

INTRODUCTION TO PREVENTING SLIPS, TRIPS AND FALLS

Purpose

In order to create a comprehensive system for preventing slips, trips and falls, you need a basic understanding of the problem. This module begins with some facts and statistics relating to slips, trips and falls. You will learn about the number of deaths and disabilities caused by these injuries and about the associated costs. You will learn the various OSHA regulations and other standards. The module also explores the different types of slips, trips and falls. Finally, you will be introduced to the components of effective trip, slip and fall prevention: recognize, evaluate, and control.

Objectives

After completing this module, you will be able to:

- Identify the impact of slips, trips and falls on the workplace.
- Recognize key slip, trip and fall terminology.
- Recognize OSHA regulations and other standards relating to slips, trips and falls.
- Identify the various types of slips, trips and falls.
- State the three components of effective slip, trip and fall prevention.

Test Your Slip, Trip and Fall IQ

Directions: Take the following quiz to determine your knowledge of slip, trip and fall facts.

- _____ 1. How many occupational injuries were caused by slips, trips and falls in 2014?
- Over 250
 - Over 2,500
 - Over 25,000
 - Over 250,000
- _____ 2. How many occupational deaths were caused by falls in 2014?
- Almost 200
 - Almost 500
 - Almost 800
 - Almost 1,000
- _____ 3. In 2014, what was the median number of lost work days due to falls to a lower level?
- 7
 - 14
 - 21
 - 28
- _____ 4. In 2012-2013, what was the average total incurred workers' compensation cost per trip/slip/fall?
- Over \$5,000
 - Over \$10,000
 - Over \$15,000
 - Over \$20,000
- _____ 5. In 2012-2013, the average total incurred workers' compensation cost per trip/slip/fall exceeded the average cost of other injuries by _____.
- 14%
 - 26%
 - 31%
 - 45%



Notes:

The data for this quiz was obtained from *Injury Facts*, a publication of the National Safety Council, and represents the most recent information available.

Definitions

There are many terms relating to slips, trips and falls. The following definitions will acquaint you with the important terminology that will be used throughout this course.

Term	Definition
<i>Slip</i>	<ul style="list-style-type: none"> Loss of balance when there is too little friction or traction between a person's foot and the walking surface.
<i>Trip</i>	<ul style="list-style-type: none"> Loss of balance when the foot collides with, strikes or hits an object in its path.
<i>Fall</i>	<ul style="list-style-type: none"> To move downward freely without control, from a higher to a lower level.
<i>Friction</i>	<ul style="list-style-type: none"> The resistance that one surface or object encounters when moving over another. On walking surfaces, it is the resistance between the shoes and the walking surface.
<i>Tribology</i>	<ul style="list-style-type: none"> The study of friction.
<i>Tribometer</i>	<ul style="list-style-type: none"> An instrument for measuring friction in sliding.
<i>Foot Candle</i>	<ul style="list-style-type: none"> The amount of light or brightness that a birthday cake candle generates from a distance of one foot.
<i>Lumen</i>	<ul style="list-style-type: none"> A measurement that is equal to one foot candle falling on one square foot of area.
<i>Slip Resistance</i>	<ul style="list-style-type: none"> The relative force that resists the tendency of a shoe or foot to slide along a floor.
<i>High Traction</i>	<ul style="list-style-type: none"> The amount of walkway slip resistance often associated with preventing a slip, trip or fall.
<i>Coefficient of Friction</i>	<ul style="list-style-type: none"> A measurement that indicates how slippery a floor is under dry conditions.



Coefficient of Friction

The coefficient of friction is a useful term for safety professionals who are responsible for preventing slips, trips and falls in the workplace. The following are helpful points regarding coefficient of friction.

- The coefficient of friction (COF) is computed by taking the amount of the horizontal force required to start an object slipping, and dividing it by the weight of the object, or its vertical force. Look at following equation/calculation:

$$\frac{\text{Horizontal force}}{\text{Vertical Force}}$$

- Generally, the COF scale ranges from 0 to 1. The higher the COF measurement, the less slippery the surface. For example, a metal object on ice (such as an ice skate) will have a low COF. However rubber on concrete will have a high COF. A surface with a COF above 1.0 is considered to be a trip hazard.
- Although there are no precise regulations defining what a COF should be, experts in floor safety consider a range of 0.5 to 0.6 to be safe.
- There are two types of COF.
 - Static coefficient of friction (SCOF): the force required to initiate relative motion between an object and a surface it is resting on.
 - Dynamic coefficient of friction (DCOF): the force required to keep a sliding object in motion, once sliding has begun.

There is some disagreement over which type of COF should be measured to prevent slips and falls, however, SCOF is the only recognized method of measurement in the U.S.

- Here are the most important things a safety professional needs to remember about COF.
 1. There are instruments that can help you measure COF of the floor surfaces in your business. (These instruments will be discussed in Module 3: Evaluating Slip, Trip and Fall Hazards.)
 2. When installing, treating, or cleaning the floors in your organization, make sure that you consider the COF of the products you are using.
 3. When purchasing, recommending, or requiring footwear for employees, make sure you select a product that has a safe COF relative to your organization's floor surfaces.
 4. Your floor and shoe vendors can help you select products with an appropriate COF.

Regulations and Standards for a Safe Workplace

A number of regulations and standards can help you create a workplace that is free of slip, trip and fall hazards. Following is a summary of some of the most important.

The Regulation or Standard: OSHA General Duty Clause (5)(a)(1)

What it is: The section of the OSH Act that describes employer and employee duties relating to a safe workplace. It states the following:

- Each employer:
 1. Shall furnish to each of his employee's employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;
 2. Shall comply with occupational safety and health standards under this Act.
- Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to the Act which are applicable to his own actions and conduct.

Where to Get More Information:

- www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=OSHACT&p_id=3359

The Regulation or Standard: OSHA Sub-Part D, 1910.21-1910.30—Standards for Walking and Working Surfaces

What it is: A comprehensive standard for virtually every situation in the workplace involving walking and working surfaces. Includes the following:

- Scope and definitions.
- General requirements.
- Ladders.
- Step bolts and manhole steps.
- Stairways.
- Dockboards.
- Scaffolds and rope descent systems.
- Duty to have fall protection and falling object protection.
- Fall protection systems and falling object protection – criteria and practices.
- Training requirements.

Where to Get More Information:

- A complete copy of the standard is on your *Tools and Resources* USB drive.
- <https://www.osha.gov/SLTC/walkingworkingsurfaces/index.html>

Regulations and Standards for a Safe Workplace—continued

The Regulation or Standard: OSHA—Guidelines for Occupational Foot Protection (1910.136)

What it is: OSHA Subpart I, states that each affected employee shall wear protective footwear when working in areas where there is danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where such employees' feet are exposed to electrical hazards.

Where to Get More Information:

- https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_id=9786&p_table=STANDARDS&p_id=9786

The Regulation or Standard: NFSI Standards for Walkway Safety

What it is: From the National Floor Safety Institute, the intent is to assist property owners in reducing slips and falls through improving walkway slip resistance. The NFSI has several walkway safety standards including:

1. NFSI 101-A, SCOF test method for evaluating the slip resistance of floor coverings and coatings
2. NFSI 101-B, SCOF test method for measuring the slip resistance qualities of floor cleaners and safety treatments
3. Guideline for auditing and inspecting walkway surfaces

The NFSI certifies walkway surfaces as “High-Traction”.

Where to Get More Information:

- www.nfsi.org

The Regulation or Standard: ANSI Standard for the Provision of Slip Resistance on Walking/Working Surfaces (A1264.2-2012)

What it is: From the American National Standards Institute, the intent of this standard is to help in the reduction of falls due to causes that are preventable. The standard addresses three key areas:

1. Criteria for reducing hazards,
2. Test procedures and equipment.
3. Slip resistance guidelines.

Where to Get More Information:

- <http://www.asse.org/ansi/asse-a1264-2-2012-standard-for-the-provision-of-slip-resistance-on-walking/working-surfaces/>
- <http://www.asse.org/broadcasts/slips-trips-techbrief5-4-09.html>

Regulations and Standards for a Safe Workplace—continued

The Regulation or Standard: ASTM Standard Practice for Safe Walking Surfaces (F1637.13)

What it is: From the American Society for Testing and Materials, it addresses walking surface defects and design considerations, including where slip resistant surfaces should be used. It provides specific guidelines for sidewalks, gratings, bumps, short-flight stairs, and wheel stops.

Where to Get More Information:

- <http://www.astm.org/Standards/F1637.htm>

The Regulation or Standard: ASTM F2413-11 Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear

What it is: From the American Society for Testing and Materials, this standard covers minimum requirements for the design, performance, testing and classification of protective footwear. The purpose of this standard is the certification of protective footwear. It supplements OSHA's guidelines for occupational foot protection.

Where to Get More Information:

- From most vendors who sell protective footwear for industry.
- <http://www.grainger.com/content/qt-protective-footwear-standards-252?currenturl=%2Frefinfo%2Fefacts%2Fefz252.htm&r=l>

The Regulation or Standard: NFPA 101—Life Safety Code

What it is: From the National Fire Protection Association, this standard that addresses light and signage criteria for evacuation purposes.

Where to Get More Information:

- www.grainger.com/content/qt-emergency-lighting-exit-sign-requirements-265

The Regulation or Standard: Individual State Building Codes

What it is: Every state has a set of building codes that businesses must follow. These codes can guide you in creating a workplace that is free from slip, trip and fall hazards.

Where to Get More Information:

- Use your favorite search engine, then type in [your state] + building codes.

Regulations and Standards for a Safe Workplace—continued

The Regulation or Standard: OSHA Subpart I, 1910.140 Personal Fall Protection Systems

What it is: establishes performance, care, and use criteria for all personal fall protection systems. The employer must ensure that each personal fall protection system used to comply with this part must meet the requirements of this section.

Where to Get More Information:

- https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=1291

Applying the Regulations and Standards to Your Workplace

If you are trying to establish your workplace as a benchmark example, or trying to address troubling hazards, these suggestions can help you learn and apply the standards.

- Become familiar with the standards, especially OSHA sub-part D.

- Set a goal to learn the standards one at a time.

- Target areas in your organization that you want to improve, then learn the standard relating to that area.

- Use your favorite Internet search engine to look up and research the standard you need to apply. Or contact the National Safety Council's Library (library@nsc.org; (630) 775-2199).

- Request assistance from your contractors, vendors and insurance company.

Activity: Types of Slips, Trips and Falls

Directions: When you introduced yourself at the beginning of this course, you identified the most common type of slip, trip or fall in your organization. Now review the following lists and check the boxes that correspond to incidents that are common in your organization.

Types of Slips and Trips

- | | |
|---|--|
| <input type="checkbox"/> Slip on wet or oily surface | <input type="checkbox"/> Slip on dry, slippery floor |
| <input type="checkbox"/> Slip on ice or snow | <input type="checkbox"/> Slip on a spilled substance |
| <input type="checkbox"/> Trip on a sticky surface | <input type="checkbox"/> Trip over defect in floor |
| <input type="checkbox"/> Trip on loose or curled rug or mat | <input type="checkbox"/> Trip from poor lighting |
| <input type="checkbox"/> Stumble over parking bumper | <input type="checkbox"/> Stumble over foreign object |
| <input type="checkbox"/> Stumble over clutter | <input type="checkbox"/> Stumble on an unclosed drawer |
| <input type="checkbox"/> Stumble from obstructed view | <input type="checkbox"/> Stumble on uneven stairs |

Types of Falls

- | | |
|---|---|
| <input type="checkbox"/> From one level to another | <input type="checkbox"/> Down stairs or steps |
| <input type="checkbox"/> From floor, dock or ground level | <input type="checkbox"/> Through a floor surface |
| <input type="checkbox"/> Through an opening in the floor | <input type="checkbox"/> From a loading dock |
| <input type="checkbox"/> From a ladder | <input type="checkbox"/> From piled or stacked material |
| <input type="checkbox"/> From a roof | <input type="checkbox"/> Through a skylight |
| <input type="checkbox"/> Through an existing roof opening | <input type="checkbox"/> From a roof edge |
| <input type="checkbox"/> From scaffold or staging | <input type="checkbox"/> From a nonmoving vehicle |
| <input type="checkbox"/> Jump from structure | <input type="checkbox"/> Jump to a lower level |
| <input type="checkbox"/> Jump from scaffold, platform or loading dock | <input type="checkbox"/> Fall from building girders or other structural steel |
| <input type="checkbox"/> Fall on same level | <input type="checkbox"/> Fall onto or against objects |

Activity: Addressing Hazards in the Workplace

Directions: Work with your group to identify two types of slips, trips or falls from Page 10. Determine one or two actions you can take to improve in each of the areas you identify.

Slip, Trip or Fall (from Page 10):

Actions to take:

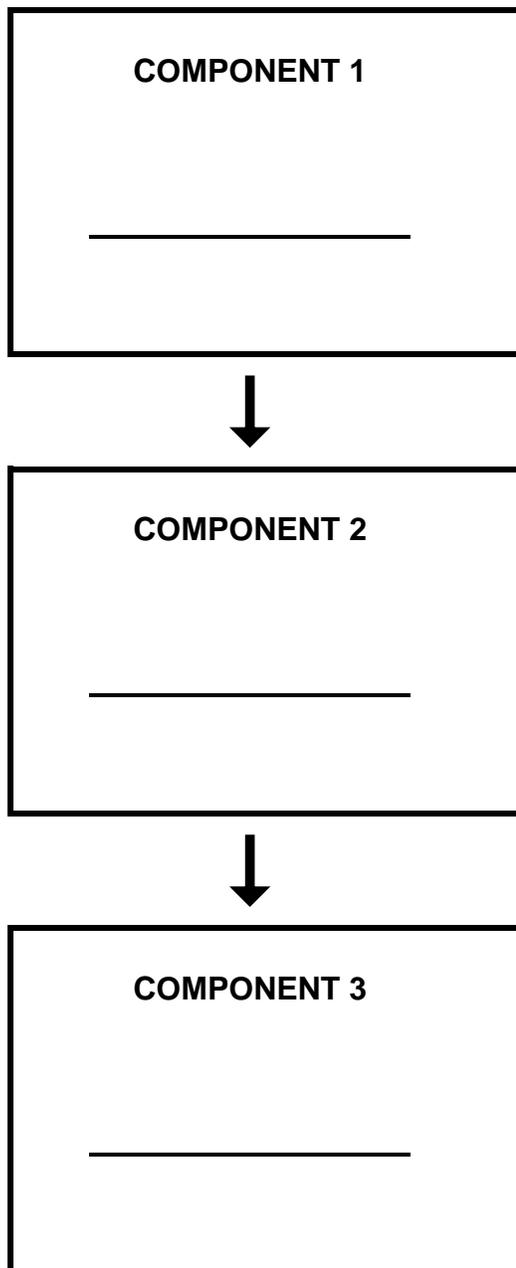
Slip, Trip or Fall (from Page 10):

Actions to take:



Components of a Proactive Slip, Trip and Fall Prevention System

There are three components of effective and proactive slip, trip and fall prevention. These components are the backbone of all safety management systems. Test your safety management knowledge by identifying the three components.



Planning for Your Business

Directions: Based on what you've learned in this module, what will you do back on the job?

1. Identify two or three actions you will take when you return to your worksite. You can select from the actions listed below, or identify your own.
2. In addition, identify the potential barriers you might encounter in taking these actions.
3. Next, list ideas for overcoming the barriers identified.

Possible Actions

- Read the entire OSHA walking/working surfaces standard to get acquainted with it.
- Log on to the OSHA website to learn about other available tools and resources.
- Select and review one or two other standards to increase your knowledge.

Action Plan

Action	Potential Barriers	Overcoming the Barriers

