Stairways – Fall Prevention Fact Sheet

WHY DO WE NEED TO WORRY SO MUCH ABOUT FALLS ON STAIRS?

Stairs of all types have been used since ancient times, and because they are inherently hazardous, people have been falling on them, getting hurt or even killed in the process.

The vast majority of stairway falls result from a loss of balance, just as falls are on the level.

A very common contributing factor is neglecting to use handrails.

Because stairway accidents can cause severe injury and even death, building codes for stairs and ramps are justifiably very rigorous. Good design can substantially reduce the potential for mis-stepping by providing us with the means to retrieve our balance, but even the best design cannot eliminate falling hazards entirely. The need for proper design also applies to ramps. The fact is that some incidents can be caused by inattention, unsafe behaviour, and inappropriate footwear.

The best approach to minimize the hazard of falling down stairs is to encourage the building of well-designed stairways, combined with training focused on raising our awareness of the potential for disaster.

What factors must we consider in designing safer stairs?

Stair dimensions

Figure 1 shows the recommended dimension ranges for all the important elements of stairways.

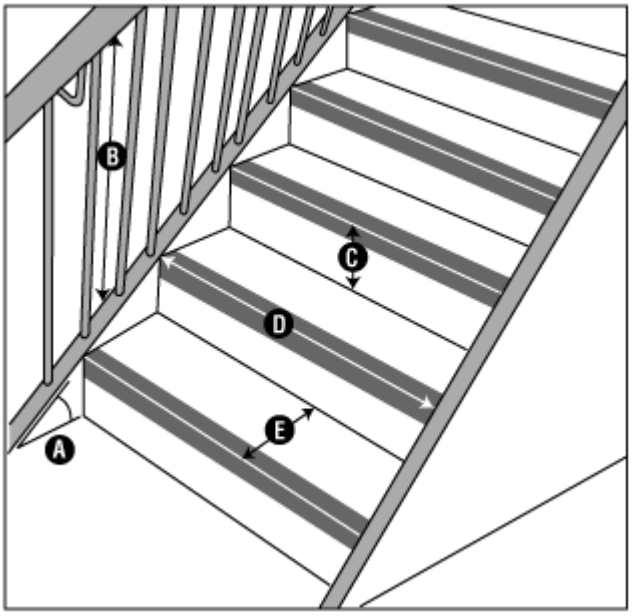

Figure 1

Figure 1: Legend

A – Optimal range: 30º-35º
B – Handrail height: between 86.5 and 107 cm*[+]
C – Riser height: between 12.5 and 18 cm*
D – Step width: 90 cm min.*
E – Tread run: between 25.5 and 35.5 cm*

Within a staircase, treads shall have a uniform run and tread depth that does not vary more than 0.5 to 1 cm*.

[+] Note that handrails or guards used for exit stairs and exit ramps (as well as landings) must not be less than 107 cm*, unless the exterior stairs or landing is more than 10 m above the adjacent ground level, where by the guard must be not less than 150 cm*.

* Values are from the National Building Code of Canada (2015). Always check with your local jurisdiction as requirements are different in each area.

The maximum range for a stair slope is 20º-50º. However, because the majority of people prefer a slope of 30º-35º, this is the recommended range.

Steeper stairs change the way you climb them because the steeper they are the more effort you exert. The ratio of riser height and tread depth has to be adjusted accordingly. (See Figures 2 and 3)

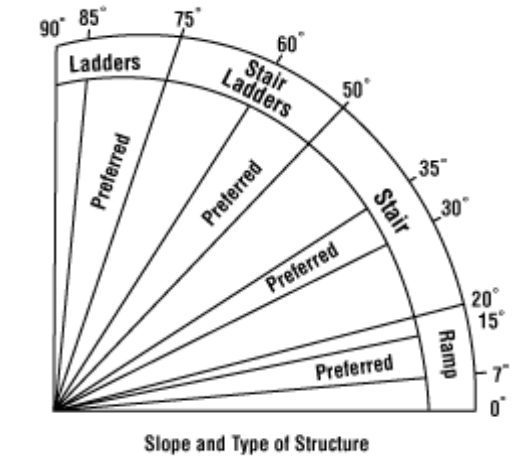

Figure 2

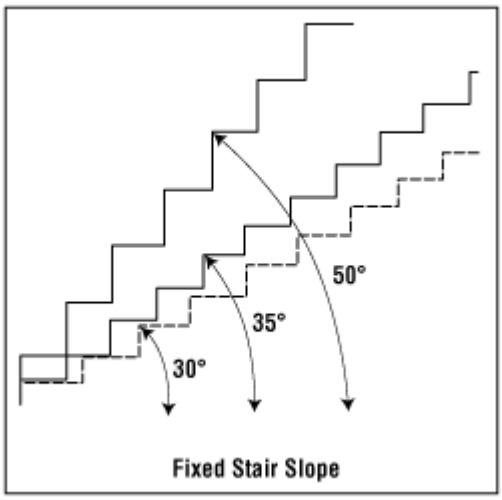

Figure 3

From: Kodak’s Ergonomic Design for People at Work. 2nd ed. John Wiley & Sons, 2004. p.244

The dimension of risers or treads in a stairway should not vary more than 1 cm. When doors open directly into the stairwell, a 50 cm-wide platform should be provided beyond the swing of the door. The recommended maximum number of steps between landings is 18, with no more than two flights without a change of direction. The depth of any landing should be at least equal to the width of the stairs.

Stair surface

To reduce the risk of slipping on stairs, non-slippery surface on the whole steps or at least on the leading edges is crucial. Such a surface can be made of rubber, or metal or painted with special slip-resistant paint. Regular maintenance of the stairs in good repair plus good housekeeping can reduce hazards for tripping.

Stair handrails

Attempts to design aesthetically pleasing stairways including handrails must not compromise functionality.

The prime function of the handrail is for holding as support while going up or down stairs. Handrails must be “graspable”.

It is therefore crucial to be able to grasp it quickly, easily and firmly if you should start losing your balance.

Figure 4 shows the recommended cross-section and dimensions of a good handrail.

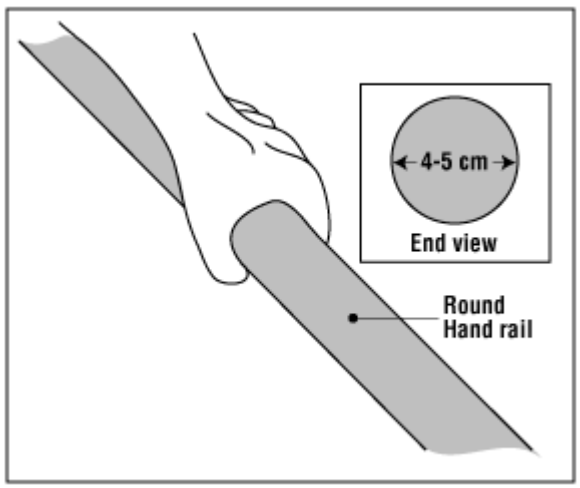

Figure 4

You should be able to run your hand smoothly along the entire length without having

to adjust your grip. You should apply the so-called “tennis-racket grip” at all times when possible.

Make sure to keep the necessary horizontal and vertical clearances in the guards to prevent the risk of young children falling through and to not facilitate climbing.

Visibility on stairs

Improving visibility on stairs significantly reduces the risk for common mishaps caused by misjudging distances. Otherwise you can trip on a step or miss it completely. You can catch a heel on the edge of a step. Such mishaps are a routine cause of twisted ankles, sprained knees or more serious injuries incurred by a total fall.

- Recommended illumination should be at the minimum 50 lux level.
- Use angular lighting and colour contrast to improve depth perception.
- Use matte finishes on the treads to avoid glare.
- Avoid patterned carpeting that may visually hide differences in depth.
- Be very cautious on stairs if you are wearing bifocal glasses.

Work activity

- Use any means to persuade people to grasp the handrail while both ascending or descending stairs.
- Avoid carrying objects with both hands.
- Do not carry bulky objects that block your vision.

Housekeeping

Good housekeeping is also vital to stair safety:

- Nothing should be sticking out the surfaces of stairs, handrails or bannisters (like nails or splinters) that could cause a fall.
- Spills, wet spots, or any debris should be immediately cleaned up.
- Broken or malfunctioning lighting should be repaired or replaced.