

Preventing Slips and Falls – Slip-Resistant Footwear



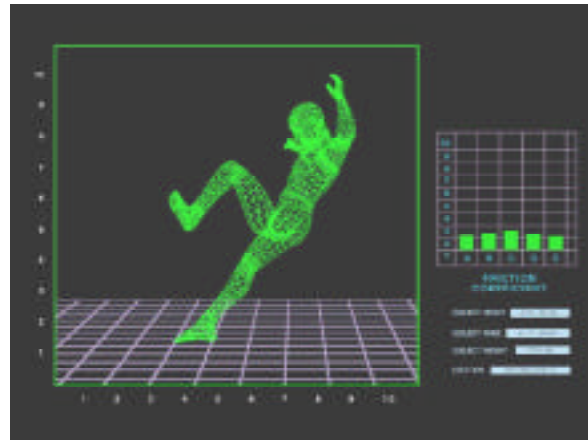
According to published research by the Liberty Mutual Research Institute for Safety, same-level slips and falls represent nearly 11 percent of all workers compensation claims and over 13 percent of all claims costs. This is second only to manual material handling, which represents 37 percent and 40 percent, respectively. In most industry groups, slips and falls represent the highest, or second highest type of workers compensation claim. In addition, 11 percent of low back pain-related claims and 12 percent of low back pain-related claims costs are attributed to slips and falls.

Proper housekeeping and the installation of quality slip-resistant floor surfaces is the foundation of any slip/fall prevention program. Utilizing slip-resistant footwear is an additional intervention strategy for reducing the likelihood of a fall. A slip-resistant footwear program needs to consider the working environment (e.g. wet/greasy floors etc.) and, when selecting footwear, whether it is worn indoors or outdoors. This reference note will provide guidelines for selecting slip-resistant footwear and implementing a slip-resistant footwear program.

There are two major components to consider when selecting an appropriate slip-resistant footwear product; one is tread design and the other is tread material.

Tread Design

There are no specific recommended tread patterns, however, there are recommendations for tread design. The Shoe and Allied Trade



Research Association (SATRA) Technology Centre, Ltd., U.K. has produced guidelines for slip-resistant sole design as follows:

- Sole should have a raised-tread pattern on heel and sole with a leading edge in many directions. In other words, a crosshatch, or similar, design.
- Cleat width between 3 to 20 mm.
- Channel width at least 2 mm.
- Tread pattern should extend over whole sole and heel area.
- Sole should have a flat, flexible bottom construction. Consider a low-density midsole that conforms to the ground and maximizes contact area.
- A square heel breast (acts as leading edge) is recommended as opposed to a rounded edge.

For more information, contact SATRA at <http://www.satra.co.uk/>

Tread Material

Tread material is very important to slip resistance and, in addition to tread design, is where

slip-resistant footwear manufacturers cite competitive differences between their products. The tread material is usually a proprietary softer rubber material with slip-resistance benefit arising from the heel and shoe sole conforming with the surface of the floor. Styrene butadiene rubber (SBR), nitrile-butadiene rubber (NBR), and polyurethanes are some of the more commonly used footwear soling materials. If a tread material is too hard it will not conform to the floor surface, and may not provide maximum slip resistance protection.

The softer rubber soling, typical of slip-resistant shoes, offers limited durability in demanding outdoor work environments such as construction work. Tread durability can be an issue with slip-resistant shoes worn in such environments. The softer, rubber materials could wear quickly and the tread could become damaged over time. A good work boot with a harder polyurethane sole with raised tread pattern will usually suffice for outdoor work. The tread material, regardless of use, should also be oil resistant.

In winter weather, softer heel and sole materials of thermoplastic rubber are often recommended, but they are not adequate for wet ice. Footwear worn in wet icy conditions should consist of harder materials, preferably studded heels and soles.

What does “slip-resistant” mean?

Slip-resistant is a specific term given to footwear that reduces likelihood of slipping. Any shoe called “slip-resistant” should have corresponding test data to support the claim. There are no standardized test methods for slip-resistance testing of shoes. Terms such as oil resistant, fat resistant, acid resistant, alkaline resistant, or skid resistant does not mean slip-resistant.

Manufacturers of slip-resistant footwear perform laboratory slip testing of their products under “realistic” conditions, mostly using wet and greasy quarry tile. The slipmeter commonly used is the Brungraber Mark II. The Mark II has



Examples of Slip-Resistant Outsole Designs

a 3" X 3" test pad surface; a good size for attaching a sample of outsole material. The English XL Variable Incidence Tribometer (VIT) has a smaller test foot surface but is also a suitable shoe tester.

Some examples of slip-resistant footwear include the: **Converse SureGrip**[®] sold mail order and by mobile truck, **Lehigh SLIPGRIPS**[®] including the Spider-Grip[™] outsole sold mail order and by mobile truck, **SafeTrax**[®] sold at K-Mart and mail order from FootstarWorks, **Shoes For Crews**[®] SFC III[™] sold mail order, **Safe T Step**[®] sold retail at Payless ShoeSource[®] stores, **TX Traction**[®] sold retail at Famous Footwear stores. **Skechers**[®] WORK distributed through regional and national distributors, **TredSafe**[®] sold at Wal-Mart, and others. This is not a complete list and no endorsement is expressed or implied from this list.

Implementing a Slip-Resistant Footwear Program

A slip-resistant footwear program should be in writing, and should include a written policy for selection, purchase, reimbursement, and replacement of footwear. A slip-resistant footwear policy needs to be customized to meet the needs of your organization. Before implementing a slip-resistant footwear program, a good idea is to have legal counsel review the policy for potential legal exposures.

Purchasing slip-resistant footwear and specifying who pays is an important decision. The following are common footwear purchase options:

- Company purchase – employer purchases slip-resistant footwear from a specified vendor and workers then pick their sizes. Employer subsidizes the entire cost and specifies the look and style of footwear they want their employees to wear.
- Employee purchase - workers purchase their own footwear from specified vendors, or any vendor that meets the specifications defined in the employer’s policy. Discounts might be offered for work purchase of shoes from retail outlets or mail order.
- Payroll deduction plans – employees order their own footwear from specified vendor(s) according to the policy, and cost is automatically deducted from their paycheck. Footwear vendor(s) work with the company on tracking purchases and providing information for payroll deduction.

In summary, utilizing slip-resistant footwear can be an effective strategy in preventing slips and falls. It is important that the features, benefits, and limitations of slip-resistant footwear be understood by managers before a program is implemented. Slip-resistant footwear, in combination with good housekeeping, can offer a comprehensive approach to managing slips and falls in the workplace.

References

Grönqvist R., Hirvonen, M., Slipperiness of Footwear and Mechanisms of Walking Friction on Icy Surfaces, *International Journal of Industrial Ergonomics*, 16, pp. 191-200, (1995).

Di Pilla, S., *Slip and Fall Prevention: A Practical Handbook*, Lewis Publishers, CRC Press, (2003).

Leamon, T.B., Murphy, P.L., Occupational Slips and Falls: More Than A Trivial Problem, *Ergonomics*, Vol. 38, No. 3, pp 487-498 (1995).

Murphy, P.L. and Courtney, T.K., Low Back Pain Disability: Relative Costs by Antecedent and Industry Group, *American Journal of Industrial Medicine*, Vol. 37, pp. 558-571 (2000).

ASTM F1679; *Standard Test Method for Using a Variable Incidence Tribometer (VIT)*, ASTM International, West Conshohocken, PA.

ASTM F1677; *Standard Test Method for Using a Portable Inclineable Articulated Strut Slip Tester (PIAST)*, ASTM International, West Conshohocken, PA.

Notes

The illustrations, instructions and principles contained in the material are general in scope and, to the best of our knowledge, current at the time of publication. No attempt has been made to interpret any referenced codes, standards or regulations. Please refer to the appropriate code-, standard-, or regulation-making authority for interpretation or clarification. Provided that you always reproduce our copyright notice and any other notice of rights, disclaimers, and limitations, and provided that no copy in whole or in part is transferred, sold, lent, or leased to any third party, you may make and distribute copies of this publication for your internal use.