

Abundance of Standardization

- testing standards = internationally the same
- performance standards = adjustment to national needs
- don’t re-invent the wheel

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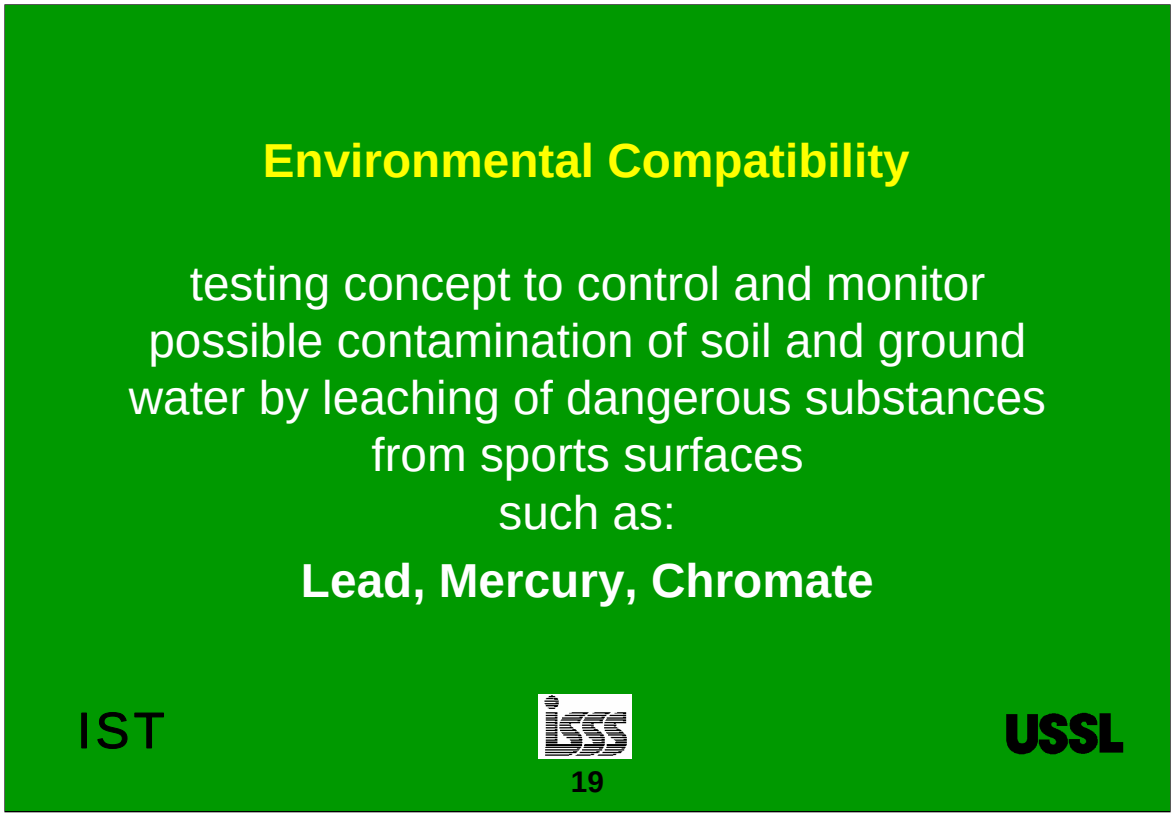

The thought was to establish tests to check on the possible soil and/or ground water contamination due to leaching of synthetic surface components. These tests were developed to avoid release of the tightly guarded component lists and mixing ratios of the various synthetic surfaces. Through this testing dangerous substances such as Mercury, Lead and Chromate have been eliminated. This testing is part of the German standards for synthetic turf and synthetic surfaces (DIN 18035-7 and DIN 18035-6).

A few European countries have copied or are about to copy this concept. Unfortunately, everybody is adding or changing details so that the results are generally not comparable and the tests have to be repeated in each country – just the opposite of what should be desired.

more information at

www.isss.de/publications/UVP

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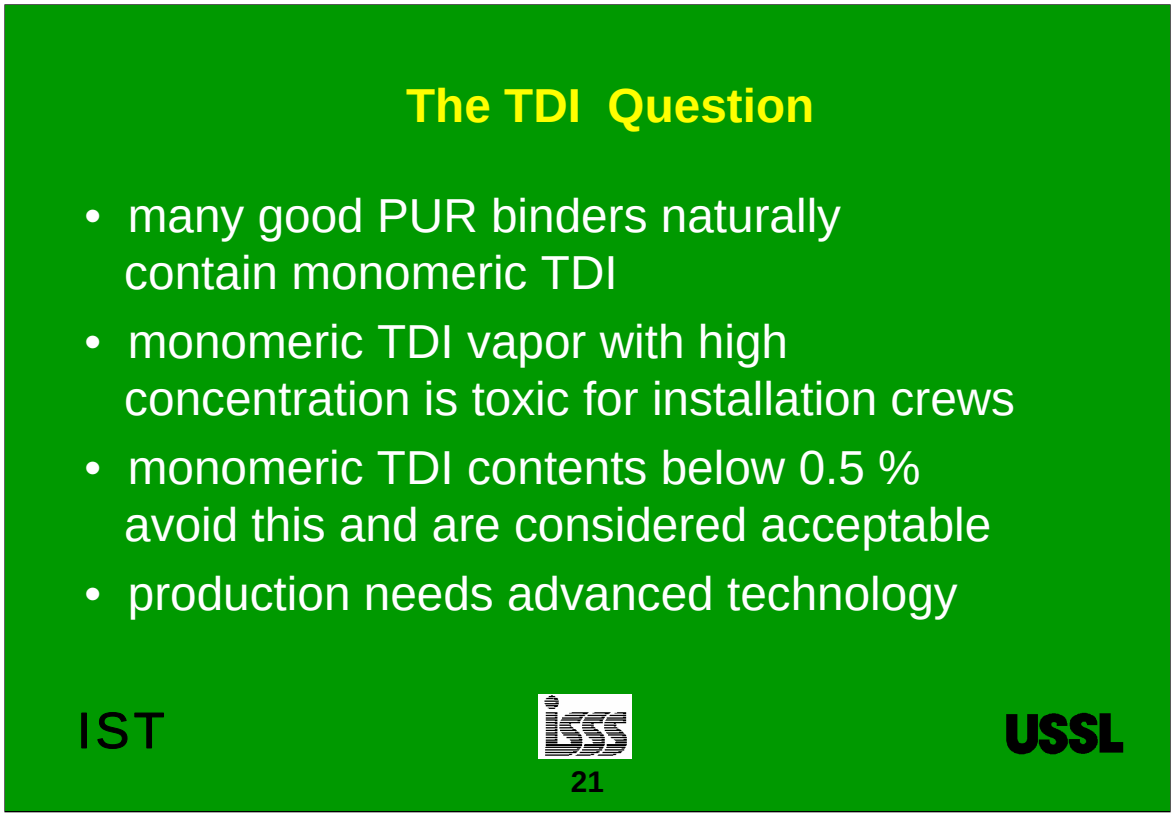
There is also a contribution from Austria available at
www.isss.de/conferences/Vienna2004



As is well known, PUR binders are mainly based on TDI PUR systems. They naturally contain certain amounts of monomeric TDI contents. Since monomeric TDI is toxic in concentrated vapor for the installation crews, the amount of monomeric TDI must be reduced. This needs an advanced technology which is applied by a few manufacturers only. It should be the obligation of the design professionals to only specify PUR binders with low monomeric TDI content. It is the view of the international community of experts that this content should not exceed 0.5%, certainly not 1.0%. According to European regulations, products with low monomeric TDI content are allowed to be labelled „harmfull“ whereas high content requests the label „toxic“.

Thank you

for

your attention

www.isss.de/ist-ch

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