



Design Note 2: Sports Hall





Sports Hall

Use

For school use, a sports hall provides the opportunity for the development of skills for indoor court games, individual activities and the practice of some skills and techniques for outdoor activity. The most likely games which will be taught are badminton, basketball, volleyball, netball, indoor hockey, handball and table tennis. In addition, skills practice such as athletics, football, golf and cricket may be taught, as will gymnastics activities needing a large floor area.

A four-court sports hall is considered as one teaching space and ideally should not be sub-divided for teaching separate classes. Doing so tends to result in a deterioration in the learning experience due to the distraction and disturbance caused by the other teacher and class. The full hall is required to give sufficient room to teach a class of pupils the activities listed above.

For community use, a large range of sports activities can be accommodated, although it would be impractical to cater for all of them at any one period in the life of the hall. The most likely activities for which there will be community demand will be five-a-side football, badminton, basketball, netball, short mat bowls, volleyball, table tennis and cricket practice. Indoor hockey may also be played, although a four-court hall is not large enough to accommodate a full size indoor hockey court.

For both school and community use, activities such as martial arts, movement and dance and keep fit should be provided in the gymnasium or dance studio as appropriate. Depending on the size of the group, these can be accommodated in the sports hall but the environment is less than ideal. In smaller schools with less facilities the sports hall may have to accommodate some of these activities.



It is essential that all the likely school and community uses of the hall are established as early as possible as these will affect later decisions on the detailed design, fitting out and equipping of the hall.

In order that the sports hall (and indeed all the activity spaces) is used to its full potential, it is essential that there is sufficient storage space for all sports equipment required by school and community users. See **Design Note 7** for further guidance.

Dimensions

Length: 34m

Breadth: 19m

Height: 7.6m

These dimensions are 1m longer and 1m wider than is recommended in current **sportscotland** guidance for stand-alone sports halls, Technical Digest 200: Sports Halls: Design (Scottish Sports Council, 1995). The height is the minimum unobstructed height above the playing area.

The extra width is required to allow space for teacher and pupils at the side of the courts during teaching. It also affords some room for team benches and officials or limited room for spectators. When the hall is divided across its width disturbance to activities is also reduced as other users can

Notes

Fire Exits omitted for clarity

Net 'Y' is optional

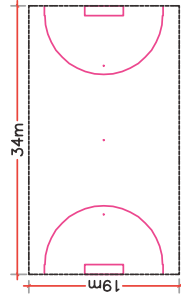
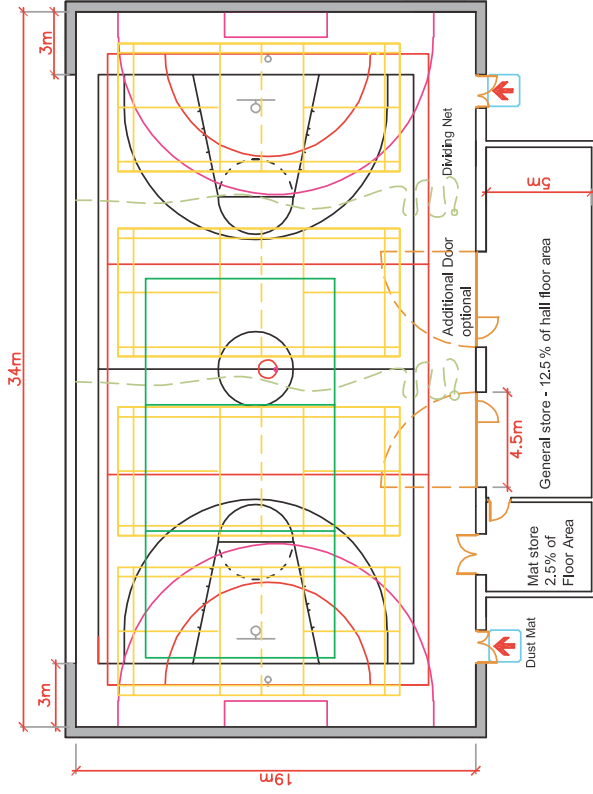
Net 'X' and Net 'Y' would not normally be used together

Badminton Court 4 would not normally be used in isolation but the divided zone may be used for other recreational activities

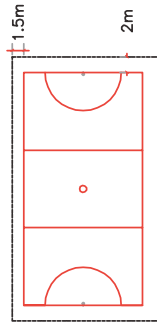
Standard Netball Court (30.5m x 15.25m) reduced to 30mx 15.25m to maintain 2m min safety margin

Netball 'D Line' could be used for 5-a-side

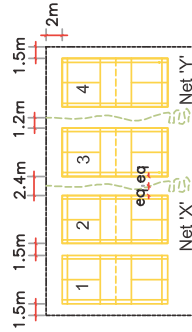
Hatched area indicates zone to be free of doors



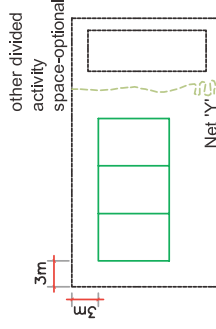
5-a-side (34m x 19m)



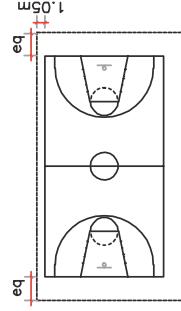
Netball (30m x 15.25m)



Badminton (13.4m x 6.1m)



Volleyball (18m x 9m)



Basketball (28m x 15m)

Drawing 02: Four Court Hall: Main Activities



cross the hall using this extra space. Consequently, the court markings should be offset to provide the minimum recommended safety margins along one length of the hall with the remaining (larger) margin on the other side which should ideally contain the main entrance door and access to the store room.

The extra length allows semi-permanent equipment such as cricket nets to be stored on the end wall without obstructing play or alternatively allows extra circulation space across the hall.

Floor

The choice of floor has a great influence on the playing conditions of a hall. The choice is therefore critical to the quality of a sports hall and should depend primarily on the range of sports activities for which it will be used. A sprung or semi-sprung sports floor will be required.

It is also important to consider any non-sporting school or community uses for which the hall may be used and ensure the floor will not be damaged by chairs or other equipment.

- Floor finishes should be light in tone and warm in colour in so far as is compatible with the clear reading of court line markings. A light reflectance value of 20 – 40% is recommended.
- The floor should be impact absorbing.
- The surface should be non-slip, non-abrasive and offer good traction.
- It should be resistant to wear, impact and indentation and require minimum maintenance.
- Thresholds should be level to allow the safe transportation of trolleys and large pieces of equipment.

Floor Markings

It is important to decide upon the most appropriate floor markings with reference to the needs of the school and the



The sports hall floor must be suitable for a variety of uses.



Playing surfaces in a sports hall must conform to BS:EN14904. A sprung or semi-sprung sports floor might typically be specified.

community and taking into account what other facilities exist in the school and nearby. For example, if the school has a synthetic multi-court area outside or if there is a five-a-side football complex nearby then (depending on the demand) it may not be necessary to mark out the hall for five-side football.

In a four-court hall, marking out courts for more than about four or five different sports will usually be too confusing. Badminton and basketball will almost certainly be required, and probably netball. Five-a-side football, hockey and volleyball may also be considered, although a four-court hall is not large enough for a full-size indoor hockey court.

For both school and community use, courts must be laid out in accordance with the appropriate sizes, colours, markings and safety margins between and around courts. For detailed information contact the appropriate governing body or refer to 'Technical Digest 201: Sports Halls: Dimensions and Capacities' (Scottish Sports Council, 1995) and Pitch and Court Markings data on the [sportscotland](https://www.sportscotland.gov.uk/) website

Skirting

Regardless of the type of sports floor chosen a robust, timber (ideally hardwood) skirting should be fitted at the junction between wall and floor. The skirting will help protect the base of the walls from impact damage and cover any perimeter expansion joint.

The skirting should be at least 100mm high and taper inwards slightly from top to bottom to limit hockey and cricket balls rebounding upwards into the face or body of participants.



Too many court markings can lead to confusion.



For school use, height adjustable net sockets at either end allow the entire hall to be utilised and are suitable for volleyball, badminton and tennis for pupils of all ages.

Walls

Sports hall walls have to be resistant to the impact of projectiles and bodies. Their detailing must avoid all projections and avoid ledges below 3m. The wall construction and finishes specified should therefore:

- Be capable of withstanding heavy impact with a surface which avoids flaking, dusting or discolouration.
- Be non-abrasive for a minimum height of 3m. Any pointing between block-work or brickwork should be flush.
- Have no recesses or projections such as columns, rainwater pipes, service conduits, switches and power sockets below 3m, and avoid recesses and projections above 3m where possible.
- Provide adequate support for basketball backboards and gymnastic equipment.
- Avoid ledges which harbour dust, balls and shuttlecocks.

Colour, Contrast and Glare

Background contrast to moving objects and the control of glare must be considered. Excessive changes in colour and materials should be avoided and the light reflectance value of the materials should be 30 – 50%. A matt finish is recommended.

Ceiling Zone

The ceiling zone is perhaps the most complex part of the hall design in that it has to accommodate elements of lighting, ventilation and acoustic control. The hall ceiling zone should:

- Be without ledges or recesses which may trap balls or shuttlecocks and harbour dust;
- Be capable of withstanding the impact of balls, in particular volleyballs and footballs;
- Take account of the requirements of the lighting system and netting tracks;
- Be designed to achieve the necessary acoustic conditions in the hall.

Colour and Contrast

It is essential that all projectiles used in activities can be clearly seen at all times. The choice of colours and tones used in the ceiling zone must therefore minimise contrast between light sources and other surfaces. Generally, ceiling zone fabrics should have matt finishes with a light reflectance value of around 0.9. Clutter and shadows should be kept to a

minimum. Suspended ceilings are not recommended.

Fixings for Equipment

Fixings for equipment, nets, rails, safety harnesses, light fittings and so on must be incorporated without impinging on the clear unobstructed playing height. In a multi-sports hall it is important that nets and apparatus fixed within the ceiling zone can be brought in and out of use without major disruption. The combination and configuration of fixings required in the hall must therefore be carefully considered, as should the relationship between this roof-mounted equipment, light fittings and ventilation ducting. The structural frame should be designed in such a way that it carries as much of the light and other fittings as possible without the need for additional support framework. Above all, players must be able to clearly see projectiles at all times.

Environment

The sports hall should have its environment controlled centrally – local occupant control is discouraged. It is important that installed services are simple to operate and easy to maintain.

Lighting

Lighting of sports halls must deliver uniform levels of illumination across the hall, good colour rendering and avoid glare.

A fundamental decision is whether natural lighting should be incorporated. Traditional sports hall design has tended to exclude natural light due to the problems of glare and contrast. However, natural lighting can help create a more pleasant environment and reduce energy consumption. It is recommended that natural lighting is utilised in the sports hall provided the detailed design can avoid the problems above. It is particularly important that the lighting controls can successfully integrate natural with artificial light for different uses of the hall and in varying levels of natural light throughout the day. Reference should be made to 'Daylighting of Sports Halls' (sportscotland, 2003).

The lighting control room should be located within the reception or staff base. As well as integration with natural lighting, controls should allow for different levels of lighting within the hall if it is divided for different activities. For most school and recreational use an illuminance level of 300 lux should be sufficient, sometimes rising to up to 500 lux for club use. The system should also have the facility to lower levels below 300 lux for cleaning, maintenance and non-sports uses. This can be done with high frequency lighting which may be dimmed.



If carefully designed, the introduction of natural lighting, for example through translucent roof panels, creates a more pleasant hall environment.

The lighting design for the hall should therefore take into account the following issues:

- Integration with natural lighting;
- Court layouts and hall division. Luminaires should be positioned above the gaps between badminton courts and may be needed on either side of hall dividers;
- Luminaires should have wire guards or another form of impact resistant cover;
- Controls should be simple but incorporate energy saving measures;
- Due to the demand for varying light levels within the hall for different activities, luminaires should be multi-lamp or be capable of being dimmed;
- Emergency lighting will be required, both in the hall and stores.

Heating and Ventilation

A temperature range of 13°C to 16°C is suitable for most sports but temperatures up to 20°C may be required for short-mat bowls, social use and activities such as art, dance and drama. Suitable heat emitters include high level radiant heating (direct gas-fired or low pressure hot water) and high level warm air. When selecting the type of heat emitters the following issues need to be addressed:

- Noise levels must be acceptable. For example, gas fired black tube radiant heating, which research has shown to be an economic option for a sports hall in both capital and operating costs, would normally be too noisy for activities such as drama;
- A rapid response may be required to heat the hall for full occupancy;
- Air velocities should be less than 0.1m/s to avoid deflecting shuttlecocks and table tennis balls;
- The system should be integrated effectively into the overall hall design.

A ventilation rate of 1.5 air changes per hour is appropriate for most sports halls of average height (around 7-8m high). The system should be capable of boosting this rate if significant numbers of spectators are in the hall or if it is used for exams, public meetings and performances where large numbers of people may be present.

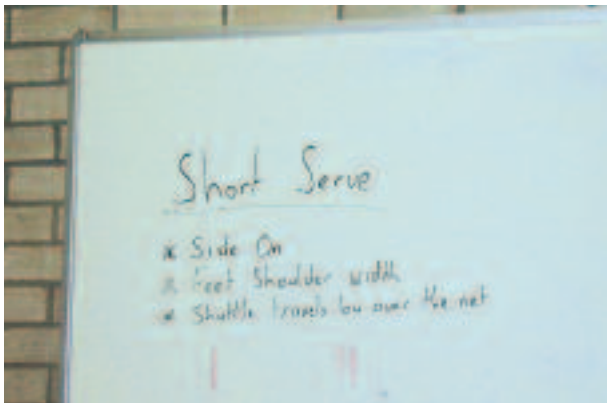
Acoustic Considerations

For normal sporting activities a maximum reverberation time of 2 seconds at 500 Hz with a background noise level of NR 50 is recommended. Shorter reverberation times, if they can be achieved, would improve the teaching environment.

The hall should be designed to achieve a 40dB reduction in noise level between it and any adjoining teaching space. Noise spillage to or from the exterior of the building may have to be contained on some sites. Users with hearing impairments may benefit from a hearing enhancement system or induction loop encircling the space, and it is recommended that an induction loop system be fitted.

Acoustic treatment of walls will not normally be necessary, as the ceiling will generally best suit the introduction of acoustic treatment. Wall surfaces above 3m can, however, be used to enhance the acoustics. Surfaces can be constructed to be sound absorbent but must also be capable of withstanding ball impact. Impact resistant acoustic panels or acoustic masonry blocks may be considered.





White boards are an essential teaching aid, and should be recessed to be finished flush with the hall wall.

Fixtures and Fittings

Doors

Access and fire exit doors should open out from the hall. These openings increase the potential for injury to users and therefore must be treated with care.

The positioning and design of doors should:

- Eliminate sharp and potentially dangerous corners in the activity zone;
- Ensure that all doors and frames are flush with the internal wall surfaces;
- Take account of the width and height of portable equipment (including bleacher seating units where required) and allow sufficient space for people to safely manoeuvre and transport such equipment through door openings;
- Avoid positions behind goal areas;
- Provide a suitable internal rebound surface which is flush with the adjoining wall surface;
- Have leafs wide enough for wheelchair users (some sports wheelchairs require a 1m clear opening width);
- Be accompanied by a full width mat outside the entrance to trap and minimise the introduction of abrasive dirt.



Rebound panels can be fitted above and below panic bolt pressure bars to produce a flush surface.

Windows and Internal Glazed Screens

There should be no windows below 3m. Any windows above 3m of floor level should be flush with the internal wall finish of the hall. Windows and internal screens should be of safety glass and be located to minimise distraction to players. Glazed screens should be double glazed with blinds between the glass panes when privacy is required. Blinds should be operated from within the hall using flush-fitting controls.

Basketball Boards

Wall-mounted boards should fold to the side for storage. For larger halls, however, the length of the cantilever required to reach the ends of the basketball court may preclude this option. In this scenario, boards can be mounted from the roof structure. Such ceiling mounted boards, on the other hand, may interfere with the playing heights required for other activities and may also have an affect on other uses of the hall such as for concerts.



Practice basketball goals on the side of the hall should be height adjustable.

Portable goals are another option, but the significant storage requirements of these should be considered as should the time taken to get them ready for use.

School use of the hall is likely to require practice boards at intervals along the long walls of the hall. These should not have any associated floor markings other than possibly a spot to mark free-throw distance and should be height adjustable to suit different age groups.

Hall Division

Although the sports hall has been considered as one teaching space, nets may be required for sub-division during community use and also for specific activities such as golf or cricket practice. The position of nets (or other means of division) should be decided with reference to the likely requirements of hall users and the roof structure should be designed to accommodate net trackings.

The weight of the nets, as well as their mesh and colour, will be determined by their function. For example, green contrasts well with balls and shuttlecocks. If visual screening is required the lower 2m of nets should be a curtain rather than mesh. The impact of netting on the lighting system must also be considered. Consideration must also be given to net storage: when not in use, netting should not interfere with activities and



Nets should be stored clear of the activity zone.

should be stored behind flush-mounted access panels in recesses in the hall wall, or be hoisted free of the activity zone. Floor sockets may also be required for tensioning of nets. Hooks, handles etc. for winding gear should be fitted behind flush-mounted access panels.

Goals

Goals for five-a-side football or indoor hockey may be required. When in use, these must be securely fixed to the wall/floor. Five-a-side goals are typically 4.5m long and therefore require the hall store to be deep enough for storage and manoeuvring. Alternatively, when not in use they can be stored folded flat and secured to the end walls of the hall. Storing the goals on the back walls may, however, interfere with hall use. Deciding where to store any such goals will again depend on the likely uses of the hall, but it will normally make sense to provide sufficient space in the store in any case.

Floor Sockets

These will be needed to secure movable items of equipment such as hockey, football and basketball goals and gymnastics equipment. Floor sockets can be inserted after floor construction, but the construction of the sub-floor must be able to accommodate sockets in the desired positions, especially if under floor heating is used.

Gymnastics Equipment

For smaller schools without a separate gymnasium, the sports hall may be fitted with wall bars/wall ladders along one wall, although these may restrict the range of other activities the hall can accommodate. Similarly, the roof framework may have to accommodate fittings for gymnastics equipment.

Other Sizes of Hall

A four-court hall is likely to be appropriate for most schools and is the minimum recommended size of hall. There may, however, be circumstances when a larger hall is appropriate. This will depend on the range of facilities provided at the school, community demand, what facilities exist nearby and so on.

For example, a school with a large roll may, on the face of it, require two halls. These need not both be standard four-court halls - the requirements of the school and community users should determine what is provided. It may make sense to provide one larger sub-dividable hall. Such a hall can accommodate more sports (perhaps a full-size indoor hockey court), can also host a higher level of competition (for example regional standard competition) and will possibly have space for spectators. Such decisions need to be carefully made, for example the method of sub-division must provide sufficient impact resistance and noise reduction to allow simultaneous use of both spaces for separate teaching or sporting activity.

A six-court hall will typically be 34m by 27m with minimum unobstructed playing height of 7.6m (or up to 8.4m depending on the required level of play). An eight-court hall will typically be 37m by 34m with minimum unobstructed playing height of 7.6m to 9.1m. See 'Technical Digest 201: Sports Halls: Dimensions and Capacities (Scottish Sports Council, 1995).

The 34m dimensions noted above should be increased to 34.5m if netball is to be a core sport for the school or community







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