

disabled people. An audible warning at the beginning and prior to the end of the travelator is essential for visually impaired people.

Travelators should have a minimum unobstructed level run-off at each end of **6 metres**. The maximum gradient for a travelator should be **5 per cent (1 in 20)**.

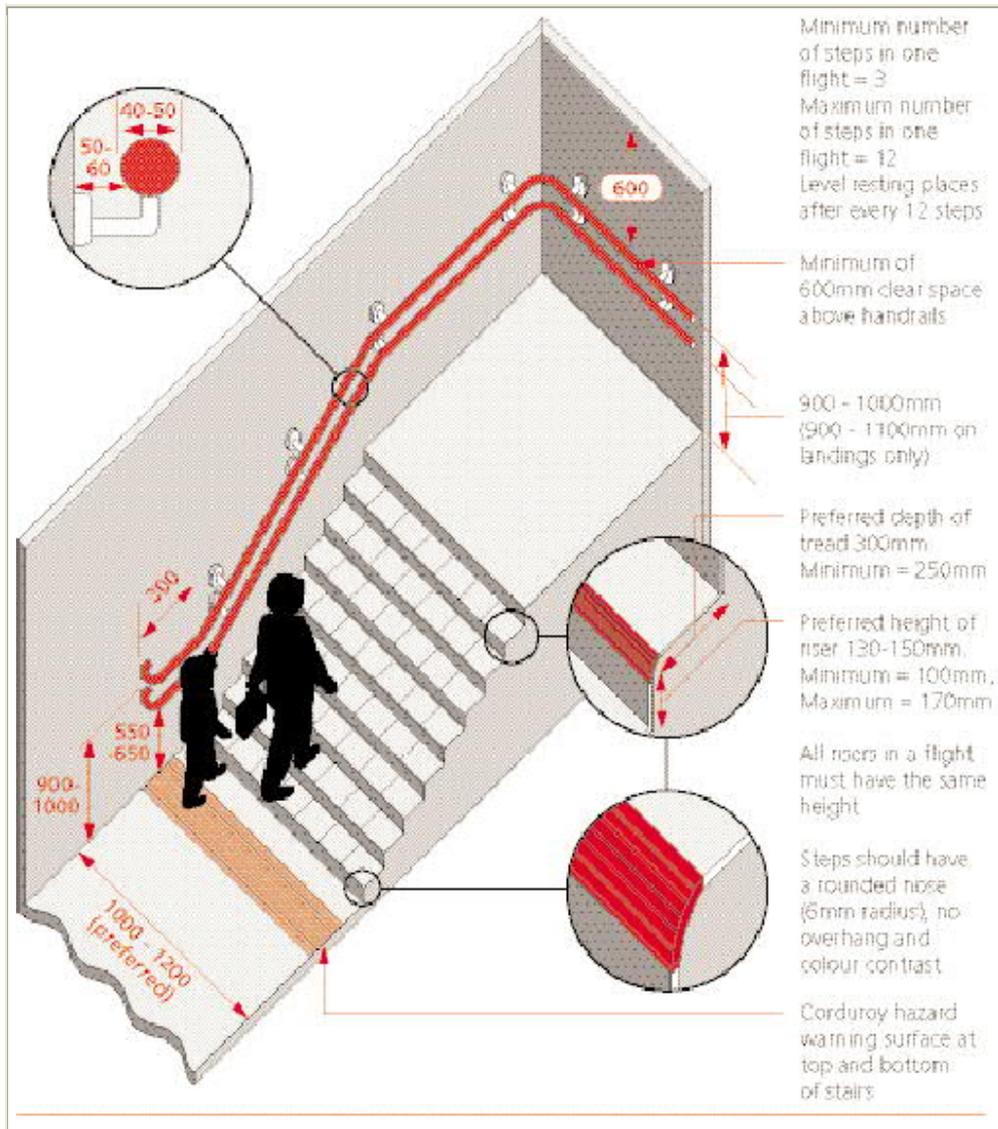
8.4 Changes in level ⁶

Even a single step will prevent access for the great majority of wheelchair users (and be a trip hazard for others), so alternatives must be provided; either ramps or lifts. However, the design of steps and stairs themselves is important. Good design can greatly assist ambulant disabled people and those with visual impairment.

8.4.1 Steps and stairs

A considerable amount of research on dimensions and design of steps and stairs was carried out in the 1970s and 1980s and there is reasonable consistency between the dimensions given in various national guidelines. A riser height of **150mm** can be managed by most people; a little more than this is possible if there are well designed handrails but **170mm** should be regarded as the maximum in normal circumstances. Steps with very shallow risers can cause problems and should be avoided; **100mm** is the absolute minimum.

Steps and stairs



Tread depth or going should be **300mm** deep (approximately the length of a size 9 shoe), never less than **250mm** and the nose of the step should be rounded (**6mm** radius) without any overhang. People with walking difficulties often pull their feet up the face of the riser; any overhang will catch their foot.

Common criteria from several guidelines are that all steps in a flight must have the same dimensions, that open tread staircases are to be avoided, as are curved or spiral staircases and that there should be tactile warning surfaces at the foot and head of the stairs (see Section 4). Stairs should be well lit (minimum **200 lux**, see Section 11) and surfaced with a slip resistant material. Colour contrast on the step noses is essential for visually impaired people and should extend across the full width of each tread, **55mm** deep on both tread and riser.

People with walking difficulties cannot manage long flights of steps. The maximum number of risers in a flight should be **12**, with resting places between successive flights. Resting places should be at least **1200mm** long, preferably **1800mm**, and across the full width of the stairway. The minimum number of steps in a flight should be **three**; fewer than this is less safe.

Stairs should have a minimum clear width between handrails of **1000mm**, preferably **1200mm** which is sufficient for a disabled person and companion. Handrails should be provided on both sides (see Section 8.4.3) and, where stairways have a clear width of more than **1800mm**, a centre handrail should also be provided⁷. Stairs of this width are needed where there is concurrent two-way movement. Stairs that lead to a platform, on which people will be carrying luggage, should be **3000mm** wide (with centre handrails).

As mentioned in Section 3.7, means should be provided to limit the risk of people colliding with the underside of freestanding stairs or ramps at any point where the clear height is less than **2100mm**. The appropriate hazard warning surface should also be provided at the top and bottom of steps (as detailed in Section 4.2).

There should be unobstructed landing space at the top and bottom of each flight of stairs of a length at least equal to the unobstructed width of the stairway.

8.4.2 Ramps

In many places ramps (defined as a gradient of more than 1 in 20) will provide the alternative access to stairs for wheelchair users. Where the change in level is no more than **200mm** a ramp may be used without alternative steps.

Ramps
