Environmental Compatibility of Sports Surfaces

an ISSS Project

Comments on the DIN Concept

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As one who was actively involved from the very beginning with the development of the German Guideline (RAL, now DIN) as well as with the Swiss Guideline (ESSM 105)*) I would like to start the discussion with my comments.

In my view, the DIN/RAL concept is a fruitful starting point in the effort to control the environmental impact of sports surface materials. Since it is not possible to require companies to publish a list of the chemical substances used in the formulation of their products, it was necessary to find an objective way to identify the harmful substances within a product which might lead to contamination of waters and ground water to an unacceptable degree. This was an empirical approach and while it was understood as such when it was conceived, this factor seems to have been lost during the discussion process. To further complicate things, a few experts are convincing people that these figures have a legal basis when they do not. .The guiding or 'benchmark' figures still represent the range of "normal" products, no more no less.

The distortion in the application and understanding of the guiding figures is widespread. Chemical Experts have copied the DIN concept applying the guiding figures as requirements and then added additional parameters such as PCB and .... to create "importance".... A common misunderstanding is that the extraction results are regarded as the exact amounts that are released from a sports area after each rainfall. Investigation by the Swiss Federal Authority for Environment revealed that the lab results exceed by magnitudes the actual runoff results . Additionally, the amount of these substances in the runoff is not static but decreases over time. There is another important difference between the runoff from sports areas and industrial or domestic sewage: the latter is a continuous flow over infinite years and the former is sporadic. Thus, although the concentration of harmful substances may be low, the total charge with unwanted substances is incomparable higher than the charge from the drainage of sports areas.

In the context of applying the DIN concept to synthetic turf with in-fill, the problem of how to determine the amount of heavy metal was discussed. Swiss experts proposed the use of CO_2 saturated water as a more realistic and tougher test since rainwater today is on the acid side. Based on the belief that it was ecological, the use of acidified water was introduced without the determination of what would happen if the concept were transferred to uncovered rubber granules. In a study, Dr. Axel Begert, Vienna, showed that the acidity of rainwater is so low (like de-ionized water, rain water does not contain dissolved salts and therefore has no buffering potential) that the smallest amount of alkaline influence from waste neutralizes the pH-value. That is why acidification of the extraction water is no longer used in waste analysis. The issue of acidification was agreed upon without detailed discussion in Germany as well as in Switzerland.

This leads to the question of why the RAL/DIN people quietly changed the procedure for sample preparation of synthetic surfaces and elastic layers by including the protection of the cut sides of rubber granules with PUR binder. This method has so dramatically lowered the extraction results that the original guiding figures (and test results determined before the year 2000) are not comparable with today's test results.

The DIN concept was later applied to synthetic turf and its in-fill. This was a blanket application without change or review for proper relevance or application procedures. This has created the situation where the rubber granules show a higher than anticipated content of heavy metals. Of special interest is Zinc, which is a vital constituent of rubber materials. It is not plausible to require a Zinc concentration of a water extract (non-acidified) of 0.5 mg/l to be set as the maximum tolerable amount (if water flowing off a sports facility really exhibits this amount at all) when even drinking water is accepted with up to 0.5 mg/l in Germany. A study established by the Batelle Institute (Frankfurt) shows that Zinc has organoleptic significance (relevance to taste) only according to information provided by WHO.

Another issue is the toxicity test. Following a proposal of the Swiss committee, the Nitrification Inhibition test was introduced. This test is favored by the Swiss Federal Institute of Testing Materials (EMPA). The relevance of the test was never discussed. Since the test in its original form was too time consuming, an acceleration procedure was developed and introduced which lacked a clear description. Thus, the time at which the nitrification process is to be assessed is not defined. In many tests, which were performed on behalf of IST, very confusing results were received. It was unfortunate that the DIN committee did not fully explore this issue and thus the nitrification test was included in the new version of DIN 18035-7 in 2002. Quite surprisingly, a reversal of attitude occurred during the negotiations over the 2004 version of DIN 18035-6 and the nitrification test is no longer a critical issue.

*) my participation in the RAL/DIN committees ended in 1996.