



## **Fall Protection Program**

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## INTRODUCTION

### Forward

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In 1970, the United States Congress established the right of workers to "safe and healthful working conditions" through the Occupational Safety and Health Act. This act created the Occupational Safety and Health Administration (OSHA). House Bill 308 incorporates by reference all federal OSHA standards found in the Code of Federal Regulations (CFR), Title 29 Parts 1910, 1926 and 1928 as Ohio Public Employment Risk Reduction Standards. All adopted Ohio Public Employment Risk Reduction Standards are found in Chapter 4167 of the Ohio Revised Code and the Ohio Administrative Code.

This program has been established by Bowling Green State University to comply with OSHA's Walking-Working Surfaces, 29CFR1910 Subpart D and Personal Fall Protection Systems, 29CFR1910.140, standards.

### Objective

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The purpose of the program is to establish guidelines to protect all employees and members of the BGSU community engaged in outdoor and indoor activities that exposes them to fall hazards. This is accomplished through effective education, engineering and administrative controls, use of fall protection systems and equipment, and enforcement of the program.

### Applicability

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Fall hazards are defined as a risk of falling from a height of four or more feet or when working over dangerous equipment and/or machinery. Falls may also occur at the same level resulting from trips and slips.

The following fall hazards are NOT covered under the scope of this program:

- Stairways, portable ladders and fixed ladders less than 24 feet in height;
- Cranes, derricks, and hoists;
- Scaffolding;
- Mobile Elevating Work Platforms; and
- Work in confined spaces

Any fall concerns regarding these topics are addressed in other BGSU programs, policies, procedures, etc. on Environmental Health and Safety's (EHS) website.

### Responsibilities

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EHS department is responsible for:

- Preparing, reviewing, and periodically revising this program.

- Providing and/or overseeing program related training.
- Monitoring and evaluating fall hazards in the workplace.
- Providing guidance and technical assistance to campus community regarding this program, any fall concerns reported/identified, and the selection of approved fall protection equipment.
- Maintaining all required records pertaining to this program.
- Maintaining a list of authorized personnel.
- Ensuring all incidents related to falls from heights are investigated and corrective action is taken to prevent a reoccurrence.

Supervisors/Managers are responsible for:

- Notifying EHS about workplace fall hazards and potentially affected employees.
- Providing new employees with informal on-the-job instruction about potential fall hazards they may encounter in their work environment.
- Ensuring that authorized employees receive necessary training before beginning work where fall hazards could exist.
- Ensuring pre-use equipment inspections are performed by authorized employees.
- Ensuring overall employee compliance with this program.
- Providing fall protection equipment at no cost to employees and ensuring they have access to and understand the manufacturer's instructions for use, care, limitations, and warnings.
- Providing a copy of this program to authorized personnel upon request or directing them to where it is located on EHS's website.

Authorized employees are responsible for:

- Complying with all aspects of this program.
- Identifying and controlling fall hazards associated with the work to be performed. If unsure, contacting a supervisor for assistance.
- Attending/participating in all required training sessions.
- Correctly using and caring for the personal fall protection equipment and supplies per manufacturer's instructions.
- Inspecting fall protection equipment before each use. If any inspection fails, taking the equipment out of service and notifying a supervisor.
- Reporting all unsafe or hazardous conditions or actions that may cause injury to either themselves or any other person to a supervisor immediately.
- Verifying a rescue procedure has been developed and reviewed prior to utilizing a personal fall arrest system.

## **Program Enforcement**

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A violation of a university employee's responsibility must be reported to the employee's immediate supervisor for appropriate action.

## Definitions

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**Active Fall Arrest System:** Equipment used to arrest an employee experiencing a fall from a working level. The primary components are: the anchorage, connectors from the anchorage (such as a lanyard) to the individual, and a full body harness.

**Anchorage:** A secure point of attachment for lifelines, lanyards or deceleration devices. For fall arrest systems, it must be capable of supporting 5000 pounds per individual tied off. It must be capable of supporting 3000 pounds for fall restraint systems.

**Authorized Person:** A person assigned by BGSU to perform duties at a location where the person will be exposed to a fall hazard (unprotected heights greater than 4 feet). The Authorized Person shall through experience and training have a working knowledge of and experience in the selection, use, storage and care of all equipment necessary to use an active fall arrest system.

**Designated Area:** A space which has a perimeter barrier erected to warn employees when they approach an unprotected side or edge and serves to designate an area where work may be performed without additional fall protection. Designated areas cannot be erected less than 15 feet from an unprotected side or edge and are only allowed for work of a temporary nature such as maintenance of roof top equipment. A designated area must be surrounded by a rope, wire, or chain supported by stanchions.

**Competent Person:** An individual designated by BGSU to be responsible for the immediate supervision, implementation, and monitoring of this program who, through training and knowledge, is capable of identifying, evaluating, and addressing existing and potential fall hazards, and who has the authority to take prompt, corrective action with regards to such hazards. The Competent Person shall have a working knowledge through experience and training of current fall protection and planned rescue regulations, standards, equipment and systems.

**Fall Restraint System:** Differs from the Fall Arrest System in that it limits the individual's travel in such a manner that the user is prevented from reaching a fall point (such as the edge of a roof or an elevated working surface). The Fall Restraint System is not designed to support an individual falling and as such does not require the same design capacities.

**Floor Holes:** Are openings measuring less than 12 inches but more than 2 inches in its least dimension, in any floor, platform or other work surface through which materials may fall or which may present a tripping hazard (examples include a pipe opening, or slot opening).

**Floor Openings:** Are openings measuring 12 inches or more in its least dimension, in any floor, roof, platform or other working surface through which a person may fall (examples include skylights, hatchways, stair or ladder openings, pits, or manholes).

**Harness:** An array of straps secured around the wearer in a manner that distributes the fall arresting forces over the thighs, shoulders, and pelvis and contains provisions for attaching it to a lanyard, lifeline, or deceleration device. Attachment must only occur at the harness rear "D" ring.

***Low-Slope Roof:*** A roof having a slope less than or equal to 4 in 12 (vertical to horizontal).

***Passive Fall Arrest System:*** Includes, but is not limited to, a standard railing system, parapet, or a designated area.

***Qualified Person:*** A person with a recognized degree or professional certificate and with extensive knowledge, training, and experience in the fall protection and rescue field who is capable of designing, analyzing, evaluating, and specifying fall protection and rescue systems to the extent required by this standard.

***Standard Railing:*** A barrier consisting of top rail, mid-rail, posts and toe board designed to prevent employees from falling.

***Steep-Slope Roof:*** A roof having a slope greater than 4 in 12 (vertical to horizontal).

***Walking/Working Surface:*** Any surface upon which an individual walks or works.

***Wall Opening:*** An opening at least 30 inches high and 18 inches wide in any wall or partition through which employees can fall to a lower level.

## FALL PROTECTION EQUIPMENT, SELECTION, DESIGN AND INSPECTION

### Equipment

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Personal fall arrest equipment as a system should be purchased from a single manufacturer. The equipment is tested as a system and substitution of equipment from another manufacturer of personal fall arrest equipment could result in a component or system failure. For example, refraining from using a Miller lanyard with a DBI-SALA harness. Personal fall arrest equipment and associated system components are designed for a combined weight (employee plus tools, etc.) of 310lbs. If the combined weight exceeds 310lbs., system modifications may be necessary. Check with the manufacturer.

Free-fall distance shall be kept to a minimum and never exceed 6 feet. Free fall in excess of this distance can result in system failure and/or injury. In most situations the anchor point should be located near or above the shoulder level. In selecting a fall arrest system, consideration should be given to swing fall hazards, obstructions in the fall area that one could strike, retrieval of individual, etc.

Consideration should be given to conditions that could affect the performance of the equipment selected. The following is a short list of conditions that could adversely affect the equipment being used: temperature extremes, use of corrosive substances (solids, liquids, or gases), welding/torch cutting, abrasive blasting, high moisture, grease/oil, and chemicals. Wire rope should never be used where an electrical hazard exists. Where fall arrest could occur on a roof or where other potential sharp edges are present, a leading edge (LE) lanyard is required (not made of a fabric/webbed material that can shear on a sharp edge during a fall).

Safety belts are not acceptable for fall arrest situations, but may be used for fall restraint. Shock absorbing lanyards shall be used where possible. Lanyards, lifelines, full-body harnesses, etc. shall be protected against abrasion or cutting. Beam wraps and clamps are available for use as anchor points. Trauma relief straps on harnesses are highly encouraged to delay the effects of suspension strap trauma.

Anchor points for fall arrest must be capable of supporting 5000 pounds per attached person (think of it supporting a small/average vehicle). For fall restraint, the anchor point only needs to support 3000 pounds per attached person. The adequacy of an anchor point must be determined by a competent person. Where there is doubt about the strength of an anchor point, an engineer must be consulted. Permanently installed anchor points should be provided for fall hazards that are routinely encountered. Anchor points for fall arrest that are exposed to corrosive conditions (acids, bases, moisture) should be corrosive-resistant.

### Selection

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This hierarchy of controls must be followed at all times (listed most to least preferred), but especially when designing new buildings, during major renovations, or when installing a new roof.

1. **Eliminate the Hazard:** This involves redesigning the work environment or changing work practices to remove the fall risk. It's the most direct and effective method of fall protection.

By eliminating the hazard, the need for further protective measures becomes redundant. This level is the most desirable outcome in the hierarchy of fall protection. For example, eliminating the need for staff to be on roofs to perform work tasks or locating all equipment requiring maintenance at least 15 feet from all unprotected sides/edges resulting in a fall of 4 feet or more to a lower level.

2. **Passive Fall Protection:** Guardrails, skylight screens, and other barriers are examples of passive fall protection. They create a physical barrier between the worker and the fall hazard. These systems provide continuous protection without requiring the active involvement of the worker. Passive fall protection becomes a practical option when you cannot eliminate fall hazards.
3. **Active Travel Restraint:** This active fall protection method includes systems like body harnesses connected to anchor points, preventing the worker from reaching a point where a fall could occur. Active travel restraints require some level of worker participation. They are more involved than passive systems but are less cumbersome than fall arrest systems. They are ideal in situations where the work environment allows for their use.
4. **Active Fall Arrest:** Another form of active fall protection, these are systems designed to safely stop a fall that is in progress, such as full-body harnesses with shock-absorbing lanyards or retractable lifelines. When other means cannot eliminate or sufficiently reduce the fall risk, they're an option. While not preventing falls, they mitigate the risk of serious injury during a fall.

## Design Requirements

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Fall protection must be considered for new buildings, facilities, and equipment as well as during major renovations and roofing projects. Fall protection is required for all open-sided platforms, floors or walkways that are 4 feet or higher off the ground or next level. The requirement includes elevated surfaces, such as rooftops, where access is needed for maintenance activities. Applicable OSHA and ANSI Standards must be referenced for design requirements for passive fall protection systems and their components. If an adequate passive system is not in place, an active system of fall protection must be employed such as a fall arrest or restraint system. In selecting active fall protection systems, these design considerations should be considered:

- Systems must meet applicable OSHA and ANSI Standards.
- The system shall be designed to support the required number of users (typically two) in case of a fall and to prevent the users from free falling more than 6 feet. All components shall be designed by the fall protection system supplier.
- The selection, design, and installation of active fall protection systems shall be performed under the supervision of a Qualified Person with experience and trained in design and use of such systems.
- All components must be installed according to the manufacturer's specifications.
- Calculations must be prepared under the supervision of a registered Professional Engineer and Qualified Person.
- The Professional Engineer who oversaw the design of the system must affix their professional seal to each drawing and calculation package issued.
- Operation and maintenance data shall be prepared per ANSI Z359.2 & Z359.6.
- A Qualified Person must verify that all manufactured units have been installed in accordance with specifications and details and will function as intended.



- Systems must be labeled and include user instructions and limitations at the access points.
- Safe access must be provided to anchorages so that users are continuously protected.

Personal fall arrest and restraint systems are composed of specific components that must be selected and used properly. Equipment includes: the harness, lanyard and anchorage. All anchorages must be designed or selected by a Qualified Person. Equipment must be stored in a manner consistent with manufacturer instruction and which protects it from exposure to any conditions that could result in damage.

## **Inspection**

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Personal fall arrest equipment (body harness, lanyard) that has been subjected to a fall shall be removed from service. Equipment shall be maintained in accordance with the manufacturer's guidelines and inspected prior to each use. The following should be checked at a minimum:

**D-Rings** – Cracks, distortion, corrosion, pitting, or excessive wear.

**Buckles** – Distortion, sharp edges or cracks.

**Body Harness** – Burns, pitting of metal parts, damage due to chemicals, cuts, rips, holes, tears, excessive fraying, missing/damaged/torn grommets, intact fall rip out stitching/points, abrasion to the material, or broken stitches. One of the best ways to check the material is to hold sections of the material between the hands and bend the material into a U-shape to look for damage.

**Keepers and Snap Locks** – Make sure they operate correctly. Do not rely on the sound of the latches. They must be connected.

**Retractable Lines** – They should operate smoothly. The rope or cable should not be damaged. A quick pull of the line should cause the line to lock. Retractable lifeline assemblies shall be returned to the factory for recertification at intervals specified by the manufacturer.

**Lanyard** (rope, webbed, or cable) – Look for damage due to chemicals, cuts, rips, holes, tears, excessive fraying, damaged fibers, and the condition of connections. There should be no knots in the line. A knot can result in a substantial reduction in strength.

**Shock Absorber** – Check for ripped stitches, signs of impact loading and connections.

## WORK PRACTICES

### Walking/Working Surfaces

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An often overlooked cause of falls is those resulting from slips and trips. A fall of this nature generally occurs at the same elevation and is often the result of poor housekeeping, spills, and/or inadequate maintenance of the surface. Due to the unpredictable nature of the exposure, personnel are encouraged to self-assess conditions and to act quickly to eliminate the hazard. These hazards may include icy sidewalks, wet floors, torn floor coverings and stair treads, and missing or broken handrails and guard rails. Other specifics include:

1. **Housekeeping:** Proper housekeeping assists in preventing falls from slips and trips. All work areas should be kept clean, orderly and in a sanitary condition. The floors of work areas should be maintained in a clean and dry condition. Where wet processes are used, drainage must be maintained and gratings, mats, or raised platforms provided. If work surfaces are temporarily wet or otherwise slippery, warning cones should be positioned in plain sight directly in front of the affected area. Every floor, working space, and passageway should be kept free of protruding nails, metal, splinters, holes, or loose grating/boards. Always sweep work areas, removing any debris, after completing a task.
2. **Floor Slip Resistance:** Walking and working surfaces should be maintained in a stable, firm, and slip resistant condition. This is particularly important when employees are likely to be exposed to wet floor conditions or perform material handling tasks involving the use of carts. The design of such environments should include considerations for how to maintain the floor; the appropriate selection of floor material to provide adequate slip resistance; and controls to reduce exposure such as floor drains and slip-resistant drainage mats. When selecting floor material, the surface's coefficient of friction (COF) should be based on the anticipated conditions. Generally, for dry conditions a surface with a static COF of 0.60 and for wet conditions a surface with a dynamic COF greater than 0.42 are considered slip resistant.
3. **Floor Openings, Holes and Wall Openings:** Standard guardrail systems should be provided to prevent falls from every open-sided floor or platform except where there is an entrance to a ramp, stairway, a fixed ladder, or working side of a platform such as a loading dock. Floor openings may be guarded with a guardrail system or covered by a cover capable of sustaining at least twice the anticipated load. When the floor opening cover is removed, a temporary guardrail shall be put in place, or an attendant must be stationed at the opening to warn personnel. Wall openings with a lower edge less than 36 inches and representing a fall hazard must be protected with a guardrail system. Wall openings may also be protected with screens, grills, doors or other barriers. Every floor hole into which a person can accidentally walk should be guarded by either a standard guardrail system or a floor hole cover of sufficient strength. The cover should not create a tripping hazard.

In some cases, a Restraining System may be used to prevent an employee from falling through a floor opening or over an edge when the floor cover or guardrail system is temporarily removed. This may be done to facilitate the transfer of materials as when an overhead crane is used to load in material or equipment and the railing is removed to facilitate material transfer. All employees utilizing a restraint system must be specifically trained in their use and limitations.

## Special Cases

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**Protection from Falling into Dangerous Equipment:** Regardless of height, open-sided floors, walkways, platforms, or runways above or adjacent to dangerous equipment, i.e. tanks, pits and similar hazards must be guarded with a standard guardrail system or employees should be provided personnel fall arrest gear selected to prevent contact with the dangerous equipment, material, and/or condition.

**Ditches:** Ditches, holes and other depressions greater than four feet deep should be surrounded by a guardrail system or other substantial physical barrier to prevent falls into the opening.

**Fixed Ladders:** Fixed ladders, including manhole ladders, must meet OSHA and ANSI standards to include being constructed of a material that is appropriate for the environment, capacity, dimensions and clearances. Fixed ladders extending more than 24 feet above the lower level must be equipped with a personal fall arrest system.

**Floor Loading Protection:** Load rating limits should be conspicuously posted on plates, raised platforms, and other engineered elevated structures or projections. Never place a load on a floor or roof greater than its approved limit. Temporary covers should be able to withstand at least twice the anticipated load.

## Roofs and Other Elevated Locations

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Falls from roofs may occur when an employee falls over an edge, through a skylight or down an access hatch. Roofs may be of different pitches, from flat to very steep. The roof slope will determine what fall protection systems are practical. Roofs with a slope greater than 8 in 12 (8 vertical to 12 horizontal) require special considerations. In all cases, doors and access hatches leading to roofs or elevated surfaces with fall hazards must be locked, restricting access to authorized, trained individuals only. On buildings that are only a few stories, it is advisable to perform this work from the ground using ladders, scaffolds, or aerial lifts. Specific roof requirements include:

1. **Flat Roofs and Elevated Surfaces:** Flat roofs and elevated surfaces are typically accessed by fixed ladders through access hatches or fixed stairs and doors. Fall hazards may include unprotected edges, skylights and access hatches. The preferred protection for these exposures is to use a passive protection system. In a passive system, the roof or elevated surface edge is protected by a standard guardrail system or a parapet that is a nominal 42 inches in height. Parapets less than 42 inches are not considered acceptable fall protection. Skylights subject to maintenance workers must either be protected with guardrails; with a screen capable of withstanding a concentrated load of at least 400 pounds applied perpendicular to any one area of one square foot dimension or twice the maximum intended load, whichever is higher. Skylights must be labeled with a performance grade rating.

An acceptable alternative for protecting employees accessing equipment on flat roofs with unprotected edges is through the use of a designated area. The designated area must be

surrounded by a rope or wire and supporting stanchions that can withstand a force of at least 25 pounds before tipping over and cannot be closer than 15 feet to the unprotected edge<sup>1</sup>. Access to and from the designated area from the roof entry point must also be delineated with lines and stanchions meeting the same criteria. The lines are intended to keep workers from straying too close to the roof edge and must be clearly visible (day and night) as well as meet additional strength and height requirements. In cases where the equipment to be serviced is located within 15 feet of a roof edge, the roof edge immediately adjacent to the equipment must be protected with a guardrail. Access to and from this area from the roof entry point must also be delineated with lines and stanchions meeting the same criteria identified for establishing a designated area. Work performed outside the designated area or lines require the use of a personal fall arrest or restraint system.

If an adequate passive system is not in place, an active system of fall protection must be employed such as a fall arrest or restraint system. Such systems must meet all OSHA standards and be designed by a Qualified Person.

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<sup>1</sup> The designated area may be as close as 6 feet to the unprotected edge for work that is both infrequent and temporary.

2. **Sloped Roofs:** Low-sloped roofs are defined as equal to or less than 4 in 12 and steep roofs are roofs with a slope greater than 4 in 12 but less than 8 in 12. Low sloped roof edges may be protected with a guardrail system or a parapet that is a nominal 42 inches in height. Weighted guard rail systems are not approved for use on sloped roofs. If an adequate guardrail system or parapet is not present, a fall restraint or fall arrest system must be used. Steep sloped roofs require special considerations and must be individually evaluated for fall protection. Generally, a guardrail system or parapet will not provide adequate fall protection on a steep sloped roof.

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## **Weather Conditions**

When adverse weather conditions exist, such as high winds, heavy rain or snow, or when the accumulation of ice or snow on surfaces significantly increase the risk of slips and falls when performing tasks, a risk assessment should be conducted and where possible the work postponed until better conditions prevail or other precautions taken.

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## **Security**

Access to areas with fall hazards (roof tops, etc.) will be limited to personnel trained in the recognition of fall hazards and the steps necessary to mitigate those hazards. All roof accesses should be locked and controlled by Campus Operations. Procedures for storage of active fall protection equipment must include provisions for limiting access to only those personnel trained in the proper use of the equipment.

## **RESCUE**

Before using a fall arrest system, consideration must be given as to what emergency rescue strategy will be employed to remove an affected employee. Depending on the location and height of the work, this strategy may be as simple as the availability of a retrievable ladder or as complex as involving the local fire and rescue department's ladder trucks and elevated equipment. Prior to performing any work activity where personal fall protection equipment will be used, a rescue plan must be developed. The rescue plan must include the following elements and considerations:

- A description of all equipment to be used.
- Complete instructions for performing the rescue safely and promptly.

For incidents related to falls and involving fall arrest systems, the following actions must be taken:

- Report all incidents to EHS.
- Remove from service and tag all fall arrest system components until an inspection can be performed by EHS.
- Ensure all personnel impacted by the activation of a fall arrest system receive medical evaluation to determine any injury.
- Complete an online injury/illness reporting form.

## TRAINING

Fall protection training is provided or coordinated by the EHS department for all authorized personnel and their supervisors/managers and consists of the following information at a minimum:

- An overview of fall protection hazards and control measures/systems;
- The importance of fall protection systems including fall related injuries;
- A brief summary of the OSHA standards relating to fall protection;
- An overview of BGSU's written Fall Protection Program;
- An explanation of how EHS can assist areas and departments in implementation of the program; and
- Proper care, maintenance, and inspection of fall protection equipment.

**NOTE:** Required upon initial employment before an employee is subjected to potential fall hazards.

Retraining (refresher) shall be provided when any one of the following exists:

- Changes in the workplace or fall protection equipment that render previous training obsolete;
- If the individual demonstrates a lack of knowledge regarding the basic components of the Fall Protection Program; and
- At 3-year intervals.

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