

# SPECIFYING DANCE FLOORS

## White Paper

### Overview

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**Professional dancers can spend six to eight hours a day working in a dance studio. It is their place of work and should offer a safe environment that is fit for purpose.**


The dance floor makes an important contribution to safe performance without risk of slips and falls or longer-term stress injuries. A good dance floor instills confidence in dancers to give full expression to their creativity, safe in the knowledge the dance floor will offer a consistent response. Only floors that have been developed specifically for dance can do this - commercial, industrial or sports are not suitable for dance. This publication reviews the issues relevant to specifying floors for dance.

## Why a dance floor is important for the safety and confidence of dancers

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A good dance floor instills confidence in dancers to give full expression to their creativity. Experienced dancers can judge a good floor instinctively. If it feels right, they can effectively forget about the floor and concentrate on putting all their focus into their artistic performance, secure in the knowledge that they are not going to slip and fall. They can be confident that lifts can be performed safely and, on landing from jumps, that the response of the floor will be consistent.

Quantifying this subjective rating of a floor into a series of repeatable tests is no simple task. Anyone specifying floors for dance should remember that dancers may not be the commissioning clients, but they are the end users. Major dance companies understand this, which is why it is not uncommon to ask their dancers to "test" floors before the final choice is made.



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## Specifying the wrong floor

There are recognised international standards for general types of floor, but not yet for dance floors. Although it is customary to specify compliance with a published and recognised standard, using general flooring or sports floor standards will not ensure the right floor is installed. Only a floor developed specifically for dance will do. There have been some high-profile examples where floors have had to be replaced by a dance company after the building is complete and dancers have their first experience of dancing on the floors.

There may be a temptation to specify floors for aesthetic reasons, or to specify sports floors in the mistaken belief they will be suitable for dance. Needless to say, replacing floors after construction is complete is an expensive error that should be avoided at all costs.



## Standards and tests

As already noted, currently no standards exist which relate specifically to dance floors. The closest available, and most widely used, are the standards for sports surfaces for multi-use sports, the European EN 14904 and the German DIN 18032-2, which are very similar. All Harlequin floors are fully tested in accordance with both these standards.

However, while these standards are suitable for sports floors, they are arguably much less appropriate for dance. Some styles of dance such as ballet require 'traction' from the floor to prevent slips during a performance. But too much traction for a basketball player, for example, blocks movement potentially resulting in twisted ankles or knees.

On the other hand, the basketball player will need the 90 percent ball bounce specified in DIN 18032-2, something that is completely irrelevant to the dancer.

As part of the testing regime for sports floors, an apparatus referred to as the "Berlin Athlete" is used to measure force reduction - commonly referred to as shock absorption. However, the profile of this 'representative athlete', a national level sprinter weighing approximately 70kg which simulates the forces exerted on a sports floor, is probably not equally representative of young dancers.

The minimum deformation allowed in DIN Standard 18032-2 is 2.3mm. But tests on dance floors indicate higher levels are preferred, suggesting that in broad terms, dance floors are softer than sports floors. A related issue is that the construction of most sports floors results in deformation which is too inconsistent for safe dance.

It should also be noted that there are many different styles of dance, some performed in hard shoes such as tap and Irish dancing, others in soft shoes such as ballet, or barefoot as in much contemporary dance. A social or ballroom dancer will appreciate the slide and speed of a traditionally finished wooden surface, but a barefoot contemporary dancer will fear splinters from such a floor and the tap dancer may be concerned about the damage their shoes may cause.

## Why sports floors are not suitable for dance

**It is tempting to assume that, as the elite athleticism of top dancers is on a par with sports people, a sports floor is appropriate for dance. It is not.**

There are certain requirements that distinguish the difference between a dance floor and a sports floor. Many sports played on these floors require a firm floor which allows balls to bounce predictably. Sports footwear is generally cushioned to protect against impact injuries. The footwear also provides grip for the sportsperson. By contrast, a dancer's footwear, depending on the genre of dance, does not include as much cushioning. Therefore, the dancer needs more absorption from the floor itself in order to land from jumps safely. Dancers also need the right traction from the dance surface which they would not get from a generic sports floor.



# Research studies seek to establish essential data

**Correlating the subjective evaluation of floors as judged by dancers with measurement criteria has prompted a number of avenues for research, particularly in the field of biomechanics.**

One researcher is dance scientist and biomechanics expert Dr. Luke Hopper with his pioneering research investigating the effects of dance floors on dancer performance and injury. Luke explained, *"Dance floors are an integral part of the dance environment, yet little information is available for the dance community that concerns how dance floors may affect dancer performance and injury. For the dedicated dancer striving to improve, injury can sadly be an all too common occurrence. By gaining knowledge concerning the relationship between dance floors and dancer performance and injury, the dance environment can be optimised in order to give dancers the best opportunities in their training. It is common to hear dancers describe a floor with words like 'sprung', 'hard' or 'stiff'. But what aspects of the floors are the dancers referring to when they make these statements? And do these elements of the floors really affect performance? These are vital research questions for dance research in the interests of dancer health."*

This phase of Luke Hopper's research reported, *"Injury occurrence is all too common in dance. Dancers will always push their bodies to the limit to get the most out of their training. It is therefore very important that safe dance environments are created by reducing any unnecessary injury risks."*

*"This research has reported that dancers can be required to perform on substandard floors which were shown to affect ankle joint stress during dance movements. Dancers also demonstrated the distinct ability to sense changes in dance floor properties. Dance institutions are now able use this information and work with dancers in creating dance environments with the aims of helping dancers to dance better, stronger and for longer."*

Another researcher is Dr. Boni Rietveld, previously an orthopaedic surgeon at the Centre for Medicine, Dance and Music in The Hague, Netherlands and past President of the International Association for Dance Medicine and Science (IADMS). Boni Rietveld observed, *"There is a distinction to make between injuries caused by the floor and those caused accidentally. As far as the former are concerned, it is evident that there is a cause and effect relationship between dancers' injuries and the floor on which they perform."*

*"Generally, dancers should refuse to perform on unsuitable floors and demand the right to have a touring floor that has the same absorbent characteristics as the floor installed in their rehearsal studio. In this way, we would certainly be able to prolong the career of dancers, who, at the moment, stop at 35 years of age, because their bodies no longer work properly, or because of injury. As far as private dance schools are concerned, they should be more careful in choosing their flooring. In my opinion, a dance floor should be neither too hard nor too soft. A hard floor has the effect of causing serious return shock waves and can bring about injuries or premature wear in the cartilage. A soft floor causes the muscles, and therefore the tendons, to work harder. Additionally, a floor that is too soft can be dangerous for dancers because of the effect of surprise."*

## Researching dancer protection

Whilst the EN14904 standard stipulates that a floor used for sport must offer a minimum of 25 percent force reduction, it does not in any way quantify the impact protection on contact with the floor, a factor considered particularly important for young dancers of school age.

To establish a way in which different levels of "protection", as opposed to force reduction, could be quantified, research was carried out in a five-year study by the biomechanics department of the University of Poitiers in France.

The study concluded that force reduction while being essential in the determination of a safe dance floor (i.e., protection against long term injuries), is not always sufficient for the profile of the people that use it. Protection is crucial against immediate injury risks such as bruising and even more important when it comes to the protection of younger dancers.



## The role of the flooring manufacturer

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Harlequin is widely recognised as the world's leading authority on dance floors. As an enlightened manufacturer, Harlequin has always worked closely with the dance community to develop floors that dancers want to dance on. Flooring products in the Harlequin portfolio were typically evolved to meet the specific needs of a particular dance style and have been developed in conjunction with dancers themselves.

Aware of the high injury level among dancers, Harlequin is an active supporter of IADMS (International Association for Dance Medicine and Science) and of NIDMS (National Institute of Dance Medicine and Science). NIDMS, through shared expertise and a network of multidisciplinary partners, is working to provide better and more affordable access for all dancers to high-quality, evidence-based, dance-specific health care and dance science support services.

Harlequin also provides backing and support for research work and is using the information derived from research studies to inform new product development.

**Harlequin offers free advice to ensure dance companies install dance floors best suited to their particular use.**

**If you would like further information, advice and samples please contact us:**

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