



# Risktopics

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## Slip-resistant floor treatment for existing floors

### Introduction

Slips and falls on walking surfaces account for 50 percent of all premises accidents to members of the public. They amount to 23 percent of all compensable injuries in the workplace. Severe injuries, including broken bones, back and head injuries, and even fatalities, can result from slip and fall accidents.

Many factors can contribute to a slip and fall, but floor surface is the single most important. If an existing floor surface is relatively slippery, then the ideal remedy is to replace it with one that has adequate slip resistant properties. However, this may not always be possible for a variety of reasons, and other remedies may have to be considered. A multitude of slip resistant floor coatings and mats are commercially available that can help in reducing slips and fall exposures with existing inherently slippery floor surfaces.

### Slip resistant floor treatment

Slip resistant floor treatment can be a remedial treatment applied to an existing floor surface to reduce slips and fall exposure. They are designed to improve the coefficient of friction. Depending on the type of floor surface, a large selection of floor treatment products is available for hard or resilient surfaces. To ensure desired results, consider different characteristics and benefits in selecting a floor treatment. Because they only treat the surface, they are subject to wear and require periodic dressing (maintenance) and eventual reapplication to maintain the desired level of slip resistance.

Research is necessary for selection of an appropriate floor treatment suitable for a specific application. Besides the initial and maintenance costs and durability, factors such as substrate conditions, pedestrian and forklift traffic, environmental conditions, compatibility and resistance to spills of chemicals, oils, foods and soapy water are some additional details to consider. Some surfaces, such as polished marble and granite, may be damaged easily if adequate care is not taken in selection of a floor treatment suitable for these surfaces. It may also be important to consider regulatory implications. For example, the Americans with Disabilities Act (ADA) requires floor surfaces to be stable, firm, and slip resistant. In addition, any cleaning treatment chemicals and coatings used in food processing plants must be approved by the U.S. Department of Agriculture. Some electronics assembly areas require anti-static specifications.

Before purchasing and applying any coating, consult with the manufacturers and their application specialists to determine the most suitable treatment. Compare several products by testing for the best results. A coating manufacturer can provide data on expected improvement in coefficient of friction and may even assist in

comparison and selection of suitable coating, including assistance with slip meter measurements. For better results, most floor treatments require a thorough cleaning of surface before applying a coating. Follow proper procedures as recommended by the manufacturer, including stripping previous finish, use of proper equipment, application rates, and drying time. Although none of the coatings and treatments can provide permanent long term results, experience has shown that without proper preparation, application and maintenance, even the best coatings do not provide desired results.

## Cleaners and degreasers

Slip resistant floor cleaning and etching chemicals are available for use on concrete, ceramic, quarry tile, and other porous surfaces. These chemical cleaners release the dirt and oils from the pores of the tile and concrete surface, thereby restoring the slip resistant quality of the original surface. Careful selection of a cleaner will help ensure that chemical reaction changes only the floor surface, not the floor appearance. Some of the special surface treatments will even improve the coefficient of friction under wet conditions. These may be suitable for use over ceramic terrazzo and tiled surfaces found in restrooms, swimming pools, and other areas. Some testing and research is strongly suggested for due diligence in product selection.

A typical quarry tile is porous, giving it slip resistance. When this porosity is lost or reduced due to build up of grease and dirt, the slip resistance of floor surface is adversely affected. Depending on the floor surface, there are several ways of cleaning and preparing the surface.

- Acid-based cleaners are used for floor cleaning to get the oily residue out. Since these cleaners are acidic, they also etch and permanently damage the floor surfaces, particularly ceramic, marble and other surfaces. Unless measures are in place to reduce the grease and build up of oily residue in the future, the slip resistance diminishes quickly.
- Another common cleaning method that is used in kitchens and other floors with grease build up is the use of enzyme-based cleaners. These enzymes "eat away" the oily residue and grease build up and restore the original surface to improve slip resistance of floor surfaces.

## Coatings

Coatings can be used for inside as well as outside walking surfaces and include urethane polymers, epoxy, acrylic, and vinyl ester resins. These coatings adhere to the existing substrate or floor surface and provide a higher coefficient of friction than the existing surface. These coatings can be applied by brush or by spray gun. The light duty types are suitable for wood surfaces, while the heavy duty types provide a non-slippery coating over wood, metal, or concrete. They may also contain rubber or plastic particles (micro-beads) to give a textured surface, which is recommended for factories, offices, corridors, and service rooms.

Polymer-based coatings have plastic micro-beads embedded in them. Upon drying, these coatings give a slight texture to the surface from the embedded micro-beads and improve traction of the walking surface. Water-based floor coatings contain no volatile organic solvents. These are non-flammable and are environmentally safer. Usually an aggregate such as aluminum oxide is included in the base material. Heavy aggregates give these coatings a high profile finish that is ideal for walking surfaces subject to oil and grease spills/accumulations. These coatings may be applied by brush, roller, spray, or trowel and will generally retain non-skid properties in wet or oily conditions. They are also good for do-it-yourself application. Since the water-based coatings contain no organic solvents, they may be used when limited ventilation or explosion hazard exists.

Slip resistant abrasive coatings and sand-in-paints are applied over wood, metal, or concrete. The abrasive floor coatings give better traction under foot even when wet. The abrasive grains may be mixed with an adhesive such as epoxy resin and sprinkled on top of a thin adhesive coating. They also work well outdoors as well as indoors on dry, wet, or oily floors, stairs, ramps, and platforms. The abrasive grains wear off over time and regular maintenance is required to retain adequate traction. Incorrect selection and application of paints for curbs, ramps and steps on a stair can actually result in slippery surfaces increasing risk of slips and falls.

Floor coatings are available in various colors. Besides the typically used orange and traffic yellows for ramps, curb markings, and walkways, some coatings are also available in luminescent formulas that glow in the dark and enhance visibility of steps or other walking surfaces. Also available are products like sand and slip-resistant

granules that are scattered to increase traction primarily for emergency use when oil, snow, or other conditions make floors slippery.

## Mats

Mats have appeal to many industries due to their versatility. They are available in many sizes, have a wide range of material composition, and can serve a variety of purposes other than protecting against slips and falls. Tracking of liquids, such as water or oil, can create a slippery walking area within work and public access areas. Strategic use of mats can provide an effective solution for controlling slips and falls. A runner is a sub-category mat that is several times longer than its width and is used along its length.

Placing mats in high traffic areas and at the entrances can help reduce floor maintenance costs. They also reduce water and dirt accumulation and moisture tracking. In special applications, foot fatigue can be reduced by placing specially designed ergonomic mats at standing workstations. Mats are portable, easily situated, and can be readily cleaned and replaced. Some walk-off mats at the entrances may be placed in recessed floor to reduce potential for tripping. Place entrance mats butting against threshold to reduce tripping hazard from the gap. If additional supplementary mats are needed, care must be taken to minimize tripping hazard at the joint between the two mats. The expense associated with the benefits received makes this product economically attractive.

Mats that are not properly maintained can actually contribute to slips and falls. Corners can start curling, tears can appear, and the backing that grips the floor can deteriorate allowing the mat to move upon contact with the foot. Vendors who specialize in mats will inspect, repair, clean, and rotate mats for a fee. An effective risk transfer contract with a mat service company can streamline mat inspection and maintenance and help reduce slip and fall exposures.

Mats are used for absorbency and drainage of liquids. Proper mat selection and appropriate length are of utmost importance. The length of the mat will depend on several factors, including weather conditions, water load, and absorbance of material and even presence of a canopy on entranceways. Minimum of two foot falls or paces length is suggested to ensure adequate removal of moisture from pedestrian shoe. If there are still wet footsteps at the end of mat, either the mat is not long enough or is water logged and needs attention. Mats are available in a variety of choices, such as cocoa fibers, fabric blends with rubber backing, and for light water loads at the entrance doors. A waterlogged mat has to be vacuumed or replaced periodically to reduce the problem of tracking water and redeposit ion under the shoes. Another classic example of poor selection is using a mat in a kitchen or automobile shop that is not oil and grease resistant. Vendors who sell mats are often experienced enough to offer the purchaser the right mat for the anticipated application and should be consulted for suitability for application. The emphasis should be on its functionality and not just aesthetic appearance.

Auto repair shops, manufacturing, and office buildings typically select rubber mats for their durability. Construction can consist of link, solid, or perforated. Extreme temperature ranges call for the vinyl or neoprene mat, either carpet or ribbed thread finish for traction. Vinyl and rubber mats contain plasticizers to maintain flexibility. In some mats, this plasticizer may leach out from the mat under some conditions, such as with radiant heat from use of a heater at the entrances. Pedestrian's shoe track this plasticizer and create a slip hazard.

## Grates

Grates are typically made of metal, although some grates are now made of vinyl or fiberglass for anti-corrosion properties. Most grates have devices that protrude upward from the walking surface and create good traction. These devices also allow accumulated foreign debris to fall away from the shoe. The openings within the grate are traditionally wide and allow debris to fall through without accumulation on the walking surface.

Grates are found frequently on stair treads in factory settings with various sized openings that can present other concerns, particularly to women wearing high-heeled shoes. The additional hazard presented is the ability of the heel to penetrate the grate opening causing a tripping accident. Grates are usually found in industrial plants where high heeled shoes are not commonly found. Grates are also considered a permanent installation and can be found on platforms, bridges, cat-walks, and drain covers.

They are also excellent for an exterior application in which snow and ice can fall through the opening, eliminating the accumulation problem to a limited extent. Grates will also allow light into the walking area and allow air to circulate, possibly creating a desirable outcome. The openings also allow visual inspection below the surface. With the exception of periodic protective coating, grates require no extensive maintenance.

Grates have their place in reducing slips and falls and perform an excellent job of scouring the bottom of the shoe for foreign debris that can cause slips, trips, and falls.

## Mopping and maintenance

Since most of the floor treatments do not provide permanent solution to an inherently slippery floor surface, periodic maintenance is essential. Although mopping looks deceptively simple, improper mopping contributes to many slips and fall problems. A dirty mop results in spreading of grease and oily residue from a localized liquid spill over larger floor area and makes the problem worse. A two-bucket/two-mop (one for clean solution and a second for rinsing) mopping protocol is recommended. Use cleaning solutions in appropriate concentration as recommended by the manufacturer.

Maintenance and cleaning frequency should be determined based on the type of use and traffic pattern. All floors should be swept regularly as part of maintenance and a sweep log should be kept on record. All liquid spills should be cleaned promptly. Proper buffing/burnishing adds a gloss to floor surface and helps maintain slip resistance. Whenever possible, schedule all floor maintenance activities when traffic is limited, such as in off-hours of business. Use signs and barricade cones to warn people of wet floors and pick up all cleaning supplies, electrical extension cords, etc. as soon as the work is completed.

## Summary

Proper selection and use of floor mats, grating and floor treatment, including cleaning and maintenance, can help in reducing the slip and fall exposures associated with slipperiness of an existing floor. Since many factors affect their selection, researching the subject well and seeking answers from manufacturers can be very helpful.

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