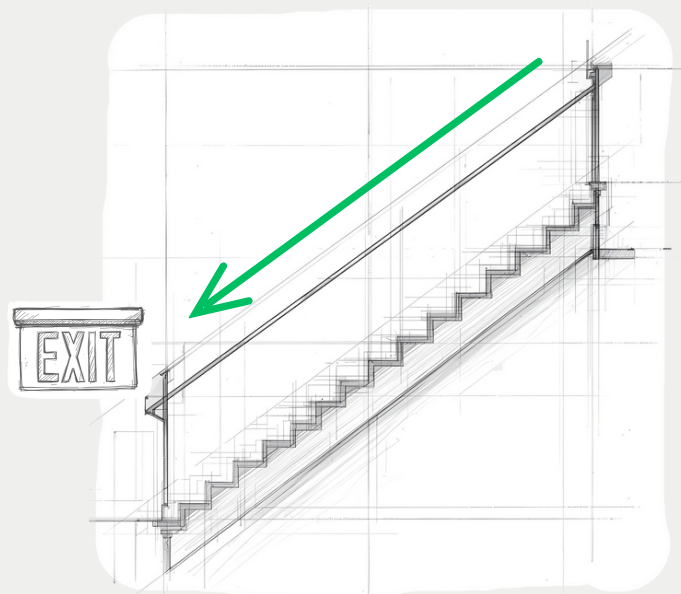
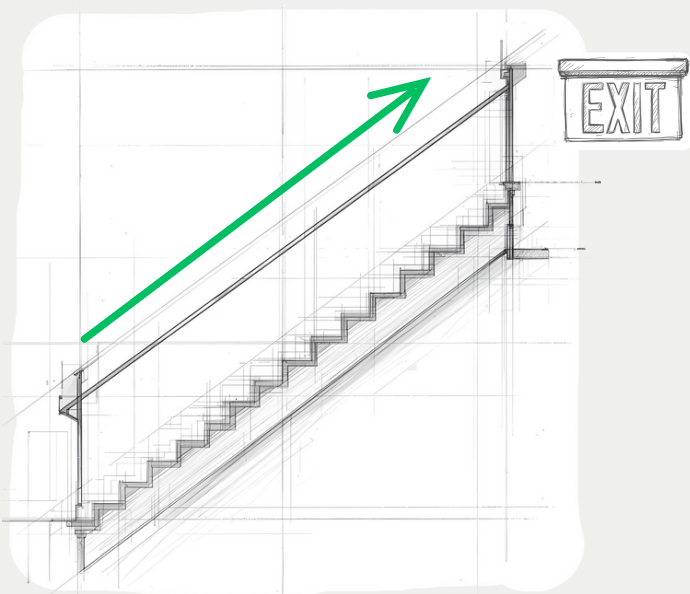


VERTICAL ESCAPE CAPACITY EXPLAINED



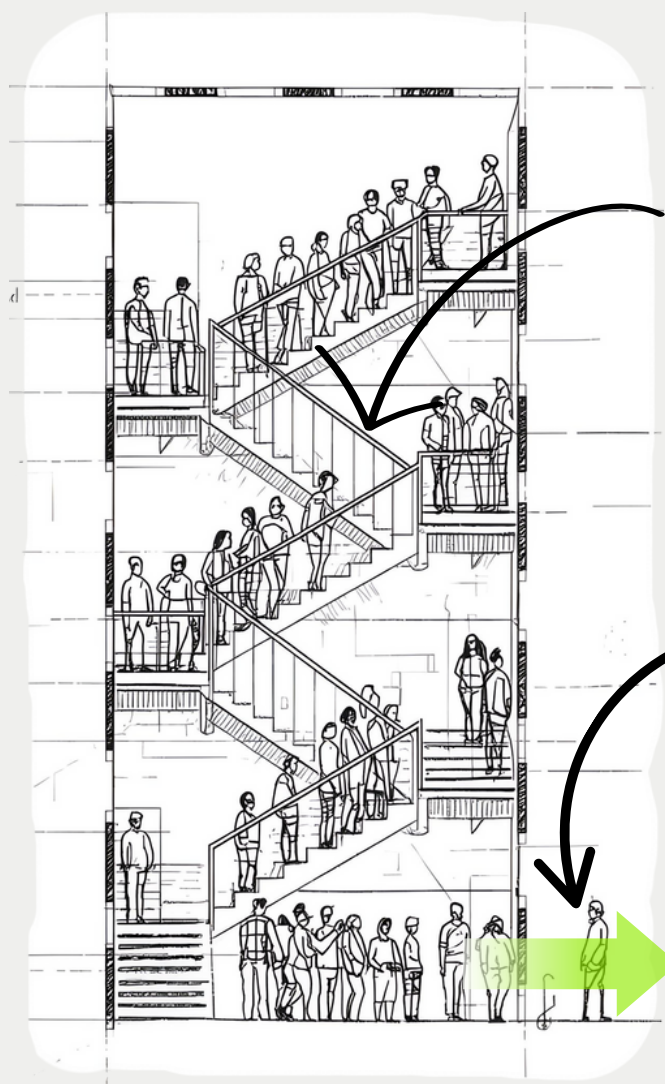
Minimum width 1000mm for downwards travel (1100mm if firefighting stair)



Minimum width 1200mm for upwards travel

Stacking and flow

Vertical escape capacity is based around the concepts of stacking capacity and flow capacity. The capacity of a given stair is dictated by the amount of people that can exit the stair at ground floor in a given timeframe (flow capacity), and the amount of people that can be safely accommodated within the stair enclosure at any given time (stacking capacity).



Stacking capacity is calculated as $50(W-0.3)(N-1)$ where W is the width of the stair and N is the number of storeys served.

Flow capacity element is based on the notional flow rate through an opening of 1.33 persons/m/s which, based on an evacuation time of 2.5 minutes, equates to 200 persons per meter opening.

Flow capacity + stacking capacity gives the total stair capacity and is calculated as:
 $200W + 50(W-0.3)(N-1)$

Is one enough?

The provision of a single stair is acceptable in certain circumstances, depending on size and use of building. However, generally speaking, buildings with a storey height greater than 11m are required to have more than one protected stair (for residential buildings the limit is now 18m).

For buildings provided with a single protected escape stair, the occupancy would generally be limited to 60 people per storey.

Simultaneous vs phased evacuation

Vertical escape capacity is highly dependant on which evacuation regime is being implemented. Vertical escape capacity in a simultaneous evacuation building is based on all occupants within the building using the stair at the same time. In a phased evacuation building, the vertical escape capacity is generally based on two floor levels evacuating at a time which could allow for a higher occupancy per floor level. More on this in the next edition of Explained.

ADB vs BS 9999

Similar to the last edition of Explained which was on horizontal escape capacity, ADB and BS 9999 have a slightly different approach to calculating the vertical escape capacity. ADB provides tabulated values depending on the width of the stairs and the number of storeys served. These values are based on the concepts and calculations to the left. However, it uses the same values for all non-residential buildings.

BS 9999 uses minimum required stair width per person based on number of storeys served and risk profile of the building i.e. it takes into account the type of building and the characteristics of its occupants. Furthermore, if enhancements are made in other areas of the building (e.g. automatic fire detection is provided) then further allowances are made.

Example

Context: Nine storey (GF + 8) office building provided with sprinklers and automatic fire detection. The building is provided with two lobby protected means of escape stairs measuring 1200mm effective clear width. For the purposes of this example, we assume that there is sufficient horizontal escape capacity.

	ADB	BS 9999
Simultaneous evacuation	138 occupants per storey	207 occupants per storey
Phased evacuation	260 occupants per storey	352 occupants per storey