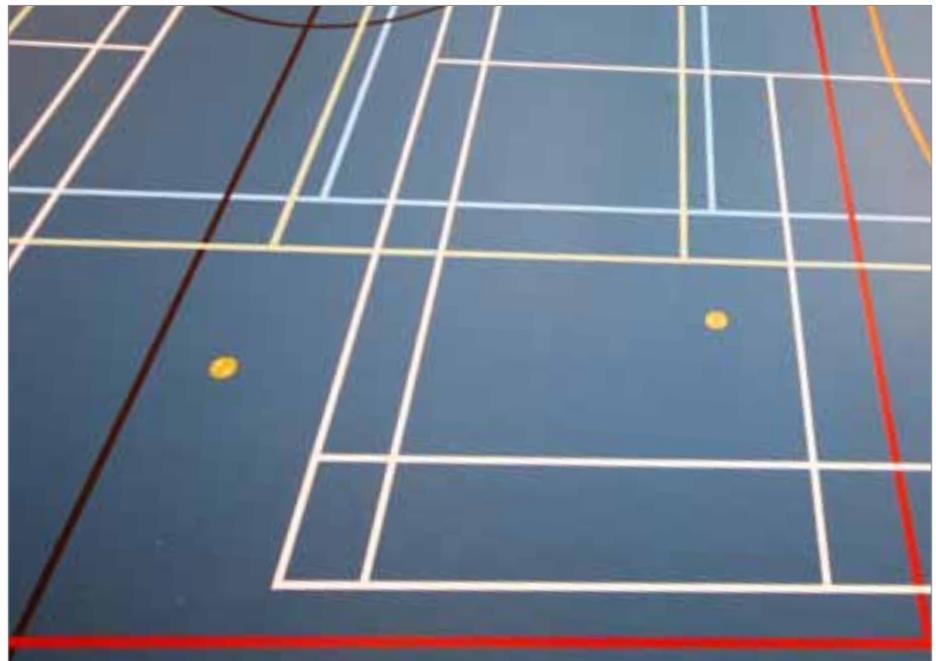


## Appendix 4 Sports Hall Flooring

(To be read in conjunction with the main document)



# Affordable Sports Halls

## Introduction

This Appendix contains additional information on the review of sports floor products that are on the market, National Governing Body (NGB) sports requirements and the selection of the sports floor type that has been included in the indicative 'Affordable Sports Halls' designs and cost plans.

Technical information for a wide range of products has been reviewed to establish general construction details, costs and their performance data against BS EN 14904:2006. This is the main standard for indoor multi-sport flooring and includes a classification system for floor types against deformation and energy absorption characteristics. It includes the terms point elastic (P), mixed elastic (M), area elastic (A) and combined elastic (C)<sup>1</sup> that are often used to describe sports floors.

## An affordable sports floor

Typically, the installation costs for sports floor products range from £45 – 80 / m<sup>2</sup> and the thickness ranges from 10 mm to over 100 mm above the structural floor slab. With the inclusion of markings and fixings, this can represent a range of cost from £34,000 - £58,000 (or 4 – 6 % of the base construction costs) for a 4 court sports hall.

However, the selection of a multi-sports floor is problematic for a number of reasons:

- No single sports floor surface will fully meet the requirements of all the sports that are likely to be played in a school and community sports hall
- The published advice tends to be focused on the requirements (or preferences) of higher levels of play, rather than on an acceptable compromise for a multi-sports project
- The floor type classification in BS EN 14904:2006 allows an overlapping range of values for deformation and energy absorption. For example, an area elastic floor can have similar deflection and energy absorption characteristics to a point elastic or combined elastic. This means that an analysis of the cost benefits under these categories can be misleading.

There are also issues around current general practice in school sports halls and perceptions of value for money. The point elastic (P1) type of sports floor product is sometimes used for physical education facilities in schools and is at

the lower end of the cost range. Whilst the product type does give a degree of softness under foot and can be considered as a forgiving surface for activities for younger children, it also has technical limitations. It does not have force reduction and deflection characteristics that are appropriate for many higher levels of sporting activities. These would include use by older children with higher body weight, for training where there are high levels of repetitive actions and competitions where the level of activity may be more intense.

## A higher performance multi-sports floor

An energy absorption of above approximately 45% has been taken as appropriate for a school / community facility that aims to cater for a full programme of sports activities involving older children, adults, repetitive training and competition to give greater comfort and to reduce the risk of injury.

Whilst this can be achieved with a range of product types (i.e. point, area and combined elastic), it was concluded that a 'low profile' or 'floating' type of (A3) area elastic sports floor would be the best option in the context of the affordable sports hall project. In addition to the energy absorption characteristics already discussed, it is in the mid cost range and has the potential to avoid inconsistency of ball bounce that is perceived to be an issue for cricket and basketball.

Typically, a floor of this type would be between 40 - 50 mm in thickness and consist of either a sheet or poured wearing surface on a plywood deck that is laid onto a foam energy absorbing / supporting layer.

## Sports floor maintenance

The establishment of an appropriate cleaning regime is important to ensure a clean, safe, long lasting and attractive sports floor and the manufacturer's recommendations should be carefully considered.

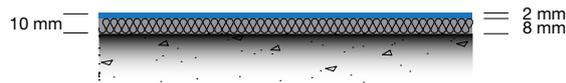
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<sup>1</sup> See Sport England Design Guidance Note *Floors for Indoor Sports*.

## Typical sports floor construction

### Point elastic:

The energy absorption is provided by the c 8 mm shock pad.

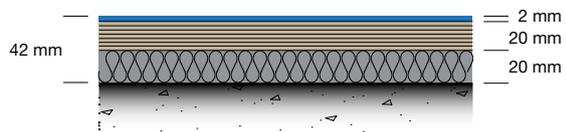


### Point elastic

(See BS EN 14904: 2006 for shock absorption and vertical deformation criteria for types P1, P2 and P3)

### Area elastic ('floating' or 'low profile' system):

This has an additional layer of plywood / timber to spread the loads and stiffen the system. The energy absorption is provided by the deflection in the plywood / timber layer and the c 20 mm shock pad.

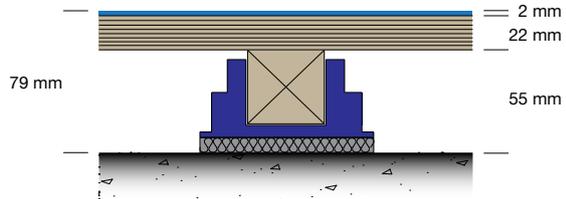


### Area elastic

(See BS EN 14904: 2006 for shock absorption and vertical deformation criteria for types A3 and A4)

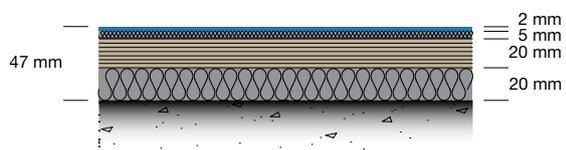
### Area elastic (on an 'undercarriage' system):

This has additional battens (and counter battens) supported on cradles. The energy absorption is provided by deflection in the plywood / timber layer / battens and in the shock pads under the supporting cradles.



### Combined elastic:

A point elastic system on a 'floating' or 'low profile' energy absorbing system.

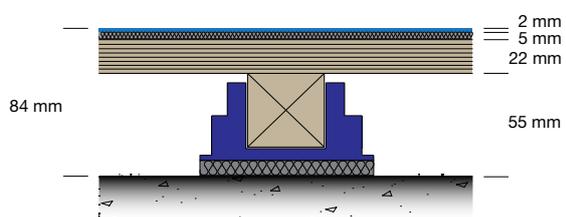


### Combined elastic

(See BS EN 14904: 2006 for shock absorption and vertical deformation criteria for types C3 and C4)

### Combined elastic:

A point elastic system on an area elastic batten / cradle / shock pad undercarriage system.



Note: The specification and thickness of the materials used in the make up of a floor system will affect the performance qualities. For example, the deflection, energy absorption, slip resistance and ball bounce characteristics.

## Acceptability issues for school and community level of use

### Class P1 sports floor (BS EN 14904:2006) <sup>2</sup>

- Shock absorption and vertical deformation are low, but adequate for many purposes.
- Slip resistance complies with BS EN 14904.
- Basketball rebound resilience is good.

Sport	Acceptability range	Comments
<b>Badminton</b>	Very Low	The limited deflection and energy absorption characteristics are issues with a P1 floor. Sprung floors are generally preferred for badminton, finished either with a point elastic sheet P1 type surface or with hardwood flooring. Therefore some P1 sports floors laid over concrete would be perceived as too hard for club levels of play.
<b>Basketball</b>	Low / Medium	A P1 floor should be acceptable since the ball bounce and slip resistance are good, but it might be perceived as harder and less shock-absorbent than ideal. The FIBA approve floor products of this type and appear to use DIN 18032 performance criteria.
<b>Cricket</b>	Medium	When combined with a roll-out wicket, the P1 floor on a concrete base could give acceptable ball bounce characteristics.
<b>Netball</b>	Low / Medium	A P1 floor is likely to be acceptable, although the Netball requirements for vertical deformation may not be met.
<b>Volleyball</b>	Very Low	A P1 floor is not likely to be acceptable since the NGB requirement for Volleyball is for a sprung floor, unless a specific product is individually approved.

### Class A3 sports floor (BS EN 14904:2006) <sup>2</sup>

- Shock absorption and vertical deformation are in the mid range. The shock absorption range is greater than the minimum set for impact on an athlete in DIN 18032.
- Slip resistance complies with BS EN 14904.
- Basketball rebound resilience is good.

Sport	Acceptability range	Comments
<b>Badminton</b>	Medium	An A3 floor at the top of the range for the Class will come close to meeting Badminton England's published requirements. However, some A3 floors products might be perceived as too hard.
<b>Basketball</b>	Medium / High	Some A3 floors would meet DIN 18032, so would be acceptable for all levels of Basketball. However, some A3 floor products might be perceived as too hard and there is a preference for timber floors.
<b>Cricket</b>	Medium	When combined with a roll-out wicket, the A3 floor on a concrete base could give acceptable ball bounce characteristics.
<b>Netball</b>	Medium	Some A3 floors (those with low vertical deformation) will meet Netball's basic requirements. Some A3 floors will meet their ' <i>Preferred</i> ' shock absorption requirement, but all will have higher vertical deformation than accepted under their ' <i>Preferred</i> ' criteria.
<b>Volleyball</b>	High	A3 floors meet the stated requirement, though it is likely that A4 would be preferred to A3 and that a Combi floor would be still better.

<sup>2</sup> This analysis gives an indicative overview. However, individual sports floor products available on the market may achieve varying degrees of acceptability.