



# Risk Awareness and Control Measures for Indoor Walking Surfaces

Slip and Fall Prevention



Most people are naturally aware of floor safety hazards and change their behavior accordingly. Changes in gait (stride length) and posture occur when the brain receives signals from body sensors. This triggers the body to adjust and position for the purpose of safety, such as slowing down while walking on a visibly wet floor. When reduced vision, environmental factors or age delays normal awareness of exposures, businesses are responsible for raising a person's risk awareness.



## Slip and Fall Variables

### Human Gait

Knowledge of gait can help offset the risk of slip and fall accidents. Walking requires both horizontal and vertical forces to work together. Friction is a horizontal force created when feet contact the floor surface. Friction is strongest when a person pushes off from one foot and the weight shifts to the other foot. Gravity is a vertical (downward) force that alters the body's center of gravity as a person shifts weight while walking. The two forces create an altered center of gravity that is near constant and results in people walking on one foot about 80% of the time and with both feet on the ground about 20% of the time.

Figure 1 illustrates the phases of walking. The first phase, the heel strike, is the most common point at which a slip can occur. The increased heel speed between phases three and four may increase the potential of slipping and falling on a slippery floor.

Personal awareness of glare, surface variation and other risks is critical to safe walking. Signage and other reminders such as flooring design choices play key roles in keeping people standing and safe.

Figure 1 – Four Phases of Walking<sup>1</sup>



1. Heel Strike



2. Support



3. Toe Off



4. Leg Lift

### Vision Acuity

People with visual disorders may have a higher risk of slipping and falling. Changes in depth perception and spatial relationships due to aging eyesight can impact a person's awareness of flooring and its properties. Designers must research and select flooring for the individuals who will walk on it – whether they are employees, customers, patients or residents.

Interior designers need to consider lighting that optimizes a person's vision. The science of syntonics, which influences the function of light through the eyes and focuses on selected visible-light frequencies delivered through the eyes, can improve vision. Optometric phototherapy is a growing field, helping to define the effect of light on the body's sensors, including the ability to focus and balance. Lighting choices that excite rather than delay the body's natural sensors can be helpful for businesses that serve people subject to weak vision.

## Key Takeaways

- Be proactive
- Train employees and all floor care parties on key slip and fall-related safety principles
- Design safe walkways
- Place floor mats in each doorway entrance
- Remain vigilant about the effects of glare and design contrast when selecting floors
- Adhere to maintenance protocols
- Be aware of changes in surface texture
- Provide adequate lighting

## Slip and Fall Controls

The following risk control actions safeguard against risks in internal environments and help promote an increased awareness of safety by the public and employees.

### Be proactive

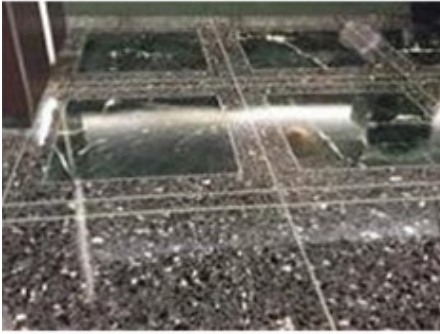
- Conduct a needs analysis of your walkway safety management efforts, including documentation of surface dynamic coefficient of friction (DCOF) values and maintenance requirements by both floor type and use.
- Understand premises liability and your obligations to customers, visitors and employees.
- Manage walkway risks through premises modifications and/or contract agreements.

### Train employees, property managers and contracted vendors on fall-related safety principles

Education is key in any sustained fall management effort. This includes specific skill training such as how to clean and maintain floors, especially walkways. Select proper cleaning equipment, including mops and buckets, for each floor type. Turn to floor experts for proper finish and sealant products. See our [Floor Cleaning and Maintenance - Training Floor Care Providers guide](#).

### Place floor mats inside each doorway entrance

Mats help trap outside walkway dirt and water before they reach interior floors and create a possible exposure. Purchase floor mats with slip-resistant backing and bevelled edges. Position the mats flat on the floor and ensure they are cleaned on a regular basis.

Figure 2 – Glare and Contrast Hazards<sup>2</sup>

1. Excessive Glare



2. Too Many Contrasts



3. Excessive Glare

### Remain vigilant to the effects of glare and design contrast when selecting floors

Slip and fall investigators have reported conditions in which a slip hazard could not be seen due to excessive glare and/or contrast in flooring color and design (see Figure 2). When [selecting flooring materials](#), always keep these concerns in mind.

To help reduce floor glare, add a decorative planter or object that is away from the flow of traffic. In addition, create surroundings where color and design contrasts help signal changes in floor elevations rather than hinder their perception, especially at door entrances. The human brain requires time to adjust to changes in its surroundings before it signals a slowing of the gait. Limiting design-related barriers that may distract the brain from detecting hazards is a necessity.

### Design safe walkways

Make sure walkway routes and building entrances are visible and free from obstacles. Water should quickly drain away from pedestrian areas to keep feet dry when entering the building. [Snow/ice management](#) is also important. Extra precautions must be taken to ensure all snow and ice are removed from the elevation change (assuming it is a single step up into the doorway).

### Adhere to maintenance protocols

Conduct floor cleaning and maintenance regularly.

- Inspect and maintain cleaning equipment.
- Select the correct type of mop for the floor and clean the mop before each use.
- To avoid the risk of contamination between different floors in the facility, replace dirty mop heads before cleaning a new area. Likewise, when using a floor scrubber, examine the scrub brush or pad to ensure cleanliness.
- To avoid damaging the mops, clean and hang them to dry after each use.
- Labeled equipment can help maintenance workers select the proper equipment for marked areas.
- When cleaning takes place, display signage warning of wet hazards. Remove the signage once the floor is dry.
- When an area needs to be off-limits during cleaning, create a procedure for setting up signage and train maintenance workers to follow the procedure.

While a certain number of falls are usual in an active business, increased attention to floor safety standards can help reduce legal exposures. [Floor care and maintenance](#) are vital parts of a slip and fall program. Success requires floor surfaces that are appropriate for their intended use, as well as cleaning products that maintain a desirable surface coefficient of friction (COF). Focusing on [slip-resistance testing](#), maintenance procedures and ongoing care can help keep people safe on their feet.



Figure 3

### Be aware of changes in surface texture

Slips occur when the sole of the shoe has insufficient traction against the walking surface. A trip results when the foot or shoe has too much traction, stopping the motion of the foot and resulting in a forward change in the center of gravity. A trip can also result from a change in surface texture such as from tile to carpet (see Figure 3). This exposure is particularly hazardous to the elderly and disabled and to those who shuffle their feet. Carpet should be no thicker than .5 inch.

Ensure there is a high contrast between different surfaces so that the change in material is easily identified. A slip and fall can result from a transition from carpet to tile or from carpet to polished concrete in an industrial operation. It is critical that the tile has a minimal slip resistance of .42 DCOF. The first step onto the tile can be the most hazardous. Pedestrians must be able to perceive and anticipate the hazard so they can adjust their stride and walking pace to maintain good balance.

### Provide adequate lighting

Adequate lighting is critical, especially in high-hazard areas such as steps/stairs and ramps, as well as changes in elevation, floor material or texture. Lighting improves walking surface hazard awareness and is particularly critical for the visually impaired and elderly.

Select and position indoor lighting so that it doesn't create a glare. Outdoor walking surfaces typically present more hazards and need proper illumination at night. See our [Outdoor Walking Surfaces guide](#).

### Workplace hazards and employee selection

When strategizing slip and fall prevention solutions, physical conditions are usually the main consideration. However, in some work environments, wet or potentially slippery walking surfaces may be an inherent condition. Additionally, rough terrain such as some construction environments may be difficult to control. It is important to consider a worker's physical ability to work in these conditions.

The physical inability to maintain balance also contributes to slips, trips and falls. Balance can be affected by medical conditions, prescription medications, a lack of strength or previous injuries, specifically to the feet, ankles, legs, hips or back. Consider incorporating a post-offer/pre-employment physical capabilities evaluation into the selection process so that strength, balance and/or pre-existing conditions can be identified.

### Sources

Figure 1, CNA Risk Control "Slip and Fall Study: Enhancing Floor Safety Through Slip Resistance Testing, Maintenance Protocols and Risk Awareness"

Figure 2, CNA Risk Control "Slip and Fall Study"

To learn more about managing your risk and increasing efficiency, visit [cna.com/riskcontrol](https://cna.com/riskcontrol).