WESTERN MICHIGAN UNIVERSITY
FALL PROTECTION POLICY

PURPOSE

The purpose of this fall protection policy is to protect Western Michigan University (WMU) employees who work at elevated heights not on ladders. In addition, this policy ensures compliance with MIOSHA General Industry Safety and Health Standards and also Construction Industry Part-45 requirements.

SCOPE

This program shall cover all WMU employees who conduct work at elevated heights not on ladders. All contractors must have their own fall protection program, which is comparable to this policy. Contractors are responsible for providing their fall protection program to WMU and must also be familiar with the WMU policy.

Elevated heights include an unprotected side which is 4 feet or more above a lower level or above dangerous equipment. Elevated heights may be found at unprotected sides and edges, hoist areas, wall openings, excavations, ramps, walkways, or holes in walking surfaces such as skylights.

DEFINITIONS

Anchorage: A secure point of attachment for lifelines, lanyards, or deceleration devices.

Body Harness: Straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with means for attaching it to other components of a personal fall arrest system.

Body Belt: Are not to be used for any reason at WMU. As of January 1, 1998 the use of a body belt for fall arrest was prohibited by law.

Buckle: Any device for holding the body harness closed around the employee’s body.

Dangerous equipment: Equipment which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment.

Deceleration device: Any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

Free fall: The act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Free fall distance: The vertical displacement of the fall arrest attachment point on the employee’s body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and
lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

**Guardrail system:** A barrier erected to prevent employees from falling to lower levels.

**Hole:** A gap or void 2 inches or more in its least dimension, in a floor, roof, or other walking/working surface.

**Infeasible:** It is impossible to perform the work using a conventional fall protection system (i.e., guardrail system, or personal fall arrest system) or that it is technologically impossible to use any of these systems to provide fall protection.

**Lanyard:** A flexible line of rope, wire, rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

**Lifeline:** A component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

**Lower levels:** Those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

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

**Mechanical equipment:** All motor or human propelled wheeled equipment used for roofing work, except wheelbarrows and mop carts.

**Opening:** A gap or void 30 inches or more high and 18 inches or more wide, in a wall or partition, through which employees can fall to a lower level.

**Personal fall arrest system:** A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. As of January 1, 1998 the use of a body belt for fall arrest is prohibited.

**Rope grab:** A deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

**Roof:** The exterior surface on the top of a building. This does not include floors or formwork which, because a building has not been completed, temporarily becomes the top surface of a building.
Roofing work: The hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal, and vapor barrier work, but not including the construction of the roof deck.

Safety monitoring system: A safety system in which a competent person is responsible for recognizing and warning employees of fall hazards.

Self-retracting lifeline/lanyard: A deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

Snaphook: A connector comprised of a hookshaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object an, when released, automatically closes to retain the object. Only the locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection is allowed.

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

Toeboard: A low protective barrier that will prevent the fall of materials and equipment to lower levels and provide protection from falls for personnel.

Unprotected sides and edges: Any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches high.

Warning line system: A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge without the use of guardrail to protect employees in the area.

Work area: That portion of a walking/working surface where job duties are being performed.

DEPARTMENTAL AND EMPLOYEE RESPONSIBILITIES

- Department supervisors must review their operations both within their facilities and at the various work sites for employee exposures to falls.
- Walking/working surfaces on which employees are to work must have the strength and structural integrity to support employees safely.
- Departments are responsible for the care and maintenance of all equipment in their custody.
- All fall protection equipment shall conform to the provisions contained in this plan.
- Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.
The department supervisor shall have a plan and provide for prompt rescue of employees in the event of a fall where using a personal fall arrest system or shall assure that employees are able to rescue themselves.

High angle rescue will be conducted by the Kalamazoo Department of Public Safety.

Contact WMU Department of Public Safety at 7-5555 to initiate response.

WMU Department of Public Safety will contact:
1. Kalamazoo Department of Public Safety dispatch and Life EMS.
2. Kalamazoo Department of Public Safety Lieutenants office at 337-8369 in case dispatch is unable to help.

ENVIRONMENTAL SAFETY & EMERGENCY MANAGEMENT

Environmental Safety and Emergency Management shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards. Employees shall be trained in the following areas:

1. The nature of fall hazards in the work area.
2. The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.
3. The use and operation of guardrail systems, personal fall arrest systems, and other protection to be used.
4. The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.
5. The role of employees in fall protection plans.
7. The regulatory standards being followed in this policy.

Environmental Safety and Emergency Management will maintain training records of all trained employees. Retraining will occur when the department supervisor or other supervisory personnel believes that a previously trained employee does not have the understanding or skills required to work safely from elevated walking/working surfaces. Circumstances which will require retraining include, but are not limited to the following:

1. Changes in the workplace render the training obsolete.
2. Changes in the types of fall protection systems or equipment to be used render previous training obsolete.
3. Inadequacies in an affected employee’s knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

ELEVATED WORKSITES

Dangerous equipment: Each employee less than 4 feet above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems or
by equipment guards. In addition, each employee 4 feet or more above dangerous equipment shall be protected from fall hazards by guardrail systems or personal fall arrest systems.

**Excavations:** Each employee at the edge of an excavation 4 feet or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier, and when an employee is at the edge of a well, pit, shaft, and similar excavation of 4 feet or more in depth shall be protected from fall hazards by guardrail systems or personal fall arrest systems.

**Hoist areas:** Each employee in a hoist area shall be protected from falling 4 feet or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems, (or chain, gate, or guardrail) or portions thereof, are removed to facilitate the hoisting operation (e.g. during landing of materials), and an employee must lean through the access opening or out over the edge of the access opening (to receive or guide equipment and materials, for example), that employee shall be protected from fall hazards by a personal fall arrest system.

**Holes:** Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than 4 feet above lower levels, by personal fall arrest systems, covers, or guardrail systems erected around such holes. In addition, holes (including skylights) shall be covered to prevent employees from tripping or stepping into holes and objects falling onto employees below.

**Ramps, runways, and other walkways:** Each employee on ramps, runways, and other walkways shall be protected from falling 4 feet or more to lower levels by guardrail systems.

**Roofs:** Each employee on a roof shall be protected from falling 4 feet or more to lower levels by the use guardrail system, warning line system, personal arrest system, parapet at least 39 inches in height, physical location (6 feet or greater from unprotected side and edge), or combined method.

**Unprotected sides and edges:** Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 4 feet or more above a lower level shall be protected from falling by the use of guardrail system or personal arrest systems.

**Wall openings:** Each employee working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is 4 feet or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface, shall be protected from falling by the use of a guardrail system or a personal fall arrest system.

**Walking/working surfaces not otherwise addressed:** Please contact Environmental Safety and Emergency Management Department (ESEM) at 387-5590.

**INJURY PREVENTION**
The preferred method of fall protection at WMU will be the use of conventional fall protection systems (guardrail systems, personal fall arrest systems). There are instances when working on rooftops where warning line systems and or safety monitoring systems may be used. See Appendix A or contact the ESEM Department for more information.

Guardrail systems

1. Guardrail systems consist of a top rail, intermediate rail, toe board, and posts, with a height of 42 inches plus or minus 3 inches above the walking/working level.

2. The midrail shall be at a height midway between the top edge of the guardrail system and the walking/working level.

3. Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches high.

4. Top rails and midrails shall be at least one-quarter inch nominal diameter or thickness to prevent cuts and lacerations.

5. Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds applied within 2 inches of the top edge, in any outward or downward direction, at any point along the top edge.

6. Midrails shall be capable of withstanding, without failure, a force of at least 150 pounds applied in any downward or outward direction at any point along the midrail or other member.

7. Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures of lacerations, and to prevent snagging of clothing.

8. The ends of all top rails and midrails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.

9. Steel banding and plastic banding shall not be used as top rails or midrails.

10. When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section shall be placed across the access opening between guardrail sections when hoisting operations are not taking place.

11. When guardrail systems are used at holes, they shall be erected on all unprotected sides or edges of the hole.

12. When guardrail systems are used around holes used for the passage of materials, the hole shall have not more than two sides provided with removable guardrail sections to allow the passage of materials. When the hole is not in use, it shall be
closed over with a cover, or guardrail system shall be provided along with unprotected sides or edges.

13. When guardrail systems are used around holes which are used as points of access (such as ladderways), they shall be provided with a gate, or be so offset that a person cannot walk directly into the hole.

14. Guardrail systems used on ramps and runways shall be erected along each unprotected side or edge.

**Personal Fall Arrest Systems**

Effective January 1, 1998, body belt systems are not acceptable as part of a personal fall arrest system. To avoid swing fall injury, always work directly under an anchorage point. When a fall arrest system is used, it is essential that the total fall distance is taken into account which includes free fall distance, deceleration distance, and lifeline elongation. Harnesses and components shall be used only for employee protection (as part of a personal fall arrest system) and not to hoist materials.

See **Appendix B** or contact the ESEM Department for specific information regarding personal fall arrest systems.

See **Appendix C** or contact the ESEM Department for equipment inspection and maintenance procedures.

**Covers**

Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

1. Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.
2. All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.
3. All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.
4. All covers shall be color coded or they shall be marked with the word “HOLE” or “COVER” to provide warning of the hazard.

**Note:** This provision does not apply to cast iron manhole covers or steel grates used on streets or roadways.

**Protection from Falling Objects**

When an employee is exposed to falling objects, the employer shall have each employee wear a hard hat and shall implement one of the following measures:
1. Erect toe boards, screens, or guardrail systems to prevent objects from falling from higher levels
2. Barricade the area to which objects could fall, prohibit employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.
APPENDIX-A

Safety Monitoring System

On roofs 50 feet in width or less, the use of a safety monitoring system alone (for example, without a warning line system, or other combined method), is permitted.

The dimension selected to be the width of an area is the lesser of the two primary dimensions of the area as viewed from above. This applies to roofs which are either sloped toward or away from the roof center.

Roofs which have several separate, non-contiguous roof areas may be considered as a series of individual roofs, for example, roofs with penthouses, additional floors, courtyard openings, etc.

Irregular, non-rectangular shaped roofs must be considered on an individual basis. (See Appendix A of MIOSHA Part 45. Fall Protection). For assistance please call Environmental Safety and Emergency Management at 387-5590.
APPENDIX-B

Personal Fall Arrest System

1. Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.
2. Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.
3. Dee-rings and snaphooks shall have a minimum tensile strength of 5,000 pounds (22.2 kN).
4. Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.
5. Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member. Effective January 1, 1998, only locking type snaphooks shall be used.
6. Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:
   a) directly to webbing, rope or wire rope;
   b) to each other;
   c) to a dee-ring to which another snaphook or other connector is attached;
   d) to a horizontal lifeline; or
   e) to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.
7. On suspended scaffolds or similar work platforms with horizontal lifelines which may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions.
8. Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.
9. Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2 kN).
10. (i) Except as provided for in the regulation, when vertical lifelines are used, each employee shall be attached to a separate lifeline.
(ii) During the construction of elevator shafts, two employees may be attached to the same lifeline in the hoistway, provided both employees are working atop a false car that is equipped with guardrails; the strength of the lifeline is 10,000 pounds [5,000 pounds per employee attached] (44.4 kN); and all other criteria specified in this paragraph for lifelines have been met.
11. Lifelines shall be protected against being cut or braded.
12. Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 feet (0.61 m) or less shall be capable of sustaining a minimum tensile load of 3,000 pounds (13.3 kN) applied to the device with the lifeline or lanyard in the fully extended position.
13. Self-retracting lifelines and lanyards which do not limit free fall distance to 2 feet (0.61 m) or less, ripstitch lanyards, and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kN) applied to the device with the lifeline or lanyard in the fully extended position.

14. Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made from synthetic fibers.

15. Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or shall be designed, installed, and used as follows: (i) as part of a complete personal fall arrest system which maintains a safety factor of at least two; and (ii) under the supervision of a qualified person.

16. Personal fall arrest systems, when stopping a fall, shall:
   (i) limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness;
   (ii) be rigged such that an employee can neither free fall more than 6 feet (1.8 m), nor contact any lower level;
   (iii) bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet (1.07 m); and
   (iv) have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1.8 m), or the free fall distance permitted by the systems, whichever is less.
   (v) To calculate fall distance: From the anchorage point, allow for 6 feet of lanyard length; 3.5 feet for deceleration distance; at least 6 feet for height of worker; and add a safety factor of 3 feet for a total of 18.5 feet. Use a shock absorbing lanyard for 18.5 feet and greater; a self-retracting lifeline for less than 18.5 feet.

   **Note:** If the personal fall arrest system meets the criteria and protocols contained in Part 45. Appendix C to subpart M, and if the system is being used by an employee having a combined person and tool weight of less than 310 pounds (140 kg), the system will be considered to be in compliance with the provisions of paragraph (d)(16) of this section. If the system is used by an employee having a combined tool and body weight of 310 pounds (140 kg) or more, then the employer must appropriately modify the criteria and protocols of the Appendix to provide proper protection for such heavier weights, or the system will not be deemed to be in compliance with the requirements of paragraph (d)(16) of this section.

17. Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.

18. Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists except as specified in other subparts of this Part.

19. When a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.
APPENDIX-C

Inspection and Maintenance

To maintain their service life and high performance, all components of the fall arrest system should be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service. If any of the conditions listed below are found the equipment should be replaced before being used.

The following are steps to visually inspecting fall protection equipment and comes from OSHA: http://www.osha.gov/Region7/fallprotection/fall_protection_info.html.

Harness Inspection

1. Belts and Rings: For harness inspections begin at one end, hold the body side of the belt toward you, grasping the belt with your hands six to eight inches apart. Bend the belt in an inverted "U." Watch for frayed edges, broken fibers, pulled stitches, cuts or chemical damage. Check D-rings and D-ring metal wear pads for distortion, cracks, breaks, and rough or sharp edges. The D-ring bar should be at a 90 degree angle with the long axis of the belt and should pivot freely.

Attachments of buckles and D-rings should be given special attention. Note any unusual wear, frayed or cut fibers, or distortion of the buckles. Rivets should be tight and unremovable with fingers. Body side rivet base and outside rivets should be flat against the material. Bent rivets will fail under stress.

Inspect frayed or broken strands. Broken webbing strands generally appear as tufts on the webbing surface. Any broken, cut or burnt stitches will be readily seen.

2. Tongue Buckle: Buckle tongues should be free of distortion in shape and motion. They should overlap the buckle frame and move freely back and forth in their socket. Rollers should turn freely on the frame. Check for distortion or sharp edges.

3. Friction Buckle: Inspect the buckle for distortion. The outer bar or center bars must be straight. Pay special attention to corners and attachment points of the center bar.

Lanyard Inspection

When inspecting lanyards, begin at one end and work to the opposite end. Slowly rotate the lanyard so that the entire circumference is checked. Spliced ends require particular attention. Hardware should be examined under procedures detailed below.

Snaps: Inspect closely for hook and eye distortion, cracks, corrosion, or pitted surfaces.

The keeper or latch should seat into the nose without binding and should not be distorted or obstructed. The keeper spring should exert sufficient force to firmly close the keeper. Keeper rocks must provide the keeper from opening when the keeper closes.
Thimbles: The thimble (protective plastic sleeve) must be firmly seated in the eye of the splice, and the splice should have no loose or cut strands. The edges of the thimble should be free of sharp edges, distortion, or cracks.

**Lanyards**

Steel Lanyards: While rotating a steel lanyard, watch for cuts, frayed areas, or unusual wear patterns on the wire. The use of steel lanyards for fall protection without a shock-absorbing device is not recommended.

Web Lanyard: While bending webbing over a piece of pipe, observe each side of the webbed lanyard. This will reveal any cuts or breaks. Due to the limited elasticity of the web lanyard, fall protection without the use of a shock absorber is not recommended.

Rope Lanyard: Rotation of the rope lanyard while inspecting from end to end will bring to light any fuzzy, worn, broken or cut fibers. Weakened areas from extreme loads will appear as a noticeable change in original diameter. The rope diameter should be uniform throughout, following a short break-in period. When a rope lanyard is used for fall protection, a shock-absorbing system should be included.

Shock-Absorbing Packs: The outer portion of the shock-absorbing pack should be examined for burn holes and tears. Stitching on areas where the pack is sewn to the D-ring, belt or lanyard should be examined for loose strands, rips and deterioration.

**Visual Indication of Damage to Webbing and Rope Lanyards**

Heat- In excessive heat, nylon becomes brittle and has a shriveled brownish appearance. Fibers will break when flexed and should not be used above 180 degrees Fahrenheit.

Chemical- Change in color usually appears as a brownish smear or smudge. Transverse cracks appear when belt is bent over tight. This causes a loss of elasticity in the belt.

Ultraviolet Rays- Do not store webbing and rope lanyards in direct sunlight, because ultraviolet rays can reduce the strength of some material.

Molten Metal or Flame- Webbing and rope strands may be fused together by molten metal or flame. Watch for hard, shiny spots or a hard and brittle feel. Webbing will not support combustion, nylon will.

Paint and Solvents- Paint will penetrate and dry, restricting movements of fibers. Drying agents and solvents in some paints will appear as chemical damage.

**Cleaning of Equipment**

Basic care for fall protection safety equipment will prolong and endure the life of the equipment and contribute toward the performance of its vital safety function. Proper storage and maintenance after each use is as important as cleaning the equipment. The storage area should be clean, dry and free of exposure to fumes or corrosive elements.
Nylon and Polyester Wipe off all surface dirt with a sponge dampened in plain water. Squeeze the sponge dry. Dip the sponge in a mild solution of water and commercial soap or detergent. Work up a thick lather with a vigorous back and forth motion. Then wipe the belt dry with a clean cloth. Hang freely to dry but away from excessive heat.

Drying Harness, belts and other equipment should be dried thoroughly without exposure to heat, steam or long periods of sunlight.