TEMPORARY & MOVABLE SEATING LAYOUTS (SEATWAYS) - SEMINAR ROOMS & PUBLIC EVENTS ETC.

What do you need to know?

If you are setting out temporary seating (not fixed to the floor such as theatres or lecture theatres etc.), then you need to be aware of how to set the seats out and terms such as ‘Seatway’¹.

- **One room and one exit** - set out seating and gangways for a maximum capacity of a single room = no more than 60 persons;
- Using floor area (e.g. 1 person to 1m²) to determine the room space seating numbers is NOT an appropriate way to factor room seating numbers;
- Generally, once the gangways and seating has been setup using the seatways spacing principal, then the resulting seating space numbers will determine the seating capacity;
- Any temporary seats in rows of more than seven (7) seats need to be clipped together to stop topple;
- The maximum number of seats in a row without an escape gangway at either end is 12 seats;
- The maximum number of seat in a row with escape gangways at either end is 28 seats.

Information for those managing small teaching venues:

- When using furniture in ‘lecture mode’, ensure that people set their seats out in sensible rows;
- Ensure that there is plenty of room for walking between the rows (i.e. around 1 metre, if possible);
- When using furniture in ‘group work’ mode, ensure that, where people are sitting around in groups, there are clear routes to the room’s exits around desk configuration;

¹ Seatway - means distance between adjacent rows of seats (seatway is measured by the distance between perpendicular dropped from the front of a seat (a) including any armrests and the back of the adjacent seat (b) or a barrier in front seat(a)).

References (Note: unfortunately, each set of guidance has slight variations in measurements and numbers of seats. This Tech Note uses BS9999**, but other guidance and information on setting out temporary seating & seatways can be found at the following documents):

- Guidance from BS 9999: Annex D - Recommendations for theatres, cinemas and similar venues,
- (Yellow Guide) Technical Standards for Places of Entertainment: Part C2 - The District Surveyors Association & The Association of British Theatre Technicians,
When asking students/users to rearrange rooms, you need to ensure that seating layouts do not obstruct escape routes from the room;

Ensure that, when setting up a room, if there is furniture that is surplus to requirements for your event, it is stored in an area clear of exits, and is not moved outside the room into surrounding escape routes, corridors or staircases;

**Information for those managing spaces with moveable furniture:**

- Ensure that furniture is stored in suitable areas (not corridors or staircases);
- Ensure that furniture is located away from sources of ignition (i.e. light fittings, heating units and electrical equipment);
- Ensure that furniture remains in good condition (if any becomes damaged, particularly if it is foam-filled, this needs to be removed or reupholstered as a priority);
- Ensure that those using the room are aware of their duties in managing the layout of the furniture, and the need for controlling the associated risks;

**Contents**

**What Do You Need To Know?** ................................................................. 1

1.0. **Introduction** ......................................................................................... 2

2.0. **Factors to Consider** ............................................................................. 3

3.0. **Seatway & Setting Out Information / Guidance** .................................. 6

4.0. **Gangways** .......................................................................................... 8

5.0. **Door Widths** ........................................................................................ 8

6.0. **Marquees** ............................................................................................ 9

7.0. **Flow Chart Guidance to Capacity Arrangements** ............................... 9

Annex - Setting Out Plans Examples

1.0. **INTRODUCTION**

1.1. It is important that in seminar rooms, halls, entertainment events, temporary structures, such as marquees (graduation ceremonies) and similar venues etc., provided with non-fixed seating that it should be set out to general standard. This is to ensure that adequate escape routes are provided and designed, so that in the event of a fire they are capable of enabling the occupants to evacuate the room, space, venue or building in the most effective manor.

The ‘Responsible Person’ for the premises, under the Fire Safety Order 2005, will need to ensure that an exercise of chair layouts with gangways/seatways and counting chair numbers is undertaken before use - this maximum seating arrangement should then be specified in the venue, function or premise’s Fire Safety Policy & Function Emergency Plan.
When designing new or refurbishing Lecture Theatres at UCL, then the guidance on seatways below is to be incorporated as part of fixed seating layouts. Lecture theatre project layout and design to be in agreed with UCL Fire Safety Manager.

2.0. FACTORS TO CONSIDER

2.1. **Vroom or Venue Capacity** - there are a number of factors that may determine the capacity:

- Upper floor or basement venue capacity will depend on the width of both the alternative escape stairs (where the largest stair is discounted for escape purposes) and the doors leading to and from the stairs. Capacity of the rooms / venues may then be reduced further, depending on the seating arrangements and layout in respect to the provision of gangways and Seatway² widths, and the general setting out of the Means of Escape from the space;

- number of exits and travel distance to exits;

- Width of doors leading from venue and into and out of stairs or rooms (if on ground floor etc.);

- number of stairs;

- the width of stairs (staircase load capacity);

- **External Marquees** - if the venue is outside using a marquee, then the seating layouts within the structure and exits, will determine capacity size;

- **Existing Buildings** - if the venue is in an existing building, room or structure, then these spaces will determine the numbers of occupants that will be accommodated and permitted;

2.2. **Seating Factors**

- Generally, once the gangways and seatways have been established, then the resulting seating space will determine the seating capacity;

- **One room and one exit** (including above ground floor or at basement level) - set out seating and gangways for a maximum capacity of a single room = 60 persons;

- **One room and more than one exit leading to independent stair enclosures** (above ground floor or at basement level):

2 **Seatway** - means distance between adjacent rows of seats (seatway is measured by the distance between perpendicular dropped from the front of a seat (a) including any armrests and the back of the adjacent seat (b) or a barrier in front seat(a)).
Physically set out seating in rows with gangways ensuring gangways lead to exits. Circulation space to be provided around exits as per guidance below;

**Now you need to considered stair widths and their capacity** - room capacity in relation to capacity of all stairs minus the largest\(^2\) (See Table 1 below)?

- If the room capacity is less than the capacity of all stairs (minus the largest\(^3\)), then it may be safe to continue ensuring you consider other factors set out below;

- If the room capacity is greater than the capacity of all stairs minus the largest\(^2\), then you will need to review seating capacity; in this case, stair capacity determines the maximum seating / occupants permitted;

2.3. **If more complex arrangement than above**, then you should seek specialist advice from fire safety staff or local fire / licensing authority, as other factors may need to be considered:

- **Ground Floor** - the capacity of the rooms / venues on the ground floor will determined by the following room area and door widths;
  - if escape routes lead directly outside to safety;
  - whether escape is through a stair enclosure, which may impact on escaping occupants on upper floors;
  - Capacity may then be further reduced depending on the seating arrangements and layout and the provision of gangways/seatway widths and the general setting out of the means of escape;

- **Upper Floor / Basement Locations** (see attached seatway plan as guidance) - for rooms / venues above (or below) ground floor and escape is via stairs, then the availability of escape stairs and their maximum occupancy/capacity numbers would apply to the seating and general layout:
  - e.g. if the width of north staircase (Stair B) is 1200mm (capacity of 250 persons) wide and the secondary stair (Stair A) is only 1050mm wide (capacity of 220 persons), then the larger of the two stairs (Stair B) is discounted (unavailable for escape due to fire for purposes of determination). Then the secondary stair (Stair A) width and capacity provides the maximum room / seating capacity regardless of the floor size of the venue;

\(^3\) See Note 5 under Table 1.
Stair capacity **Stair a & B = 470 persons** (**Stair B** minus the widest staircase = 250 persons) due to discounting (unavailable for escape due to fire); leaves **Stair A** determining the stair & upper floor capacity at anytime of 220 persons (see Table 1 below). This figure would include room occupants / catering / stewards / presenters & other occupants on floors above. Therefore, the alternative escape route determines the maximum capacity of venue / room of **not more than 220 persons**.

2.4. **Stair Width Occupancy Guidance (Table 1)** - guidance on the evacuation capacity of staircases used for people using venues and rooms:

<table>
<thead>
<tr>
<th>Number of Upper Floors Served:</th>
<th>Recommended Maximum Capacity* of Staircases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[maximum number of people that may rely on escape from a staircase with width of stairs measured between walls or balustrades ignoring handrails - so long as each handrail does not project more than 100mm into the escape route]:</td>
</tr>
<tr>
<td></td>
<td>900** mm</td>
</tr>
<tr>
<td>First Floor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60**</td>
</tr>
<tr>
<td>Second Floor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60**</td>
</tr>
<tr>
<td>Third Floor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60**</td>
</tr>
<tr>
<td>Fourth Floor</td>
<td>Not Permitted</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BASEMENT LEVELS</th>
<th>Number of Lower Floors Served:</th>
<th>Recommended Maximum Capacity* of Basement Staircases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[maximum number of people that may rely on escape from a staircase with width of stairs measured between walls or balustrades ignoring handrails - so long as each handrail does not project more than 100mm into the escape route]:</td>
<td></td>
</tr>
<tr>
<td>Basement @ -1 level</td>
<td>Not recommended</td>
<td>150</td>
</tr>
<tr>
<td>Basement @ -2 level</td>
<td>Not Permitted</td>
<td>Not Permitted</td>
</tr>
</tbody>
</table>

Note 1: *Based on Approved Document B, The Building Regulations / **applies to single staircases from upper floors or basements only / maximum capacity of occupants using a room with a single door or exit;*

Note 2: the aggregate capacity of any staircase forming part of the means of escape from any floor should be equal or exceed the room venue limit for that floor;

Note 3: where a staircase serves more than one floor the capacity of the staircase should equal or exceed the aggregate capacity of the exits opening onto it; or be equal or exceed the total room / accommodation limit for all floors opening onto that staircase;

Note 4: the aggregate capacity of several staircases is calculated by adding together the maximum numbers of people who can safely use the staircases to escape - and not by adding together the widths of the various staircases. E.g., the capacity of two staircases each 900mm wide is (2 x 60 people) = 120 and not the capacity of a single staircase 1600mm wide of 320 people;

Note 5: because a fire may render any one staircase unusable, the remaining staircases should have sufficient capacity for the total number of people needing to use them to escape, after discounting one (generally the widest) staircase. The aggregate capacity of the staircase(s) from each floor should be adequate having discounted each staircase in turn. It would not be necessary to discount a staircase if:

(a). all staircases provided for means of escape have a pressurised smoke control system complying with BS 9999; or

(b). where each entry to each staircase is protected by an unventilated lobby of fire-resisting construction providing a minimum of 30 minutes fire resistance;

Note 6: After discounting a staircase it is accepted that the travel distance to the storey exit may exceed the recommended maximum distance;
3.0. SEATWAY & SETTING OUT INFORMATION / GUIDANCE

3.1. Audiences seated in rows will first have to make their way to the end of the row before being able to use the escape routes provided. Seating and gangways in rooms / venue auditoriums should therefore be arranged in order to allow free and ready access direct to the exits. In fixed seats, there should be a clear space of at least 300mm between the back of one seat to the front of the seat behind it.

3.2. What is a Seatway? It is the distance between perpendiculars dropped from the front of a seat, including any armrests, and the back of the seat in front or the barrier in front. Where seats tip up automatically, the width of the seatway is measured from the maximum projection of the seat, including any armrests, when the seat is in the ‘up’ position.

3.2. Viewing Screens - space at the front of the room / event space has to be allowed for both circulation, escape and for the front seating users to view any screen etc, without unnecessary discomfort to neck. It is recommended that seats be arranged so that a spectator’s eyes do not have to look up more than 35° to see the top edge of a screen.
3.3. **Seating Rules and Guidance** - temporary seating in rooms/venues should be set out as per Table 2:

(a). **Table 2 - guidance on seatway widths:**

<table>
<thead>
<tr>
<th>Seatway Widths (mm)</th>
<th>Recommended Maximum Number of Seats in a Row</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seats in Rows with 1 x Gangway</td>
</tr>
<tr>
<td>300 to 324 mm</td>
<td>7 Seats</td>
</tr>
<tr>
<td>325 to 349 mm</td>
<td>8 Seats</td>
</tr>
<tr>
<td>350 to 374 mm</td>
<td>9 Seats</td>
</tr>
<tr>
<td>375 to 399 mm</td>
<td>10 Seats</td>
</tr>
<tr>
<td>400 to 424 mm</td>
<td>11 Seats</td>
</tr>
<tr>
<td>425 to 449 mm</td>
<td><strong>12 Seats</strong></td>
</tr>
<tr>
<td>450 to 474 mm</td>
<td></td>
</tr>
<tr>
<td>475 to 499 mm</td>
<td></td>
</tr>
<tr>
<td>500 mm</td>
<td></td>
</tr>
</tbody>
</table>

(b). **Table 3 - guidance on the fixing of seats:**

<table>
<thead>
<tr>
<th>Number of Seats:</th>
<th>Recommendations:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>50 Seats or more</strong></td>
<td>Seats should be fixed or clipped together when in rows of 4 or more to prevent 'row topple' obstructing the escape of occupants in other rows,</td>
</tr>
<tr>
<td><strong>250 Seats or more</strong></td>
<td>Secure the seats together in rows and fix the ends of the rows to the floor or to each other by using chamfered bars,</td>
</tr>
<tr>
<td><strong>Over 600 Seats</strong></td>
<td>Fix all seats to the floor,</td>
</tr>
</tbody>
</table>

**Notes:**

1. The fixing of seats together should be sufficiently secure to prevent easy separation, snaking or row topple under pressure.
2. Where it is impractical to fix seats to floor plates, for example on polished dance floors, other means will be needed.
4.0. GANGWAYS

4.1. Gangways may be flat, sloping or stepped and should be carefully set out to provide clear flow of occupants towards exits and generally meet the following conditions:

(a). Gangways should be a minimum of 1100mm wide,

(b). Gangways being used by less than 60 persons may be set out at a minimum 900 mm wide (However, unless absolutely necessary, it is strongly recommended that gangways are generally not less than 1100mm wide);

(c). Gangways used by people with impaired mobility or use wheelchairs for example, should be at least 1100mm wide;

(d). Gangways should have no projections or obstructions, and should provide a clear route throughout its length;

(e). the end of rows of seats should be aligned to maintain a uniform width throughout the length of gangways;

(f). Gangways should be not be wider than doors or stairs, to prevent funnelling and ‘crush’ conditions.

5.0. DOOR WIDTHS

5.1. The time available for escape depends on several factors, including the distance that has to be travelled to reach a place of safety and the risk rating of the premises. Established escape times are around 2½ minutes for normal risk premises with guidance below on numbers of occupants that can pass through clear door openings:

<table>
<thead>
<tr>
<th>Door Widths:</th>
<th>Numbers of persons able to pass through:</th>
</tr>
</thead>
<tbody>
<tr>
<td>750 mm (absolute minimum width)</td>
<td>60 persons (normal risk)</td>
</tr>
<tr>
<td>850 mm</td>
<td>110 persons (normal risk)</td>
</tr>
<tr>
<td>950 mm (minimum width for wheelchairs)</td>
<td>160 persons (normal risk)</td>
</tr>
<tr>
<td>1050 mm</td>
<td>220 persons (normal risk)</td>
</tr>
<tr>
<td>Doors greater than 1050 mm wide</td>
<td>1050mm = 220 &amp; then 5mm per person on width greater than 1050mm (e.g. door width of 1500mm - 1050mm = 450mm (450 + 5mm = 90) 220 + 90 = max 310 persons)</td>
</tr>
</tbody>
</table>
6.0. **MARQUEES**

6.1. Setting out of seating, gangways, exits and the provision of emergency lighting, emergency signage, fire equipment and seatways should use this guide, as a base document - but also arrangements should also be discussed with the UCL Fire Safety Manager prior to the event.

7.0. **FLOW CHART GUIDANCE TO CAPACITY ARRANGEMENTS**

7.1. A flow chart is provided below to assist with the planning of venue seatways and occupant capacity.
SEATWAY GUIDE TO STAIR CALCULATION IN ACCOMMODATION ABOVE GROUND FLOOR LOCATIONS

Temporary Seating Required

Is the venue on an upper floor or basement level?

Yes

The maximum number of people that may rely on escape from a staircase is likely to have an impact on the venue numbers regardless of the available space.

No

Is there more than one stair?

Yes

You will need to measure the stair widths and discount the widest stair (checking on Table 1 above & follow guidance) to give stair capacity.

No

Then the maximum total number permitted is 60 persons.

Is the venue on an upper floor or basement level?

Yes

Are there direct exits to open air?

Yes

Exit door width capacity - may determine seat numbers see guidance above.

No

Do venue exit routes pass through stair enclosures?

Yes

Occupants from venue + occupants from floors above or below may exceed capacity of final exit door(s) & cause overcrowding or delay to occupants from upper/lower floors in leaving the premises.

No

See Table 4 Above – Door Width Capacity

If Yes

If Yes

Room / Seating Capacity Determined

Stair Capacity Identified?

No

Problems?

Yes

You may need to seek specialist advice

Single room, with one exit and or one stair = a maximum of 60 persons subject to room size, seating layout & physical number that can be safely set out. Gangways absolute minimum of 900mm wide but should aspire to 1100mm widths if practicable

Do venue exit routes pass through stair enclosures?

No

Is the venue on the ground floor?

Yes

Are there direct exits to open air?

Yes

Temporary Seating Required

Is there more than one stair?

Single room, with one exit and or one stair = a maximum of 60 persons subject to room size, seating layout & physical number that can be safely set out. Gangways absolute minimum of 900mm wide but should aspire to 1100mm widths if practicable

Exit door width capacity - may determine seat numbers see guidance above

Occupants from venue + occupants from floors above or below may exceed capacity of final exit door(s) & cause overcrowding or delay to occupants from upper/lower floors in leaving the premises.

Identify if occupancy using stairs is low in numbers? Or, will the event take place out of working hours? Both may remove problem...

Stair Capacity Identified?

No

Problems?
GUIDANCE ON CHAIR NUMBERS & LAYOUT TO SUITE ONCE GANGWAY & SEATWAY WIDTHS HAVE BEEN ESTABLISHED

Notes:

(2) Absolute Minimum widths of Gangways = 900mm (General recommendation = 1100mm)

(3) Maximum capacity of a Staircase is 1200mm (Stair B) = maximum capacity of 240 persons HOWEVER alternative escape stair/route is 1050mm wide (Stair A) with a maximum Capacity of 200 persons. Therefore, alternative escape determines maximum capacity of Lecture Theatre / Gallery / Office Occupants (1st & 2nd floors) + Catering / Theatre Stewards / Presenters etc - not to exceed 200 persons maximum occupancy.

(4) Seating should be in rows of no more than 12 seats with the 'Seatway' gap of between 400 & 425mm (Recommended that 425mm is used) - Seats in rows of 4 or more should be clipped and connected together to prevent 'row topple' obstructing the Means of Escape.

(5) Disabled Refuge - 2 potential areas identified for Disabled Refuge, but to be used must have 3 means of communications provided and Suitable & Robust Management Arrangements to remove occupants without the assistance of the Fire Brigade to make Lecture Theatre accessible and have Emergency Egress arrangements.
The following guide can be used to determine the general capacities of escape routes based on clear opening door widths - Door Widths & Numbers of persons able to use:

- 750 mm (absolute minimum width) = 60 persons (normal risk).
- 850 mm = 110 persons (normal risk).
- 950 mm (minimum width for wheelchairs) = 140 persons (normal risk).
- 1050 mm = 200 persons (normal risk).

Doors greater than 1050 mm wide - use 5mm per person (1200mm = 5mm = 240).

Exit door width opening in the direction of escape will determine gang width and recommended minimum gap of 1050mm here to allow for Means of Escape.

Seaway for 7 seats suggested gap of 300-350mm (but recommend gap 325mm used here to allow for Means of Escape)

50 seats or more - Seats should be fixed or clipped together when in rows of 4 or more to prevent 'row hoppers' obstructing the escape of occupants in other rows.

250 seats or more - Secure the seats together in rows and fix the ends of the rows to the floor or to each other by using chained bars.

Over 600 Seats - Fix all seats to the floor.

Seatway Widths (mm) - Seats in Rows with 1 x Gangway:

- 300 to 324 mm = 7 Seats
- 325 to 349 mm = 8 Seats
- 350 to 374 mm = 9 Seats
- 375 to 399 mm = 10 Seats
- 400 to 424 mm = 11 Seats

12 Seats (Maximum Permitted) in single direction of escape

Seatway Widths (mm) - Seats in Rows with 2 x Gangways:

- 300 to 324 mm = 14 Seats
- 325 to 349 mm = 16 Seats
- 350 to 374 mm = 18 Seats
- 375 to 399 mm = 20 Seats
- 400 to 424 mm = 22 Seats
- 425 to 449 mm = 24 Seats
- 450 to 474 mm = 26 Seats
- 475 to 499 mm = 28 Seats

Seatway for 28 seats maximum row length gap of 500mm used here to allow for Means of Escape.

SUGGESTED LAYOUT OF TEMPORARY SEATING TO ACCOMMODATE MINIMUM PERMITTED GANGWAY & SEATWAY WIDTHS
Seatway for 8 seats 350-375mm to allow for Means of Escape