FALL PREVENTION/FALL PROTECTION

Purpose

To ensure the safety of employees by providing prevention and protection from potential fall hazards.

MS&T is committed to fall hazard control wherever the potential exists for falls. Accordingly, MS&T will take all practical measures to eliminate, prevent, and control fall hazards. Work sites and activities shall be surveyed to identify all exposures to falling from elevations. First consideration shall be given to the elimination of those hazards through fall prevention. If a fall hazard cannot be practically eliminated, second consideration shall be given to implementing effective means of fall protection. Fall protection systems shall be designed for continuous use and the supervisor will monitor usage appropriately to prevent intermittent or improper use.

All permanent walking and working services over 4 feet from the ground should have a standard rail installed. This includes floors, wall openings, window openings and mezzanines. Roofs, the tops of tanks, boilers, machines and other surfaces may need rails if workers must regularly climb on top them to perform work.

If there is no rail and there is a fall hazard, temporary means of fall protection should be used. The OSHA standard for construction work considers 6 feet and above to be a fall hazard. OSHA requires fall protection to be used whenever there is potential for a fall of over 6 feet.

All personnel working where fall hazards cannot be eliminated shall be equipped and trained to minimize adverse effects of accidental falls. Refresher training shall be given at specified intervals. Fall protection training standards shall be established and compliance shall be mandatory for all departments. Fall protection equipment and training will be provided where required and properly documented.

Guidelines To Be Used For Fall Prevention Protection:

1. **Access & Egress**—The first step in preventing falls is providing safe means to get to and from work. This includes correct installation and use of ladders, scaffolds, stairways, ramps, work platforms, and elevating equipment.

2. **Ladders**—Employees need to practice proper selection, safe use and maintenance of ladders.

- Proper instruction on the safe use of ladders and compliance with the required standards is the responsibility of the supervisor
- Inspect ladders before use for construction, missing/defective rungs, damage, or deterioration
- Select ladders suitable for the task and of sufficient length
- If a ladder is in safe condition and used safely no additional fall protection is needed. Step ladders are to be fully opened and braces locked when used, and the user is to follow all safety labels and instructions. Portable extension ladders are to be tied off and extended three feet above the landing surface, and proper ladder use practices followed. However, any non-standard use of a ladder, such as leaning with the center of the body past the side rail, use of a step ladder without fully opening the legs, or standing on a ladder without holding side rails, will require fall protection.

Revision Date: 7/17/2009

FALL PREVENTION/FALL PROTECTION

3. **Scaffolds**—Scaffolding should have rails in compliance with OSHA regulations for the type of scaffold. Accidents involving scaffolding are mainly caused by lack of guardrails, equipment failure, unsafe use, and environmental conditions. The major reasons for these accidents are:

- Failure at attachment points
- Parts failure
- Inadequate fall protection
- Improper construction
- Overloading of scaffolding and improper training

Preventing scaffolding related falls requires:

- Sound design
- Selection of right scaffold for the job
- Competent erection procedures and proper training

4. **Stairways, Ramps, Etc.**—At times, the construction or installation of an access device such as a stair, ramp, walkway, bridge, or runway is necessary to ensure the prevention of injuries to workers moving from one area to another at an elevation or over an excavation. Standard rails should be provided on all access devices.

5. **Open Sides and Holes**—Open sides and holes in structures and in the earth present a high potential for falling accidents. To prevent accidents working at height, safeguards must be used. Guardrails should be provided before beginning work at unprotected sides or edges where employees are exposed to fall of 4 feet or more. Guardrails are to consist of at least top rails, mid-rails, and toeboards.

Top Rail:
(Wood) minimum 2"X 4" stock lumber, 38" to 42" from the floor
(Pipe) minimum 1-112" diameter
(Structural Steel) 2"X 2" angle
(Cable) *112"* wire rope, with a maximum of 2" deflection

Mid-rail:
(Wood) minimum 2"X 4" stock lumber, approximately 21" from floor
(Pipe) 1-112" diameter
(Structural Steel) 2"X 2" angle
(Cable) *112"* wire rope, with a maximum of 2" deflection

Toeboard:
(Wood) minimum 4" stock lumber, positioned on the edge of the floor.

Post:
(Wood) minimum 2"X 4" stock lumber, every 8 feet or less
(Pipe) 1-112" diameter
(Structural Steel) 2"X 2" angle

Stair rails and ramp rails - same as guardrail, except to rail height must be between 32" and 34" above treads.

Revision Date: 7/17/2009

FALL PREVENTION/FALL PROTECTION

Floor openings and holes, large enough to cause trips or falls must be covered and secured in place to the extent of supporting the maximum intended load for the area. Hatchways or stair openings must be secured to prevent movement and clearly marked to state holes are present. At excavations, wells, pits, shafts, etc. of 6 feet or more in depth, guardrail systems, fences, signs, barricades or covers should be used.

6. **Perimeter Barricades**—Perimeter barricades shall be placed 6 feet from the edge of any opening or roof edge. The barricade is a warning device to alert employees that they are in the danger zone. Barricades shall also be placed below area of work or to prevent traffic of the public access to a work zone.

7. **Material Handling -** Falling hazards associated with material handling should be recognized. Care and handling of materials must begin at off-loading. Materials may have shifted in transport and can suddenly collapse when supports or bandings are removed. Correct hoisting and rigging equipment must be used to prevent overloading and equipment failure leading to dropped loads. Personnel need to be kept from under loads, and unneeded workers should be kept away from the delivery points. Materials need to be stored/stacked in an organized layout and secured from collapse. Mechanical or manual hoisting/rigging equipment delivering materials to the actual work location must be in good order and used correctly.

8. **Housekeeping**—Walking and working surfaces need to be kept in good order to prevent trip and fall hazards. Temporary electrical lines, welding leads, compressor hoses, scrap material, pipe, etc., should be kept clear of areas where worker travel might logically take place. When appropriate, utilities should be tied overhead, run under protective sheathing, taped down, stacked, etc., to minimize hazards. Tools, materials, and equipment not being used should be stored in their assigned places.

   Construction waste materials should be picked up and disposed of on a regular basis. Oil, fuel, grease, snow, mud, ice, and other slippery substances need prompt clean up and removal. Personnel should be assigned to keep the jobsite in good housekeeping order.

9. **Personal Fall Arrest Systems**—A personal fall arrest system is a type of fall protection rather than prevention. Fall protection requires safe use of equipment to protect a worker in the event of a fall. Fall protection minimizes the consequences of an accident, rather than preventing its occurrence.

   A personal fall arrest system consists of components that function together to prevent a worker from falling to the ground. This system can be either temporary or permanent and is selected based upon the type of job, and hazards involved with performing the job. Fall Arrest System Components:

   - Anchorage (also known as the attachment point)
   - Connecting means (such as lanyard, shock absorbing lanyard, or retractable lanyard)
   - Body support (for the purposes of this program, always a full-body harness)
   - Rescue and/or escape plans

   A full body harness with shock absorbing lanyard attached to a safe attachment point is required any time you will be working on an unprotected work area where a fall hazard exists and no standard rail system is in place and no temporary means of fall prevention such as a temporary rail system can be used. Examples include the tops of tanks, silos, equipment, etc. A body harness and lanyard are also required when using man lifts and articulating or extendable boom lifts.

FALL PREVENTION/FALL PROTECTION

Although it may be convenient to attach a lanyard to a sprinkler pipe, scaffold brace or other nearby equipment, it may not be safe as the attachment for personal fall arrest must be capable of supporting a 5000 pound load. Finding a safe attachment point is therefore often the most difficult aspect of personal fall arrest. Consult with a registered professional engineer if you have any doubt about the strength of an attachment point.

Regardless of the type of lanyard, when the wearer is not directly below the attachment point, the possibility of swinging into some obstruction after a fall exists. This swing hazard must be considered while planning the anchorage point. Anchorages must be planned to allow enough distance from the anchorage to the feet of the harness wearer to allow a fall without striking anything before the fall is stopped. When considering the anchorage point include the total fully extended length of the lanyard, and the length added by any additional shock absorbing devices after a fall.

The connecting means in a fall arrest system is usually a fixed length lanyard. A lanyard usually includes a device to reduce the impact force of a free fall. An energy-absorbing lanyard or personal shock absorber is one such device. All shock absorbing devices elongate during an arrest, adding to the fall distance. Retractable lanyards limit the fall distance so they reduce fall impact. All lanyards and shock absorbers are generally single use devices. After a fall they are to be discarded and never re-used. Some retractables may be sent back to the manufacturer for inspection and recertification.

The body support used in a fall arrest system is the full body harness. A full body harness distributes fall forces to areas of the body best able to withstand severe deceleration forces. Harnesses are generally single use devices. After a fall they are to be discarded and not re-used. Some harness manufacturers have programs to inspect re-certify harnesses which require shipping the harness back to the manufacturer after a fall.

Whenever fall prevention such as guard rails are not provided, a personal fall arrest system must be used. After an arrested fall, the person who fell will be suspended from the fall arrest system and will have a very limited amount of time to be removed from the harness before the restriction of circulation begins to cause harm. A means of rescue should be considered and prepared prior to any operation requiring personal fall arrest.

- Body harnesses are only effective for arresting falls when connected to the D-ring in the upper middle back. Side D-rings are for positioning only, and the front D-ring is used for attachment to fixed cables or rigid type railing systems. When a body harness is worn correctly it will be snug-fitting and the leg straps will be secured.
- Shock absorbing lanyards shall not be any longer than 6 feet, but regardless of the length, there must be consideration of how long the lanyard will be after an arrest, and how much additional space is required from the D-ring to the surface below for the body and legs of the person in the harness. In some cases the minimum clearance distance can be several times longer than the lanyard. If a fall will cause the person in the harness to strike the surface below or other obstructions, the work may not proceed until safe conditions can be assured.
- Tie-off points should be over the head and never below the waist.
- Tying knots in lanyards to shorten length is prohibited. Any loaded or damaged lanyards must be destroyed and replaced.
- Snap hooks must have the double action snap mechanism.
- Static lines shall be a minimum of ½ inch wire rope on a horizontal parallel to the work surface.

FALL PREVENTION/FALL PROTECTION

- Vertical life lines shall be no less than 5/8 inch rope. They shall be anchored to a point sufficient to withstand over 5,000 pounds. Rope grabs are required when using life lines for fall protection. (Keep in mind, life lines will be used for other application other than fall protection). Only one worker shall be attached to a vertical life line.

Fall Restraint Systems: Fall restraint is a type of fall prevention using equipment similar to a personal fall arrest system. It is also sometimes referred to as a positioning system and when correctly designed and implemented, it keeps the user a safe distance from an unguarded edge. A fall restraint system should not be subject to fall arrest forces. However, anchorages used in fall restraint should meet similar requirements as anchorages used in fall arrest.

10. Training Requirements

The supervisor will provide training for each employee who might be exposed to fall hazards. The training will enable each employee to recognize the hazards of falling and will train each employee in the procedures to be followed in order to minimize these hazards.

- The nature of fall hazards in the work area
- The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used
- The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used
- The role of each employee in the safety monitoring system when this system is used
- The limitations on the use of mechanical equipment during performance of roofing work on low-sloped roofs