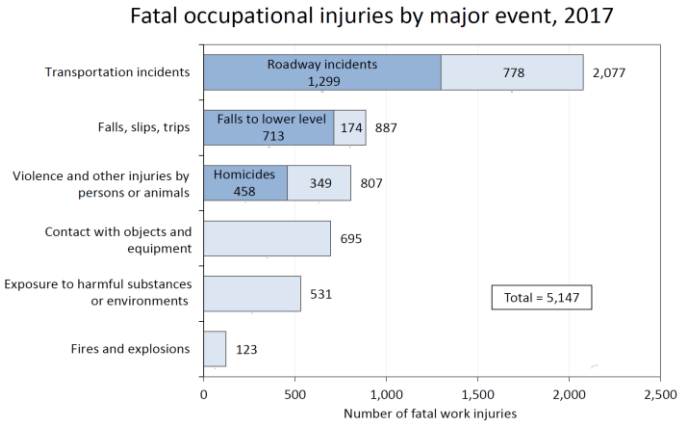
Slip, Trip, and Fall Prevention Guide

Slips, trips, and falls can never be fully prevented, though necessary measures should be taken to eliminate STF hazards as much as possible. Slips, trips, and falls are the leading cause of accidents/injuries at businesses and workplaces. In fact - slips, trips, and falls are the most frequent causes of workers' compensation claims. According to the Bureau of Labor Statistics (BLS), slips, trips, and falls accounted for 17 percent of all the fatal occupational injuries in 2017. The BLS reported a preliminary total of 5,147 fatal work injuries for calendar year 2017. Of this total, 887 were associated with slips, trips and falls. Falls to a lower level accounted for 80 percent of the fatal falls. In 2017, STFs were the second leading fatal occupational injury cause, first being transportation incidents.



U.S. Bureau of Labor Statistics, 2018.

Causes of Slips, Trips, and Falls

Hazards leading to slips, trips, and falls are often overlooked as these are not always noticeable hazards. Especially in busy work environments where there is considerable foot traffic, the probability of injury from a slip, trip and/or fall is a big concern. There are three main components that are essential in reducing STFs: the design of the walking surface-material, walking surface upkeep, and hazard recognition training. Making sure to look out for these hazards and eliminating them, is extremely important as they can call for some serious loss. If you discover a slip, trip, and/or fall hazard and cannot

resolve it yourself, you should immediately report it to someone who can. There are various factors that contribute to the risk of STFs.

According to the National Institute for Occupational Safety and Health, the top 10 STF hazards are:

- Contaminants on the floor
- Indoor walking surfaces irregularities
- Outdoor walking surface irregularities
- Weather conditions: ice and snow
- Inadequate lighting
- Stairs and handrails
- Stepstools and ladders
- Tripping hazards: clutter, loose cords, etc.
- Improper use of floor mats and runners
- Poor drainage: pipes and drains

There are also many contributing factors that could lead to slips, trips, and falls as in:

- Visual observation/ability
- Age
- Weight
- Physical state
- Stress
- Sickness
- Medications, alcohol, drugs
- Behavior – there are times the person can control whether the slip, trip, or fall
- Carrying or moving heavy or bigger objects, or too many objects – impairing your balance and preventing you from holding onto handrails, or blocking your view
- Improper housekeeping
- Insufficient signage when there are slip or trip hazards
- Not using walkways or designated pathways

- The velocity that the person is traveling when he/she encounters the hazard

Housekeeping

Developing and implementing a housekeeping program/STF risk control prevention policy could help to prevent slips, trips, and falls, as well as help reduce the number of workplace injuries and associated loss costs. In the prevention program you may want to include these basic principles:

- Address management commitment to reducing the risks of these accidents and injuries, along with identifying the parties responsible for the implementation of this policy.
- Educate all employees on slip, trip, and fall hazards. Notify them of the support and assistance to help prevent, identify, and report hazards.
- Periodically walk throughout your work premises to observe/inspect – helping you keep your property and buildings in a safe condition. Each walkthrough inspection survey should be documented in order to keep track of constant hazards and in the case of an accident – may being able to figure out what caused it
- Find the right floor surface for your work environment. There are several flor materials on the market that are slip-resistant: carpet, ceramic, porcelain, vinyl tile, terrazzo, rubber tiles, concrete, granite, etc. Make sure proper floor mats are being used where they should be – proper floor mats at every entrance allows rain, snow, and other contaminants to be cleaned off shoes before stepping onto walking surface.
- Inspect floor mats and runners to ensure they are of appropriate size. Also look for aged, worn, and/or improperly placed mats as these could create a trip/fall hazard. Any mat that cannot lay flat on the floor without any curls, ridges, or puckering should be removed as soon as possible and replaced. All mats and runners should be a color that contrasts against the flooring on which it is used.
- Mats should be properly cleaned, when mats fail to remove soil and water, they are ineffective and can create a slip hazard – this usually occurs because the

mat becomes saturated with too much water. It may be necessary for the mats/runners to be changed throughout the day. The cleaning schedules for floor mats and runners should be included in your slip, trip, and fall policy.

- Maintaining your property and buildings is important in preventing slips, trips, and falls. Pay close attention to areas of high-volume traffic such as walkways, aisles, and passageways. Keep an eye out for any unsafe conditions such as holes or broken areas of the floor surface, inadequate cleanup of spills or other liquid gatherings, poor drainage, and insufficient removal of mud, ice, or water during inclement weather.
- Excellent housekeeping allowing clean and clutter-free floors intensely helps prevent slips, trips, and falls. Clutter/debris in walkways, untreated spills/inadequate use of wet floor signs, cords in walkways, and flooring surfaces in disrepair increases the risk of an accident. You should:
    - Ensure there is a trash bin near each part of the walkway to help prevent trash ending up on the floor
    - If you don't have the option to keep a cord from high traffic walkways, tie them together or use cord covers
    - Determine how often the floors must be cleaned (document this as well) and/or mop during times of low traffic.
    - Use "wet floor" signs to warn of spills or puddles due to inclement weather
    - Thoroughly train all employees who clean the floors
    - Identify the appropriate cleaning method and solvent for the floor surface you've chosen – document both for maintenance.

- In the event that a slip, trip, or fall incident occurs – you should conduct a thorough investigation. A thorough investigation after an accident may lead you to the cause of it, then helping you find out what needs to be done to eliminate the hazard preventing any other future accidents. Look back on any previous slip, trip, or fall claims and map them to help identify any high-risk zones in your facility and figure it out. A thorough investigation could also help control the severity of claims. In

order to ensure you have a solid slip, trip, and fall program after an accident you should:

- Keep an accident investigation kit in multiple known premises. This kit should include investigation forms, a digital camera, a pen, tape measure, and some barrier tape to secure the area, if necessary.
- Review of closed-circuit television security records should be a part of the investigation. They should be preserved to document conditions when the accident occurred.

Floors, Aisles, and Passageways

Floors, aisles, and passageways are particularly common places for a slip, trip, or fall to occur. This is because these are high traffic areas. As mentioned above, proper slip-resistant flooring should be chosen as well as proper cleaning methods. Slippery surfaces can transpire from polymer on wax dressing; inadequate drying time; buffing to a mirror-like shine; inadequate removal of grease or oil; or letting cleaning residue combine with freshly applied finishes.

Coefficient of Friction (COF) Slip and Fall Safety

The Coefficient of Friction is used when trying to measure the slipperiness of a walking surface. COF is a particular value that represents the correlation between the force of friction and the natural force between two objects. Simply put, it refers to the ratio of the force required to move one surface over another to the total force pressing the two surfaces together. The COF is measured by using a tribometer, a mechanical instrument.

Floor Friction Coefficient	Safety Report
0.00 – 0.34	Extremely Dangerous
0.35 – 0.39	Very Dangerous
0.40 – 0.49	Dangerous
0.50 – 0.59	Very Safe
0.6 & Above	Extremely Safe

The above reference data is detected by ASM825 (Digital Static Friction Coefficient Tester); the actual condition of the floor surface is different, and the measured data of ASM825 can be used as an objective evaluation standard.

Under the Occupational Safety and Health Administration standard **29 CFR 1910.22** it is required that employers must ensure all areas of the work environment (passageways, storerooms, service rooms, and walking-working surfaces) are kept in a clean, orderly

and sanitary conditions. It is also required that the floor of each workroom is maintained in a clean and, to the extent feasible, in a dry condition. When wet processes are used, drainage must be maintained and, to the extent feasible, dry standing places, such as false floors, platforms, and mats must be provided.

Exposure Controls to Prevent Slips, Trips, and Falls

- Floor material and treatments for cleaning or dressing should be slip-resistant. Maintain the coefficient of friction (COF) of the floor 0.50 or higher. Do not wax, polish, or treat floors in any way that would raise the COF lower than 0.50.
- Clean up spills immediately, if the spill is hazardous – appropriate government regulations are to be followed.
- Install proper drainage where wet processes are used.
- Maintain clearance and good repair in permanent aisles and passageways to avoid them from being utilized as storage areas.
- Mark all aisles and passageways appropriately.
- Maintain proper clearance around fire alarms and extinguishing equipment.
- Ensure all mats and runners are secure and tight to the ground with no damaged or folding lips/edges.
- Maintain carpet condition, ensure all carpet is attached securely to the floor surface. Make sure all edges are fastened, include trim along edge if it is an exposed edge.
- Loose, worn, and/or torn carpet and mats should be replaced immediately.
- If any section of floors, aisles, or passageways need repairs – guard the hazard by blocking it off. Warning signs may also be used to alert people of the hazard.
- Adequate lighting should be maintained throughout the work environment, this also includes parking garages, lots, and sidewalks/walkways.
- Refer to OSHA standard 29 CFR 1910.176 for the use of mechanical equipment clearance: “Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made” The equipment manager should be consulted for guidance on placement, clearances, and related safety information.

Stairways and Ramps

Proper maintenance of stairs, ramps, handrails and guardrails is important because stairways and ramps present many hazards – some that could result in a severe injury. Many accidents involving falls within and around buildings occur on stairways and ramps.

Exposure Controls for Hazards of Stairways and Ramps

- Ensure adequate lighting is provided and maintained throughout all stairways and ramps.
- Keep stairways and ramps free from obstructions and/or obstacles.
- Ensure stairways and ramps have the proper COF of 0.50 or greater.
- If carpet is present on stairs or ramp surface(s), ensure the carpet is maintained properly and securely attached to the surface with exposed edges fastened to floor surfaces. Loose, worn, or torn carpet should be replaced immediately.
- Ensure stairways and ramps are always kept dry and clean. RSpills on stairways and ramps should be immediately cleaned up, wet floor signs are required until the spill is cleaned.
- Outdoor stairways and ramps should be designed to prevent the accumulation of water. Proper accommodations for snow and ice removal shall be made.
- Observe and complete inspections of floors, aisles, and passageways – monthly or weekly. Correct any deficiencies or hazards immediately. Upon the completion of your inspection, you should ensure the inspection sheet is fully completed with important details.

Handrails and Guardrails

Exposure Controls

- Ensure handrails are provided on **both** sides of **all ramps and stairs**.

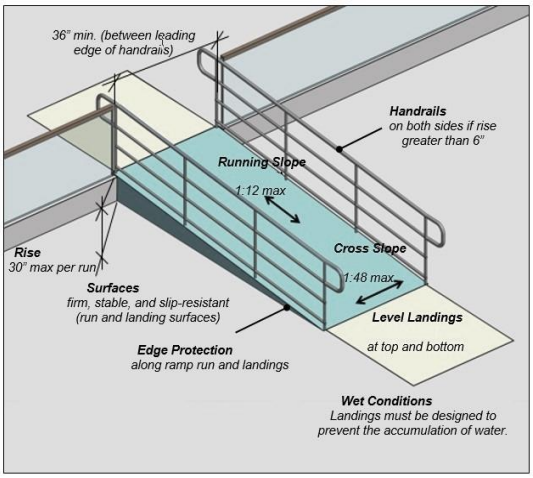
- If there is a drop of 48 inches or higher, an appropriate guardrail should be installed.
- Ensure top rails and mid-rails are at least 0.25 inches in diameter or thickness.
- All ramps and stairways should be protected by continuous handrails for the entire length of the stairway/ramp, ensure handrails are mounted between 34 and 38 inches above the leading edge of the stair treads.
- Ensure the ends of all handrails and guardrails are connected to the wall or terminate in a newel post.
- Handrails should include a circular cross section with an outside diameter of not less than 1 ¼ in. and not more than 2 in.
- All handrails should have a space of not less than 1 ½ inches between it and the wall.
- Anywhere along the top of the rail, handrails must be designed to support a 200 lb. load in a downward or outward direction.
- Handrails, and any wall or other adjacent surfaces should be free of any sharp or abrasive elements.
- Regarding guardrail openings, a four-inch diameter ball should not be able to pass through the opening.

Codes and Regulations for Stairs

- NFPA 101 requires that new stairs meet the following dimensions:

Feature	Dimensional Criteria
Minimum width clear of all obstructions except projections not more than 114 mm (4½ in.) at or below handrail height on each side	44 in. (36 in. where total occupant load of all stories served by stairways is fewer than 50)
Maximum Height of Risers	7 in.
Minimum Height of Risers	4 in.
Minimum Tread Depth Measured nosing to nosing	11 in.
Minimum Headroom	6 ft. 8 in.
Maximum Height Between Landings	12 ft.

- The NFPA Life Safety Code requires a new ramp must comply with the following: it must not exceed a slope of 1 in 12; any cross slope must not exceed 1 in 48; level landings must be provided at top, bottom, and at intermediate points after each 30 inches (76 centimeters) of rise; the ramp and landings must be at least 44 inches (112 centimeters) in clear width; changes in travel direction are permitted to be made only at landings; handrails must be provided at both sides if rise is greater than 6-inches; minimum 42-inch (106-centimeter) guards are required at open sides; and minimum 4-inch (10-centimeter) curbs are required at open sides to prevent a wheelchair wheel from hanging up at the side edge.
- The NFPA Life Safety Code requires an existing ramp must comply with the following: 30 inches. Minimum width; 1 in 8 maximum slope; 12 ft. maximum height between landings.
- The ADA requires that landings subject to wet conditions must be designed to prevent water accumulation. Landings may have slopes not steeper than 1:49 to allow for drainage.



- Ramps shall have slip-resistant surfaces.
- Guards shall be located along open-sided walking surfaces, stairways, ramps and landings that are located more than 30” above the floor or grade below.

Sidewalks and Parking Lots/Garages

Sidewalks and parking lots can play a huge role in injuries if adequate measures aren’t taken considering inclement weather procedures, proper drainage, enough lighting, and frequent inspections. Sidewalks and parking lots need to be constructed as slip-resistant surfaces, even when wet.

- Design sidewalk and parking lot/garage surfaces so that they are slip-resistant when wet. Do not paint the surface in any way that may negatively impact slip-resistant condition.
- Ensure sidewalks are free of obstructions, cracks, holes, drop-offs, and additional defects that pose a trip/fall hazard.
- When sidewalks and parking lots/garages change levels, these curbs/levels should be painted with slip-resistant high-contrast yellow paint. Ramps should also be painted/outlined in a high-contrast color (usually yellow) to bring attention to the change in level. Signage may also be used if appropriate for the level change.
- Wheel stops should be installed where parked vehicles may reduce the walking pathway to less than 3-ft wide. Wheel stops should be painted a high-contrast color.
- Speed bumps in parking lots/garages should be painted with high-contrast yellow and slip-resistant.
- Ensure lighting is powerful and maintained. Inspect light bulbs and replacement, if necessary.
- Ensure there is no downspout that could be discharging on sidewalks, stairs, ramps, and other walking surfaces. Inspect regularly and not any drainage issues observed.
- Know who is responsible for clearing your sidewalks and parking lots/garages, and how to contact them.
- Snow and ice removal procedures should be planned and recorded in case of inclement weather. Snow should be removed from sidewalks and parking lots as often as required by the authority having jurisdiction, as much as the snow continues to fall, and after it stops.
- Sidewalks and parking lots should be de-iced as necessary to prevent build-up.
- Parking lots and sidewalks should be clear of snow and ice prior to employees arrive for work and observed throughout the day in the course of inclement weather.

Snow and Ice

Once snow and ice accumulate on the walking surface, the potential for slips and falls increases significantly. If not promptly removed, snow and ice are extreme hazards. According to the U.S. Bureau of Labor Statistics, there were 20,520 workplace injuries due to falls from ice, sleet and snow that resulted in a day or more away from work in 2016, and 28 percent of those resulted in more than a month off work.

Exposure Controls

- Develop and maintain a written plan for snow and ice removal. The plan should include all that are responsible for:
    - Carrying out the plan
    - Contractor selection
    - Communications
    - Identification of potential problem areas
    - Creating and maintaining removal logs
    - The frequency of removal
    - The use of salt and/or sand
    - Proper claim handling practices
- Encourage all employees to report unsafe conditions as quickly as possible, so that remedial action can be taken before an injury occurs.
- Decide if the snow and ice removal will be contracted out or if it will be carried out by in-house personnel.
- If you choose to hire a contractor, you should consider these important factors:
    - Their ability to react quickly in the event of a storm
    - Their experience
    - The adequacy of their equipment
    - Their reputation

With the contractor, determine your organization's priority on their response list. **Be sure to also verify proper liability insurance coverage. An attorney should review the terms of all contracts.**

- If you choose to keep the task of snow and ice removal in-house, determine the following factors:
    - How many employees you will need to assign to this task, depending on the size of your facility and the number of walking surfaces potentially impacted.
    - How these employees will be notified and mobilized during operational and non-operational hours.
    - Considering you may not have the type of mechanical equipment needed for snow/ice removal, this may require more equipment (shovels, salt/sand/ice melt, snow blowers/throwers, plows, or whatever is needed to remove the snow and/or ice.
    - Additional employee training for equipment.
    - A Job Hazard Analysis for the removals will need to be developed.
- Determine who will be responsible for monitoring weather conditions, walking surfaces, and effectiveness of removal methods.
- Record all removal activities in a snow and ice removal log, which should contain the following:

Date	Time Started	Time Completed	Weather Conditions	Ice Removal Activities Sand, Salt, Shovel, Snow Blower	Supervisor Comments	Initials

- In hazard areas, high-visibility warning signs should be posted.
- Repair or guard any objects that have the potential to present a hazard if hidden under snow.

- According to the jurisdictional/code requirements, remove snow and ice accordingly. You should obtain and record the municipality requirements where your business or property is located.

References

OSHA General Industry Safety Standards

NFPA 101 Life Safety Code – 2012 edition

Bureau of Labor Statistics

National Institute for Occupational Safety and Health