

# Preventing Slips and Falls Through Effective Floor Care

## Introduction

The procedures and products used to clean and maintain floor surfaces are sometimes a direct cause of many “slip and fall” accidents. Maintenance staff may not have proper instruction and training in floor care, may fail to follow manufacturers’ directions when cleaning and applying finish, or may not understand that specific types of floors require specific types of care. Many of the best cleaning and finishing materials can be hazardous when applied improperly, and using the wrong product for a specific surface can create problems. It is critical that the right product be used on the right surface, for the right reasons, and under the right conditions.

Primary errors in floor care procedure include:

- Floors not completely and properly stripped of previously applied finish
- Floors improperly cleaned or scrubbed
- Floor-treating product applied too often
- Surface not properly buffed when buffing is necessary
- Finish applied with improper equipment
- Too much finishing material applied
- Improper finish for type of floor
- Inadequate drying time
- Inadequate cleaning, leaving soap residue on the floor
- Inadequate or untimely removal of spills

## Use Floor Products to Increase Coefficient of Friction

Many floor treatments are available that can be used to increase the coefficient of friction of floor surfaces. These products are made for specific types of floors and work best on the floors for which they are designed. However, the application of any of these products is not effective unless the floor is properly cleaned and maintained. Maintenance staff must follow specific procedures for proper application of these products in order for the treatments to be effective.

## Follow Maintenance Procedures for Specific Floor Surfaces

The following is an overview of various floor types and general recommended maintenance procedures. Regardless of the floor type or the specific product used, however, the two most important factors in the proper maintenance of floors are 1) the use of the specific chemicals and procedures designed for the particular type floor involved, and 2) proper application of the treatment products according to manufacturer’s specifications.

LOSS CONTROL TIPS

## Terrazzo

Terrazzo tile is composed of granite and marble chips bonded with cement. It is a brittle material and is easily damaged by cleaners. The common varieties of terrazzo have very low coefficients of friction and are therefore very slippery.

Terrazzo is especially slippery under wet conditions. In addition, many sealants, when applied to terrazzo, create a slippery surface. Therefore, it is extremely important to use chemicals specifically designed for terrazzo.

Terrazzo floors may be treated with a semi-permanent seal and cleaned with a neutral liquid detergent, with a slip-resistant dressing applied after cleaning. Floors must be flushed clear of all soap residue after cleaning and, before applying any new dressing, floors must be completely stripped using a stripper designed for Terrazzo. Terrazzo floors in high traffic or public places should never be waxed.

Some terrazzo tiles contain non-slip additives. One common non-slip additive for terrazzo flooring is alundum grit. These terrazzo tiles cannot be distinguished visually from the more dangerous slippery terrazzo material. However, the cleaning process is the same for both. When proper floor maintenance procedures are followed, non-slip terrazzo floors are generally safe under both dry and wet conditions.

## Marble

The surface properties and safety of marble vary depending on its origin, how it was cut, and the wear patterns that have developed on individual surfaces. Polished marble is a relatively slippery surface with a low coefficient of friction value.

Normal wear can increase or decrease slipperiness, depending on conditions. For example, marble flooring close to a street entrance, where grit and dirt is deposited, can be ground to a rough surface with a higher coefficient of friction, while marble flooring away from street entrances usually becomes highly polished.

Generally, marble steps have a very low coefficient of friction, and unless they are very carefully maintained, they can become extremely dangerous floor surfaces.

It is essential to follow manufacturer's directions when using chemicals designed for use on marble floor surfaces. Mop all marble floors, including borders, to remove all dust, grit, and debris before applying any chemical or water. Follow these general procedures to maintain marble floors properly:

- *Clean and condition.* Prepare a marble floor by removing all built-up soap and wax; use a stone

cleaner/stripper compound according to manufacturer's instructions. Apply an "acid free" marble stone cleaner and conditioner, according to manufacturer's instructions.

- *Protect.* Apply a permeable stone impregnator (for long term protection) according to manufacturer's instructions.
- *Polish.* Apply a silicone-based "no-wax" marble polish preserver, according to manufacturer's instructions.
- *Buff.* Buff the floor once or twice weekly, using the type of pad and the buffer speed called for by the manufacturer of the preserver. (Obtain information about the pad type and rpm values (buffer speed) from the manufacturer of the preserver.)
- *Keep It Clean.* Keep the marble surface clean. If the floor has been properly maintained, this intermediate cleaning can be easily accomplished with only a dust mop and damp mop, saving much effort and time.

## Ceramic And Quarry Tile

Ceramic tile comes in so many different surface variations that they are difficult to distinguish, and it is almost impossible to generalize maintenance procedures for all types. Ceramic tile is available in virgin fired condition or glazed; some have non-slip additives.

Virgin tile, such as quarry tile, has a generally high coefficient of friction; when properly maintained, it offers a relatively safe surface. Virgin tile is often sealed after installation. Many sealants give the virgin tile a ceramic appearance and also a low coefficient of friction. Some tile manufacturers even warn in their literature that their tile product can be dangerous when wet.

Glazed tiles are not appropriate for high use walkway areas because they have low anti-slip coefficient of friction values. Some glazed tiles are manufactured with non-slip implants; however, glazing eliminates the benefits of the friction implants.

Ceramic and quarry tile floors are designed and intended to offer a natural look. If they are very shiny, they have been improperly treated. Proper maintenance usually involves the use of stone cleaners and the use of "no wax" stone preservers. Use only chemicals designed specifically for natural and stone tile floors.

## Vinyl Tile

Vinyl and vinyl asbestos tile are plastic or plastic-containing floor surfaces (such as asphalt, rubber, plastic, or linoleum). These plastic sheet tile surfaces have very low coefficients of friction. Floor products that combine cleaner and wax are not

acceptable for commercial pedestrian traffic areas because of the build-up of residue that naturally occurs with their use.

The usual treatment for these resilient floor surfaces is to strip and clean the floor periodically, then to apply a non-slip wax or synthetic resin finish, and buff or polish the floor as *little as possible*, ensuring that the finish does not create a slippery surface. The application of “non-slip” wax dressing *without buffing* is highly recommended for these floors. This will allow a safe shine on the floor and will be much easier to clean. A non-slip wax dressing also protects the floor surface from wear and brings out the color pattern.

### Wood

Fewer slip and fall accidents occur on wood floors than on other types of floors. Many stained woods provide safe floor surfaces. The customary finishing treatment for wood floors involves sanding, sealing with a penetrating sealer, and then dressing with a solvent-resistant combination cleaner and dressing. Wood floors generally become dangerous when unsafe sealants are applied or when they are oiled. The use of oil on wood flooring is *not* recommended because a slight film of oil may remain on the floor. If oil is used, the floor must be *thoroughly* wiped and dried. Appropriate commercial products other than oil are recommended; be sure to apply them according to the manufacturer’s instructions.

### Brick

Brick floors are simply that: brick. Brick floors are not usually harmed by the strongest of cleaners. They are not intended to be sealed, and should never be waxed. Brick has a naturally high coefficient of friction material and makes an excellent floor surface when left in its natural state, as long as the integrity of the brick persists and the surface remains even and relatively free of protrusions. When any type of sealant or wax is used, the natural coefficient of friction is seriously reduced. The safest method of maintaining brick surfaces is to use a strong cleaner, apply it vigorously, and thoroughly remove all soap residue.

### Floor And Deck Paints

Walkway surfaces which have been painted with floor and deck paints can present serious slip and fall hazards. Most paints produce surfaces which are below a .50 coefficient of friction and are therefore dangerous. Few paint manufacturers and distributors provide labels or warnings advising that their products may be slippery when applied to walkway surfaces, especially under wet conditions. A very few manufacturers warn that it may be necessary to include a non-slip additive (such as sand) in the paint. Some companies market non-slip additives under different labels.

## Clean Floors Effectively and Safely

Several processes involved in cleaning floors have been discussed. Three of the more important concerns that need to be continuously addressed for all floor types are:

- Use soap sparingly. A little soap goes a long way. Too much soap produces dangerous, slippery residue.
- Remove all traces of soaps and cleaners. If a floor has been cleaned with liquid or powder soap, flush the surface clean with clean water to remove all soap from the floor surface. Thoroughly clean and rinse all mops, sponges, buckets, etc., to remove all traces of soap.
- Maintain floors properly to limit build-up of residues. A build-up of soap and wax can defeat even the best non-slip flooring. A non-slip floor has usually been treated or impregnated with a material to increase friction. When a build-up of residue from soap, wax, or other floor preparations is allowed to accumulate, it may increase to the point that the friction-increasing material is actually buried under the accumulated residue, resulting in a slippery surface.

## Use Floor Finishes And Waxes Properly

Keep the maintenance of a high coefficient of friction in mind during application of any floor finish. Suspended polymers (plastics) are used in some contemporary floor finishes. As the floor dries, these polymers become interlocked, creating, in essence, a surface comparable to a sheet of plastic. Some of these plastic floor finishes are safe walkway surfaces before they are buffed. However, many of them have very low anti-slip coefficients of friction and are very dangerous.

When a wax must be used, care should be taken to use a non-slip wax. Floor products that combine cleaner and wax are not acceptable for commercial pedestrian traffic areas because of the build-up of residue that naturally occurs with their use. When any type of wax is used, be sure that the floor is periodically stripped, cleaned, and sealed (if appropriate for the type of floor), and dressing applied as indicated by the manufacturer.

If a floor is not properly cleaned and rinsed, any residue left on the floor will mix with the newly applied floor finish, destroying much of its water resistance.

## Use Buffing Only As Specified

Many floor finish products on the market are not designed to be buffed. High speed buffing can drastically reduce the coefficient of friction. A floor which has been covered with

what should be a very safe floor finish may often be buffed into a very slippery floor. Sometimes maintenance personnel use highly abrasive or nylon pads to buff floors to create a high shine. Often, this buffing is done by a buffing machine set at high speeds. This vigorous buffing will seriously lower the coefficient of friction of the floor surface. In fact, many slip and fall accidents occur when retail and commercial establishments first open in the morning, after the night maintenance crews have cleaned and buffed the floors.

Many floor maintenance personnel do not understand the need to match floor finishing materials with specific buffing speeds and specific types of abrasive pads. If the buffing speed is too high, and/or the abrasives of the pad too great, the buffing will create very slippery floor conditions. It is also very important to wipe the buffing pad clean after every use.

### **Take Care of Standing Water And Spills Immediately**

Standing water or spills on a floor create serious slip and fall hazards; a plan for their immediate removal should be in place.

Floors, especially those that have been waxed, should never be left wet. Use a “dry mop” procedure to clean up water and/or spills. A dry mop procedure is one where a slightly damp or dry mop (depending on the substance spilled) is used to clean up water or other spills, the point being to remove the spill without leaving the floor wet. A wet mop simply spreads water and most spilled substances, but does not remove them.

If water has been spilled on the floor and not immediately removed, it will start to dissolve the finish. A person may slip in a puddle of water and partially dissolved plastic.

Standard practice in floor care procedures to handle spills should include the following:

- Have clean water and more than one clean mop available.
- Be sure that mops are dried continuously and not left standing in a bucket of water.
- Do not use soapy water during business hours unless absolutely necessary, and then only in a weak solution.

### **Inclement Weather, Rain, Ice, and Snow**

Protect against slips and falls caused by inclement weather. Start on the outside with the timely and effective application of ice melting material on parking lots, sidewalks, and steps, to increase traction. Shovel and clear snow from walkways, paths, steps, and overhangs.

To guard against slips and falls, and to protect floors, follow this three-step procedure during inclement weather:

1. Place a tough “scrape” mat just outside the entrance, where pedestrians can scrape ice, snow, and mud off their shoes before they enter. Be sure this mat has high mat bristles with enough space between the bristles to allow water and ice to fall below the bristles and not collect on top. Sweep or clear this mat on a regular basis, depending on snow or ice accumulation.
2. Place a non-slip absorption mat just inside the front entrance to collect water and excess ice, snow, or mud that is tracked in on pedestrians’ shoes. Change this mat regularly to assure its ability to keep absorbing water. Place signs warning of wet floor conditions where needed.
3. Be sure that two or three dry mops and squeeze buckets are available to mop up excess water as it accumulates. Keep more than one mop available so that one can dry as the other is being used. Use the “dry mop” technique described above.

### **Use Mats With Caution**

Mats, if not placed and maintained properly, can create a “trip and fall” hazard. Take care to ensure that mats:

- are in good condition
- are laid flat with no upturned corners
- do not raise the height of a step
- are easily distinguished by color from the walking surface or floor

An additional hazard is created if staff must lift or manipulate heavy or water-logged mats. Contracting with cleaning companies, or companies which provide and maintain mats, is an excellent method of transferring risk away from your company, as it effectively eliminates the need for your employees to do this work. These contract companies are also better equipped to maintain mats in adequate condition through replacement or trade-outs as needed.

### **Have A Program For Fall Prevention**

Your firm’s top management should ensure that floor care and fall prevention methods and practices are uniformly followed by all employees and contractors. Management should assign accountability for this task to a respected position or individual, and all management should be held accountable for following proper fall prevention methods in their work. The fall prevention program, at a minimum, should include:

#### **Investigate Every Fall Incident to Determine Conditions**

Every fall incident, like every other accident, must be

investigated immediately and thoroughly to obtain all pertinent data (such as location, time, prevailing physical conditions of floor, operations at time of accident, etc.) Record names of witnesses and names of employees who can testify as to the condition of the floor, whether or not they witnessed the accident, etc. Take photographs of the area where the fall occurred to show the physical condition of the area at the time of the incident. Promptly report all accidents to the insurance company or management designees.

### **Investigate Every Incident To Determine Cause**

Investigate each accident to identify cause(s). Summarize and analyze all accident data to discover the cause(s) of falls on floors and the areas or locations producing such accidents, so that operating methods or conditions can be improved to prevent similar incidents. Develop monitoring techniques so that management to assess the success, or lack of success, of the various departments or facilities in maintaining a low fall incident ratio.

### **Hold Employees Accountable**

Assign responsibility to employees who are held accountable for performing maintenance work in a proper manner. Ensure that floor maintenance is completed on a scheduled basis, and that employees who clean the floors follow manufacturers' directions completely. If the manufacturers' directions are not in the native language of the employee(s) doing the work, find some means of translating the information so that the worker(s) know exactly what to do. In all cases, training employees in proper floor maintenance is of primary concern in all loss prevention programs. Be sure that orientation programs for new employees include basic safety training. Emphasize fall prevention as well as the relationship between improper work procedures and slip and fall hazards.

### **Hold Contractors Accountable**

If a contract company does the cleaning, ensure that the company is aware of, and uses, proper cleaning and finish compounds and proper maintenance procedures. Require contractors to provide Certificates of Insurance evidencing adequate levels of Completed Operations Liability coverage.

### **Conduct Periodic Inspections**

Periodic housekeeping surveys and inspections, conducted by the safety committee, are important to the program of prevention of falls. Inspections can identify unsafe conditions and improper work methods so that corrective steps can be taken. An inspection program can also stimulate

satisfactory housekeeping standards. The success of a fall prevention program depends upon the timely identification, investigation, and correction of unsafe conditions and practices discovered through housekeeping surveys, employees reports, or other methods.

## **Summary**

Floor care and maintenance is an integral part of an effective slip and fall prevention program. Select floor care procedures carefully, and use materials, cleaners, and other floor care products according to manufacturers' specifications. General examples of methods and materials for various floor types are illustrated in Appendix 1, *Product reference for cleaning and waxing floors*.

Accident investigation and accident trend monitoring are important components of a slip and fall prevention program. (A method for recording and monitoring slip and fall incidents is illustrated in Appendix 2.) To be effective, a slip and fall prevention program must be tailored to the operations and organizational structure of a company, and accountability and responsibility must be assigned to appropriate staff and monitored for results.

## **References**

1. "Falls on Floors." National Safety Council Data Sheet I-495, Rev. 1991
2. "Slips, Trips, and Falls." Engineering and Safety Service *General Liability Report*, Number 10.01. New York: American Insurance Services Group, Inc., February 1994.
3. Rosen, Stephen I. *The Slip and Fall Handbook: Case Evaluation, Preparation, And Settlement*. Columbia, MD: Hanrow Press, 1983.
4. "Floors and Stairways," pp. 887-889 in *Encyclopaedia Of Occupational Health And Safety*, Third (Revised) Edition, Volume 1. Geneva: International Labour Office, 1983.

For more information, contact your local Hartford agent or your Hartford Loss Control Consultant. Visit The Hartford's Loss Control web site at [www.thehartford.com/losscontrol](http://www.thehartford.com/losscontrol)

## Appendix 1 Product Reference For Cleaning and Waxing Floors

TYPE OF FLOOR	RECOMMENDED CLEANERS & METHODS	RECOMMENDED TOP DRESSING	RECOMMENDED SEALERS	AVOID
<b>Cork</b>	Neutral detergent, impregnated mop sweeper, wax sweeping powder, solvent cleaner	Solvent wax polish, emulsified dressing over a sealed surface	All except water-based	Water, alkali, acids
<b>Concrete and granolithic</b>	Any type	Solvent wax polish, emulsified dressing over a sealed surface	Any type	Acids
<b>Linoleum</b>	All types except strong alkalis and abrasive sweeping powder	Solvent wax polish, emulsified dressings	Any type	Water, alkali, acids
<b>Magnesite</b>	All types except solvents or abrasive sweeping powder	Solvent wax polish, emulsified dressings	Any type	Acids, alkalis
<b>Quarry tile and ceramic</b>	Neutral detergent, impregnated mop sweeper	None	None	Acids, alkalis
<b>Rubber</b>	Neutral detergent, impregnated mop sweeper, wax sweeping powder	Emulsified Liquid dressings	None	Solvents and oils
<b>Thermo-plastic</b>	Neutral detergent, impregnated mop sweeper, wax sweeping powder, alkali cleaner	Emulsified dressings	None	Solvents and oils
<b>Vinyl and vinyl asbestos</b>	Neutral detergent, impregnated mop sweeper, wax sweeping powder, alkali cleaner	Emulsified dressings	None	Solvents and oils
<b>Wood</b>	All types except alkaline and abrasive cleaners	Solvent wax polish, Solvent wax polish dressings over a sealed surface	All except water-based	Alkali, water, acids
<b>Terrazzo</b>	Neutral detergent, impregnated mop sweeper	Emulsified dressings	Water-based resin, emulsion	Alkali, acids
<b>Mastic</b>	All except white spirit solvent	Emulsified dressings	Water-based sealers	Solvents, oils

From: "Floors and Stairways," Encyclopedia of Occupational Health and Safety, 3rd ed., Vol. 1, ILO, 1983, p. 888.

## Appendix 2 Basic Fall Incident Analysis Spreadsheet

	CASE 1	CASE 2	CASE 3
<b>Date</b>	100496	112796	122496
<b>Where</b>	Store #1	Store #2	Store #3
<b>Time</b>	10:40 am	4:00 pm	11:55 am
<b>Name of Party</b>	D. Smith	B. Jones	M. Long
<b>Weather Condition</b> (R=Rain, S=Snow, I=Ice, C=Clear)	R	S	I
<b>Slip (S) or Trip (T)</b>	S	T	S
<b>Slip or Trip on What</b>	Water	Box	Ice
<b>Type of Floor or Surface</b>	Tile	Marble	Paved Parking Lot
<b>Conditions and Comments</b>	Tile floor waxed last week. Has been stripped, and cleaning company notified not to wax floor.	Box left by customer in foyer. Box removed.	Ice still covering lot. Manger was asked to apply snow melt. Manager complied.

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