Preventing Slips and Falls: Floor Cleaning and Maintenance

HIGHLIGHTS:

- Managed floor cleaning methods are critical to preventing slips and falls
- Types of cleaners
- General floor cleaning procedures
- Housekeeping programs
- Other considerations

This reference note describes the effects of contaminates on floor slipperiness, types of cleaners for breaking up and removing contaminants, and the importance of written and managed floor cleaning protocols as part of an overall housekeeping program.

Tribology, the study of the interaction between sliding surfaces, is derived from the Greek "tribos," meaning rubbing. The field of tribology includes the analysis of friction, lubrication and wear, and the application of these principles to mechanical design, manufacturing processes and machine operation.

In slips and falls, tribology helps describe causes and support preventative strategies associated with friction between the shoe sole and the floor surface; lubrication at the interface or contaminate on the floor surface, such as water, grease, oil, dust or particulate soil; and wear of floor surface and shoe sole material over time.

Managed floor cleaning methods are critical to preventing slips and falls. An important study by the Liberty Mutual Research Institute for Safety in U.S. Limited Service Restaurants (Verma, et al., in press, 2009) concluded most participants in the study used an enzyme-based floor cleaner (see Types of Cleaners below) but reported using hot/warm water, thus violating the manufacturer's floor cleaning protocol.

Effects of Contaminants

Contaminants may accumulate on floor surfaces due to inadequate cleaning processes, resulting in a reduction of surface roughness as soil, grease or other contaminants fill in the pores or valleys in the floor surface. Accumulating contaminants alters these surface features and, consequently, reduces the uncontaminated floor's original friction characteristics. It is, therefore, very important to keep floors clean in order to maintain these desirable features of the walking surface.

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Keeping floors clean maintains desirable walking surface features and, therefore, improves slip-resistance. A floor cleaning protocol must consider the floor type, the contaminants involved and a cleaning solvent most suitable for both.

Types of Cleaners

Major categories of cleaners include alkaline, acidic, neutral pH and microbial or enzymatic cleaners. Most chemicals used to clean floors are intended to act upon contaminants chemically and emulsify or break down the contaminant so it can be removed easily by rinsing. Surfactants and water conditioning additives are common.

Alkaline Cleaners

Alkaline cleaners react with fats and oils, converting them into soap (saponification), and must be thoroughly rinsed with clean, hot water to prevent polymerization. Alkaline cleaners are used to remove grease and can remove sealers, finishes and waxes.

Alkaline cleaners are often used on restaurant kitchen and dining area tile floors. In restaurant kitchens, animal and vegetable fats (fatty acids and triglycerides) used in cooking oils hydrolyze and fall to the floor as a “grease” contamination. Grease, in the presence of water, can produce a very slippery floor. Over time, triglyceride molecules can unite to form a long chain polymer (called polymerization) and form a hard grease film on floors, resistant to most detergents.

Cleaning a restaurant kitchen floor with a mop and pail with hot water and detergent only partially cleans the floor. A restaurant kitchen floor is only clean when the polymerized grease film is also removed, which means a suitable amount of detergent applied to the floor in hot softened tap water with a dwell time period followed by a vigorous deck brushing.

Greasy residue must be picked up using a squeegee or wet vacuum or rinsed away using hot clean water. A hose rinse is best assuming good drainage is available.

Acidic Cleaners

Acidic cleaners use a process known as oxide reduction to remove rust, scale and oxides from floors. Commonly used for cleaning porcelain, ceramic tiles and grout, but, if too strong, these cleaners can etch the floor surface.

Neutral Cleaners

Neutral cleaners are typically used on floors with glossy finishes, surfaces damaged by acid or base cleaners, or those that can be dulled by the abrasive qualities of acidic or alkaline cleaners. Examples include resilient flooring and rubber flooring, terrazzo, and natural stones such as marble and granite.

Microbial and Enzymatic Cleaners

Microbial and enzymatic cleaners are no-rinse cleaners that use enzymes created from scientifically formulated strains of non-pathogenic forms of Bacillus bacteria. Enzymes from these bacteria consume and digest oil, fat, grease and petroleum hydrocarbons.

Three types of enzymes include:

1. Proteases, that breaks down protein based soils
2. Lipases, that works on lipids or fats
3. Amylases, that works on carbohydrates

Like any cleaner, choose an enzyme that focuses on its enzymatic action.

Microbial cleaners have been used to clear drains and clean concrete floors, tiles, and grout areas.

The wrong soap or detergent, or incorrect application can add to the slipperiness of floors. Some commercial cleaners may leave a residue on the floor if the concentration of cleaner to water is too high. Floors should be rinsed only with clear water to avoid leaving residue on floors after drying. Exceptions are microbial or enzymatic cleaners where no rinse is applied.

General Floor Cleaning Procedures

Floor cleaning procedures may vary by the type of product, so check the manufacturer’s guidelines or protocol for the product used.

Recommendations for removing grease include:

1. Use the proper amount of cleaning product with hot softened tap water
2. Apply cleaning product evenly on floor surface with a clean mop
3. Temporarily block any floor drains to permit chemical sufficient time to penetrate built-up contaminants
4. Allow sufficient time for the cleaning product to loosen contaminants on the floor – usually 5 to 10 minutes
5. Scrub the floor briskly using a deck brush
6. Open floor drains, wet vacuum or squeegee before rinsing
7. Rinse floor with clear hot, softened tap water to avoid leaving a residue on floors after drying

Housekeeping Programs

A good housekeeping program should include written instructions regarding floor maintenance.

Basic elements of an effective program should include the following:

- Identifying specific contaminants and selecting a cleaner/ chemical that effectively breaks each down.
- Establishing a floor cleaning protocol for removing contaminants.
- Providing appropriate tools to clean the floor (e.g., mops, buckets, deck brushes and squeegees). Designating dedicated tools for specific areas is necessary in order to avoid cross-contamination (e.g., mops used in areas with grease should not be used in non-greasy areas).
- Implementing a floor-cleaning schedule that is consistently followed; including identifying responsible employees and the time of day during which cleaning should take place.
- Establishing a training program for persons responsible for inspection, maintenance and cleaning. This includes defining cleaning requirements, cleaning procedures, safe handling and disposing of chemicals and solutions, emergency conditions and operations, and record keeping or reporting related to housekeeping and maintenance.
- Routinely inspecting all floor surfaces for wear, damage, debris and contaminants. Clear communication of any needed repairs to the facilities or maintenance department is critical.
- Occasional testing of floor surfaces to monitor slip resistance levels and determine effectiveness of the floor cleaning protocol.

Other Considerations

In addition, the housekeeping safety program should address the following procedural questions:

- How are potential hazards identified and reported to appropriate supervision?
- Are “sweep logs” maintained?
- Are routine inspections performed, including unannounced inspections? Are results recorded?
- Are first-line supervisors held accountable for hazards in their departments?
- Are warnings or signage provided whenever a slip and fall hazard has been identified and is it left in place until appropriate action taken? Warning signs should use symbols that follow ANSI Z535.3 2007 Criteria for Safety Symbols.
- Are enough trash containers provided and are they located close to the points of waste generation?

Summary

In summary, identifying slip and fall causes can become complex, but fall prevention begins with selecting and maintaining the flooring. Developing and adhering to formal floor cleaning protocols and housekeeping programs are an important element of removing contaminates and improving the slip-resistance of floors.

References

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