Slips/Falls From Height Standard Operating Procedure (SOP)

Sample: Standard Operating Procedures

Tasks/Process: **SLIPS/FALLS FROM HEIGHT**	Department:
Prepared/revised by:	Approved:
Supersedes:	Date Issued:

Purpose

The purpose of this procedure is to provide a protocol for the creation of procedures/practices to ensure that persons will not be injured or harmed by falling from heights. It is also intended that this procedure will assist the firm in ensuring compliance with the Occupational Health and Safety Act and the Regulation for Industrial Establishments (R.R.O. 851).

Scope

The application of this procedure is intended to cover:

- fall arrest/fall restraint systems
- scaffolds
- ladders
- mobile access platforms
- access/egress on machinery

This procedure is applicable to all employees and contractors associated with the firm.

Responsibilities

The **health and safety coordinator**:

- is responsible for ensuring that work sites have been assessed to identify where the potential for slips/falls from elevation exist;
- is responsible to establish a team of qualified persons to determine the best means of controlling exposures to slips/falls from elevation as per specific situation (the team should consist of a minimum of the maintenance manager, department supervisor and the worker);
- will develop procedures/practices for those activities and equipment identified and to be used in controlling this potential exposure;
- is responsible for maintaining all records associated with this SOP (a safety coordinator with fall protection responsibilities, must have the knowledge in maintaining a fall protection program including; selection of equipment, inspecting equipment, procedure writing, emergency rescue procedures, and training employees).

The **supervisor**:

- will actively participate in any team identified as needed to develop practices/procedures for fall protection associated with his/her department;
- will ensure that all fall protection procedures/practices are being adhered to by all workers within his/her department;
- will ensure that all workers involved in the fall protection procedures/ practices have been adequately trained;
- will respond immediately to all identified substandard condition, hazards, defects, or noncompliance to the fall protection procedures/practices.

The **worker**:

- will participate in any team identified as needed to develop practices/ procedures for fall protection as requested;
- will inspect all pieces of equipment as required by the fall protection procedures/practices;
- is required to record the findings of all equipment inspections;
- will report immediately to the supervisor any identified defects, hazards, substandard conditions or noncompliance items associated with the fall protection procedures/practices to his/her supervisor;
- will abide by all fall protection practices/procedures.

Procedure

Priority will be given to eliminating the need to work at heights. This can be done by engineering out the need to do the work at heights, or contract out the work to qualified, competent, knowledgeable persons. Those tasks that cannot be engineered out will be controlled by installing or using the following:

- permanent walkways with guardrails
- mobile access platforms/scaffolds
- ladders/step ladders
- fall arrest systems/fall restraint system

It should be recognized that certain control measures such as permanent walkways with guard rails are a better form of control than simply using a ladder, and/or a fall arrest system. Controlling the hazard may involve the use of more than one means of control, the basic rule applies that the greater the risk the more controls that should be in place.

Once the control method(s) have been determined the team is required to source out appropriate guidelines/standards/regulations/best practices as determined for that control. (See attached references and guidelines for best practices information)

The team shall create a step-by-step procedure to be used for the defined work incorporating the appropriate references, guidelines and specific to the needs of the specific work. This completed procedure will be incorporated into the health and safety manual for future reference.

Provision for Training

The health and safety coordinator will ensure that all procedures/ practices related to slip/fall protection will be communicated to supervisors and workers. It is the responsibility of the department supervisor to ensure that all workers affected by the fall protection procedures/practices have been trained in the following:

- the slip/fall protection procedures/practices;
- the use, inspection, maintenance, storage and handling of all related equipment;
- the hazard associated with working at heights;
- rescue and emergency procedures;
- any other relevant training.

Note: Fall protection users need both theory and practical training prior to using the equipment on the job. Trainees should be able to demonstrate "hands-on " competency of all training prior to being required to use fall protection equipment in actual work environments.

Control Monitoring

All too often controls are put in place in a formal way, but are not carried out or are forgotten. An inventory of the hazard controls for slips/falls prevention that are supposed to be in place can be drawn up. A program should be developed to monitor how controls are working in practice. The JHSC will be issued a copy of the results of any tests conducted for this purpose.

Appendix: General Best Practices

- Acrophobia is the medical term for the fear of heights, a condition common to many people. A person suffering from acrophobia will be at particular risk if assigned to work in elevated environments.
- Slip and trip hazards must be recognized and removed.
- Clean and tidy workplace conditions result in lower accident rates.
- The company should have a policy that sets out accountabilities and responsibilities for good housekeeping.
- Flooring should be assessed for slip resistance.
- Pedestrian routes and circulation areas should be separate from work areas.
- Changes in floor levels should be identifiable.
- Use adequate and secure doormats or abrasion strips to prevent slipping.
- Adequate lighting should be provided for all areas.
- A procedure should be developed to quickly deal with liquid contamination on the floor.
- Appropriate footwear should be worn for the type of process (tread design).
- Handrails should be added to prevent loss of balance.
- Loose or damaged floor coverings should be dealt with immediately.
- Cords from phones, typewriters, lights, computers etc. should be tied down.
- Drawers to filing cabinets and desks should be kept closed when not in use.
- Walking surfaces should be routinely swept or vacuumed.
- Polishes or sealers used on flooring should not reduce slip resistance.
- Barriers, signs, notices should be used to keep people away from areas being cleaned or polished.
- Ensure a procedure is in place ensuring that outdoor pedestrian routes are regularly swept and during icy/frosty conditions salted/sanded.
- Ensure all staircases are fitted with handrails and, where appropriate, anti-slip tread in good condition.
- Working outdoors may expose workers to ice, snow and rain which may contribute to slippery conditions.
- All elevated work surfaces should be well illuminated.
- All fall related incidents should be investigated, whether or not an injury has occurred. Investigations should review the adequacy of the fall protection system and be improved to prevent potential recurrence.

Fall Protection Systems – General Guidelines

General

- Companies must distinguish between what system is needed for their application; either a fall arrest system or a travel restraint system. One typically uses a body harness, the other can use a safety belt. Never mix components from the two different systems.
- Proper training for workers is essential for any system in place.
- Ensure that the program includes individual fit testing of equipment.
- Workers who use a fall arrest or travel restraint system must perform a pre-use inspection of the system about to be used.
- Workers using fall arrest systems should not work alone.
- Daily pre-use inspections should be done by the worker and semi-annual inspections performed by a competent person in these type of systems.
- Information for every piece of equipment in a fall protection program should be documented; type of use, nature of environment, etc. All pieces of equipment, no matter how small are vital to the overall performance of the system.
- Inspections should be done routinely to ensure integrity of the fall protection system. Dates should be recorded.
- Rescue plan needs to be in place in case of an emergency.
- Free fall distance must always be kept to a minimum.
- Re-evaluate your fall protection program on a ongoing basis.
- Store equipment in a clean, dry, free place away from direct sunlight.

Full-Body Harness/Safety Belt

- Clearly distinguish which is to be used in your program, train workers to the difference and when each one is used, common practice now is to eliminate safety belts altogether, and only use full-body harness.
- If a harness fails the formal inspection process, it must be marked UNUSABLE and removed from service.
- Look for cuts, abrasion or open stitching, chemical or heat damage.
- Inspect the D-ring for distortion, cracks, or other damage.
- Adjustment plate holding the D-ring should be free from distortion, cracks or other damage.
- Check for kinks and twists once harness put on.
- Clean harness when task is completed. Usually cleaned in mild detergents, not solvents.
- Manufacturer’s instructions should be followed regarding the service life of belts and harnesses.

Lanyards

- Lanyards should be of the appropriate type, either fall arrest or travel restraint type lanyards.
- Never tie knots in lanyards to shorten them.
- Lanyards must be retired immediately under the following conditions:
  - after a fall;
  - when a integral shock absorber has been totally or even partially deployed; and
  - if the lanyard has been used for any purpose other than fall protection.
- A retired lanyard should be cut in two to ensure it is never used again.
- Most lanyards have a service life of 5 years, check for manufacturing date.
- Inspect the lanyard for cracks or other distortion or damage.

Shock Absorber

- Check the outer jacket for signs of damage.
- Check the end loops for damage, cracks, etc..
- Remove a shock absorber if found to be damaged.

Snap Hooks

- Snap hooks must be connected to compatible hardware and must never be attached to another snap hook.
- Check the snap hook for damage, pitting, and distortion.
- Ensure that the spring has enough tension to close the keeper.
- Ensure that the keeper and locking mechanism work properly without binding, and without excessive lateral play.

Rope/Lifelines

- Ropes should be kept clean.
- Do not use knots in ropes since this reduces their strength by up to 50%.
- Rope must always be protected over sharp edges.
- All rope material should be stored away from heat and direct UV light.
- Always look for areas where the rope material is separating and out of shape. Check for broken fibres and severely worn areas of the protective sheath.
- Do not allow rope to come into contact with acids, oils, or other chemicals.
- Ropes of natural fibres must never be used for vertical lifelines.
- All falls must be reported to the person inspecting the fall arrest equipment.
- Vertical lifelines should be at least 16mm diameter polypropylene or other material of equal strength.
- Check the eyes of the rope for deformities or cracks.

- Many different types of ropes exist; kernmantle, braided, twisted, manila, hemp, jute, nylon, polyester, polypropylene, polysteel, kevlar, spectra, etc.. One should know the type to use for the application.
- Safe use of ropes requires skill, training and practice; please ensure that the user is qualified to use these ropes and is aware of their limitations.

Note: *See* **CAN/ULC S555-2001**"Fire and Emergency Service Technical Rescue Rope and Water Rescue Throw Rope and associated Equipment"

Rope Grab

- Ensure that it is mounted right side up, look for the directional arrow.
- Check for corrosion, distortion, and secure mounting.

Anchor Points

- All components of an anchor system must be inspected. Always consult the manufacturer's recommendations for use, inspection, care and maintenance.
- Do not use one anchor for multiple lifelines, if possible.
- Anchors should be able to withstand a minimum of 10 times the weight of the person using the fall arrest system. Typically vertical fall arrest anchor points require to withstand 22 kiloNewtons, horizontal fall arrest anchorage requires to withstand a 71 kiloNewton force, and a fall restraint anchor point requires to withstand 4 kiloNewtons force.
- Do not confuse fall arrest anchor points with fall restraint anchor points, clearly mark if both are used in your facility.

Note: See Anchorage Planning: The Key to Fall Protection, Safety and Health, September 1991
See Breaking the Fall, part 1, Accident Prevention Magazine, January/February 1997
See Breaking the Fall, part 2, Accident Prevention magazine, May/ June 1997

Webbing

- Routinely inspect all webbing for tears, fraying, or other damage.
- Ensure grommets are not loose, broken.
- Inspect tongue area of belt or harness for normal wear.

Retractable Lifelines

- All three components must always be inspected prior to each use and according to the manufacturers recommended frequency, the self-retracting lifeline, the locking mechanism, and the braking mechanism.
- Usually needs to be certified on a yearly basis (or sooner based on the working environment) by the manufacturer or an approved agent.
- Due to the nature and complexity of the retracting mechanism, overhaul, inspection and maintenance should be left to the competent and knowledgeable person.

Scaffolds – General Guidelines

- Erection of a scaffold should be done by a competent person knowledgeable in scaffold erection.
- Inspections of scaffolds should be done by a competent person and prior to use.
- Barriers and signs should be used in the vicinity of the work being done.
- Castor wheels must have locks, which must be locked when the scaffold is in use.
- Never exceed the specified working load.
- Only to be used on flat, hard ground or flooring.
- All components should inspected and a document kept of that inspection routinely or as specified by the manufacturer.
- Toeboards should be used on scaffolds to prevent items from falling off.
- Handrails must be in place.
- Never exceed the base to height ratio as recommended by the manufacturer.

Guardrails – General Guidelines

- Ensure guardrails are constructed of material adequate to support the load that potentially will be applied to it. In the specific circumstances, rope, chain or tape guardrails are unacceptable, guardrails constructed from wood materials should be inspected to ensure an acceptable standard.
- Use guardrails along the open sides of any area where a worker can fall from 2.4 metres or more.
- Install guardrails at the edges of floor openings, stairways, landings, rooftops, scaffolds, shafts, etc..
- Secure rails, toeboards to the inside of posts or jacks.

See Ministry of Labour data sheet on guardrails, data sheet 2-05

Ladders – General Guidelines

- Consider a man-lift cage attached onto a forklift instead of a ladder for work at elevation indoors.
- Use a vertical lifeline that runs the entire length of a fixed ladder.
- Documented, periodic inspection of ladders and stepladders should be done.
- Unsafe ladders and stepladders must be taken out of service until repaired.
- All ladders and stepladders should be fitted with non-slip feet.
- A safety harness should be worn when performing work that has a fall distance of 3 metres or more.
- Fibreglass, not metal or wood, ladders or stepladders should be used near electrical installations.

- Ladder footing profile and condition should be inspected prior to each use.
- Rung profile and condition should be inspected prior to each use.
- Ensure that workers shoes are clean and with a well defined heel prior to use.
- Place warning signs in area where work is being performed.
- Make sure ground or floor has level, solid flooring.
- Place the ladder at a tilt of 70-75 degrees (gradient of 4:1).
- Secure the top of the ladder when practical; if not practical then a second person must foot the base at all times.
- Never use a painted wooden ladder or stepladder since cracked rungs are not clearly visible.
- Ensure that ladders are of the correct height to avoid reaching or stretching.
- Do not stand ladder on snow, ice or other slippery contaminant.
- Fully lock or open any door near a ladder in use.
- Open ladder fully.
- Never use the top two rungs of a ladder as a step.
- Maintain 3 point contact when climbing or descending a ladder, always face the ladder when climbing or descending the ladder.
- Portable ladders should be CSA certified for their type of use in the workplace.

Mobile Access Platforms – General Guidelines

- Mobile access platforms typically include elevating work platforms, cherry pickers, crawl boards, and personal cages.
- Always review manufacturers' instructions prior to using the platform for the first time.
- Training of workers in the use of mobile access platforms is required and a record to be kept.
- Safe working load of the platform should be clearly marked and visible.
- The platform should not be driven or moved when in the raised position.
- Place barriers and warning signs around the work vicinity.
- Ensure that when raising the platform that the area overhead is clear of overhead structures or services (wires, piping, lighting etc.).
- The surface should be flat and without gradient, where the platform is to be used.
- When lowering the platform ensure that no one is in the way, and could be caught under, or in, the lowering mechanism.
- Workers on the platform should wear and attach a safety harness to discourage climbing out of the basket or off the platform.

Hazardous Access Or Egress on Machinery – General Guidelines

- Examples include: climbing in and around equipment such as trailers, tankers, large equipment; erecting tarpaulins; and securing loads on flatbed trucks.
- Weather and wind conditions should be considered before climbing onto, or off, of equipment.

References

For specific guidelines and references, refer to the following:

Occupational Health and Safety Act

- Regulations for Construction Projects
- Regulations for Health Care and Residential Facilities
- Regulations for Industrial Establishments
- Regulations for Mines and Mining Plants
- Regulations for Roll-Over Protective Structures
- Regulations for Window Cleaning

Ministry of Labour Engineering Data Sheets and Alerts

- Engineering Data Sheet 2-04, Fixed Access Ladders
- Engineering Data Sheet 2-05, Railings and Toeboards
- Window Cleaning Anchor Systems (Alert #C 15/0696 ISSN 1196.6228)

Canadian Standards Association

- A Guide to Fall Protection ISBN 0-921347-52-9
- CAN/CSA-Z259.1-95 (R1999) Safety Belts and Lanyards
- CAN/CSA-Z259.11-M92 (R2003) Shock Absorbers for Personal Fall Arrest Systems
- CAN/CSA-Z91-02 Safety Code for Window Cleaning Operations
- CAN/CSA-S269.2-M87 Access Scaffolding for Construction Purposes
- CAN/CSA-Z259.10-M90 Full Body Harnesses
- CAN/CSA-Z321-96 Signs and Symbols for the Workplace
- CAN3-Z11-M81 (R2003) Portable Ladders
- Z259.2.1-98 (R2004) Fall Arresters Vertical Lifelines, and Rails
- Z259.2.2-98 (R2004) Self-Retracting Devices for Personal Fall-Arrest Systems
- Z259.3-M1978 (R2003) Lineman's Body Belt and Lineman's Safety Strap

American National Standards Institute

ANSI Z359.1-1992 (R1999) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

Construction Safety Association

Construction Safety Magazine,
volume 9, number 3, Autumn 1998 call 1-800-781-2726

Canadian Centre for Occupational Health and Safety

PPE Care of Safety Belts, Harnesses and Lanyards, Safety Infogram K-09

Safety and Health, September 1991

Anchorage Planning: The Key to Fall Protection

CAN/ULC S555-2001

"Fire and Emergency Service Technical Rescue Rope and Water Rescue Throw Rope and associated Equipment"

National Institute of Occupational Safety and Health

Criteria for a recommended Standard Emergency Egress from Elevated Workstations.

Industrial Accident Prevention Association

- Housekeeping at Work*
- Inspecting Physical Conditions, Guidelines for Setting Standards - LPBA0140410
- Ladders*
- Ladders Can Kill You - a joint publication of the Ontario Safe Workplace Associations and representatives of Ontario ladder manufacturers. For more information, contact your Safe Workplace Association, your Industry Association, or a ladder manufacturer.
- Rolling Scaffolds*
- Walking and Working Surfaces*
- Workplace Inspection Recording Form*

* Download from www.iapa.ca

Slips/Falls Loss of Balance Standard Operating Procedure (SOP)

Sample: Standard Operating Procedures

Tasks/Process: **SLIPS/FALLS, LOS OF BALANCE**	Department:
Prepared/revised by:	Approved:
Supersedes:	Date Issued:

Purpose

The purpose of this procedure is to provide a protocol for the creation of procedures/practices to ensure that persons will not be injured or harmed during work through exposure to slipping, falling or loss of balance hazards. This procedure will assist the firm meet compliance with Occupational Health and Safety Act and the Regulation for Industrial Establishments (R.R.O. 851).

Scope

This procedure will apply to same elevation working surfaces with exposure to slips, falls and/or loss of balance hazards.

Responsibilities

The **health and safety coordinator**:

- is responsible for ensuring that work sites are assessed to identify potential slips/falls and loss of balance hazard locations;
- will establish a team of qualified persons to determine the best means of controlling identified slips/fall exposures per the specific situation;

  The **team** should include the maintenance manager, department supervisor, and the worker at the site (as appropriate).
- will develop procedures/practices for the those activities and equipment, determined by the team, to be used in controlling identified slips/fall hazards;
- will maintain all records associated with this standard operating procedure.

The **supervisor**:

- will actively participate in any team identified to develop practices/procedures for slip/fall protection associated with his/her department;
- will ensure that all fall protection procedures/practices are being adhered to by all workers within his/her department;
- will ensure that all workers affected by the fall protection procedures/ practices are adequately trained in the procedures/practices;

  Training will be done to the standard of this procedure, to include competency in the identification, assessment of slips, fall and loss of balance hazards, the care of, selection fitting and use of personal protective equipment as per the procedures/practices.
- will respond immediately to all identified substandard conditions, hazards, defects, or non-compliance to the slip/fall protection procedures/ practices.

Workers:

- will participate in any team identified to develop practices/procedures for slip/fall protection as requested;
- will inspect all pieces of equipment in accordance to the slip/fall protection procedures/practices;
- will actively participate in training programs associated with the slips/falls procedures and practices; and

All workers:

- will report immediately to the supervisor any identified hazards, substandard conditions or noncompliance items associated with the slip/fall protection procedures/practices to his/her supervisor;
- will abide by all slip/fall protection practices/procedures.

The **maintenance manager** will actively participate in any team identified to develop procedures/ practices for slip/falls protection.

Procedure

- Controlling a hazard means eliminating the hazard or reducing it to a level that protects workers from its adverse effects. Priority for controlling hazards will start with controls at the **source**. If unable to control at the source, controls along the path from the source to the worker will be implemented. When no other means of control can be identified controls at the worker will be used.
- The best control is the total elimination of the hazard.
  - Substitution of a non-hazardous surface is an effective control at the source for slip hazards.
  - Slip hazards can also be controlled at the source by workstation and workplace redesign to provide for surfaces with a uniform coefficient of friction. Coefficient of friction for surfaces should be tested to ensure they are above .5.
  - Many trip hazards can be controlled at the source by safe work design and good housekeeping.
  - Stair, ramp, scaffold and ladder hazards can be controlled at the source by applying principles of safe design. They can also be controlled at the source by a sound preventive maintenance program.
- When slip or trip hazards cannot quickly be eliminated, they can be controlled along the path to the worker by highlighting, posting and guarding.
- All hazards can be reduced at the worker by good education and training programs. They can be controlled at the worker by the use of boots with slip-resistant soles suited to the surface the worker is on.
- Once the control method(s) have been determined the team is required to source out appropriate guidelines/standards/regulations/best practices determined for that control. (See attached references and guidelines)

- The team shall create a step-by-step procedure to be used for the defined work incorporating the appropriate references/guidelines. The procedure will be specific to the needs of the work. This completed procedure will be incorporated into the health and safety manual for future reference.

Provision for Training

A good training plan is key to controlling walking and working surface hazards. Along with education and training in safe movement on surfaces, a good worker education and training program should cover:

- principles of safe design
- legislated requirements
- inspection and preventive maintenance
- good housekeeping
- safe work procedures, and
- recognition of musculoskeletal injuries associated with slips, trips and falls and their symptoms

All workers in the workplace should be given some training about all the walking and working surfaces in the workplace. In this way they will be able to recognize the hazards associated with those surfaces and understand how they can be controlled.

Control Monitoring

All too often controls are put in place in a formal way, but are not carried out or are forgotten. An inventory of the hazard controls for slips/falls prevention that are supposed to be in place can be drawn up. A program should be developed to monitor how controls are working in practice. The JHSC will be issued a copy of the results of any tests conducted for this purpose.

Appendix: General Best Practices

- Housekeeping surveys and inspections should be conducted for identifying and removing hazards.
- Clean and tidy workplace conditions result in lower accident rates.
- The company should have a safety policy setting accountabilities and responsibilities for good housekeeping.
- Flooring should be assessed for slip resistance.
- Pedestrian routes and circulation areas should be separate and distinguishable from work areas.
- Changes in floor levels should be identifiable.
- Use adequate and secure doormats or abrasion strips to prevent slipping.
- Adequate lighting should be provided for all areas.
- A procedure should be developed to quickly report and deal with liquid spills on the floor.
- Appropriate footwear should be worn for the type of process (tread design).
- Handrails should be added to prevent loss of balance on ramps.

- Loose or damaged floor coverings should be dealt with immediately.
- Cords from phones, typewriters, lights, computers, etc., should be tied down.
- Drawers to filing cabinets and desks should be kept closed when not in use.
- Walking surfaces should be routinely swept, vacuumed or cleaned.
- Polishes or sealers used on flooring should not reduce slip resistance.
- Barriers, signs, notices should be used to keep people away from areas being cleaned or polished.
- A procedure should be in place to ensure that outdoor pedestrian routes are regularly swept and salted/sanded during icy/frosty conditions.
- Ensure all staircases are fitted with handrails and where appropriate, that anti-slip tread is in good condition.
- The selection of safety footwear should incorporate the sole material and sole pattern that is appropriate for the type of work to be done.

Surface Material – General Guidelines

Slippery surface hazards can be controlled at the source by setting a slip-resistant surface over a slippery surface. This can be done by four means: matting, self-adhesive flooring, wall-to-wall flooring and coatings.

Matting

Matting is an anti-slip surface of vinyl or moulded rubber that provides drainage for moisture and spills. Drainage is attained through the open grid construction of the matting or by perforation. The matting's surface is usually serrated in some way to give additional slip resistance. The serration also serves to scrape slippery substances from the soles of workers' boots. Alternatively, the matting can have a coating of mineral particles or have particles incorporated in it to give it some of these properties.

Matting is not usually fixed in place. Therefore, it is easy to install: it an be cut to size and laid where it is needed. It is also easy to remove for cleaning. Matting is the most widely used anti-slip surface. It is well suited to workplaces where floors tend to be wet or greasy. It is commonly used along assembly lines, in commercial kitchens and along aisles in warehouses where there are slip hazards.

Self-adhesive Flooring

Self-adhesive flooring is an anti-slip surface that is fixed permanently to the floor. It consists of a textured, sometimes abrasive, surface backed with a strong adhesive. Abrasive surfaces are achieved by a coating of silicon carbide or aluminum oxide. Aluminum oxide has the advantage that the particles are more durable and so keep their abrasive edges longer.

Self-adhesive flooring is more difficult to install than matting. To avoid air pockets, it has to be laid down in strips, small patches or tiles. It is also often necessary to apply an edge-sealing compound to prevent later curling of the edges. When the surface is abrasive, the flooring has to be steam cleaned or brushed. It cannot be mopped.

Heavy duty flooring of this type is suited to ramps, loading platforms, steps and ladders. Intermediate grades perform well in commercial and light industrial settings, where drainage and scraping are not of concern. Lighter grades are good for pool and shower areas.

Wall-to-Wall Flooring

Wall-to-wall flooring is an anti-slip surface of thin rubber or vinyl sheets fixed permanently to the floor. Additional slip-resistance can be achieved with this flooring by giving it an abrasive quality. This is done by embedding particles of silicone carbide or aluminum oxide in the sheets. The particles stay below the surface of sheet until weight is applied. They then protrude to provide abrasive slip resistance. Because the surface is selectively abrasive in this way, it can be mopped.

The rubber and vinyl sheets of wall-to-wall flooring are pliable so that they can be coved around walls and around irregularities like drains. They can also be treated at the seams to provide a watertight seal. In this way wall-to-wall flooring can be applied to provide a continuous watertight membrane that is hygienic and easy to keep clean. However, professional installation is usually needed.

Coatings

Coatings are paint-like substances that provide textured or abrasive surfaces. They tend to be the least costly of the anti-slip surfaces, but they are also the least durable. They are available in various grades and can be applied in a variety of thickness by adding more coats.

Coatings are best suited to relatively moisture-free and grease-free work spaces. Grease resistant coatings are available.

Surface Changes – General Guidelines

Changes in the co-efficient of friction for walking and work surfaces pose a slip hazard and can be controlled at the source by surface redesign.

Surface Design

Surfaces which present uneven co-efficient of friction to workers can be redesigned to provide a uniform co-efficient of friction.

The hazard of walking surfaces that are unavoidably wet or greasy can be controlled by removal, roughening the surface, covering it with grating or matting, or footwear.

Ice

Icy surfaces require immediate control, since snow and ice adhering to walking surfaces drastically reduce their coefficient of friction. Forty percent of falls on the same level involve ice. Measures for controlling this hazard include: plowing, shovelling, de-icing, salting and sanding.

Salt is widely used as an ice remover. Salt has the capacity to melt ice because a solution of salt and water has a freezing point considerably lower than water itself. However, it is no longer effective for this purpose at temperatures below minus 4 degrees centigrade (25 degrees Fahrenheit). Sand is a good alternative to salt since it creates a surface with high friction or traction. Blends of salt and sand are widely used. Chemical de-icing products are sometimes used on sidewalks.

Boots

The coefficient of friction for boot soles is the other part of the equation of slip hazards. Using the correct sole material for the surface condition is a control at the worker that reduces slip hazards.

Soles of synthetic rubber or neoprene, are suitable for all surfaces, wet or dry, except for oily or greasy surfaces. Leather soles are usually the best for wet or greasy surfaces, but they are hazardous on dry, smooth concrete and tile. Hard rubber soles grip on greasy concrete or wood surfaces, but do not work well on tile, wood and concrete, either wet or dry. Soft rubber soles are best for dry surfaces of most types, and crepe performs well on rough surfaces. However only a small proportion of slips happen on surfaces that are either dry or rough.

Trip Hazards – General Guidelines

Many trip hazards can be controlled at the source by safe work design and a thorough housekeeping procedure.

Work Design

Safe work design is a control at the source of trip hazards. Work tasks can be designed or redesigned to eliminate some of the common causes of trips and falls. These include:

- tasks which require workers to carry objects so that their vision is obstructed; and
- tasks which require workers to carry objects with two hands up stairs and ramps, so that the handrail cannot be used for safety.

Work Space Design

Trip and fall hazards can also be controlled at the source by effective work space design. Layouts of work stations and storage capacity can be redesigned to provide for effective and safe storage of tools, equipment, cords, hoses and work spaces.

Other work space features which can be considered for redesign include:

- electrical floor receptacles can be relocated away from corridors, isles and walkways;
- one-step risers can be eliminated by the substitution of ramps;
- telephone cords at the sides of desks can be clipped or tied out of the way;
- corners and intersections where vision is obstructed can be outfitted with convex mirrors so that oncoming traffic can be seen; and
- aisles can be redesigned to fully accommodate traffic.

Stairway Design

The hazards of slips, trips and falls on workplace stairs can be controlled at the source by uniform design. Uniform design ensures that the design of the stairs is consistent throughout, so that users encounter no unanticipated features.

Research on falls in workplace stairways indicates that the safest stairs are those with a riser of not more than 18 centimeters (7 inches). Tread depth should be not less than 28 centimeters (11 inches).

Other principles of good stair design include:

- avoidance of single risers, and the use of ramps instead;
- handrails on both sides of the stairway, set 76 to 86 centimeters (30 to 34 inches) up from the tread and capable of supporting a 90 kilogram (200 pound) load;
- intermediate handrails on stair widths of more than 2.2 meters (88 inches);
- handrail clearance of at least 4 centimeters (1.5 inches);
- good coefficient of friction on treads by means such as vinyl or rubber-tractioned surfaces, non-slip strips, slip-resistant epoxy or grooving; and
- good illumination to enable users to clearly discern tread noses, including supplementary illumination to eliminate shadows.

Ramp Design

Ramp hazards can also be controlled at the source by good design. Principles of good ramp design include:

- ramps no shorter and no narrower than 1 metre (3 feet) so that they are readily detectable;
- landings at the top, on either side of doors onto the ramp and at intermediate levels with a depth of at least 1.5 meters (5 feet);
- landings at the bottom with a depth of at least 1.8 meters (6 feet);
- handrails on ramps with a slope of more than 1:5;
- guardrails on platforms more than 1.2 meters (4 feet) high;
- non-slip surfaces of at least 0.5 coefficient of friction when dry; and
- cross cleats at regular intervals on steep ramps.

Note: Many building codes make a number of these design features mandatory.

Housekeeping Program

Housekeeping is a control at the source of the safety hazards caused by improper storage/placement of tools, cords and hoses, falling objects and debris. Housekeeping keeps walking and work surfaces clean and free of trip and fall hazards. A good housekeeping program can encompass a wide range of safety concerns in the workplace, including for example:

- securing extension cords and the cords and hoses of powered tools so they are not tripped over;
- returning, tools, cords and equipment to storage when work is complete;

.

- reporting or cleaning up spills and other obstructions right away;
- keeping stairs and walkways of clear of debris;
- cleaning and repairing stairway lighting;
- keeping file drawers and other drawers closed; and
- ensuring that material, tools and equipment are in their proper places.

A good housekeeping program identifies and assigns responsibilities for day-to-day clean-up, waste disposal and removal of unused materials. It also assigns responsibilities for inspection to ensure that all is kept in good order

Preventive Maintenance Program

The Occupational Health and Safety Act places a duty on employers to maintain equipment, materials and protective devices in good condition. A preventive maintenance program is a control at the source of the hazards caused by surface defects and equipment failures. Its aim is to keep surfaces and equipment in safe, working order.

Preventive maintenance is an organized program for preventing the gradual breakdown or sudden failure of surfaces and equipment. Typically, it involves the planned maintenance of floors, stairs, ramps, ladders, scaffolds and powered equipment. It should also be concerned with workplace lighting, and might be responsible for snow and ice removal as well.

The preventive maintenance program can also have responsibility for carrying out preventive maintenance on powered equipment. Or it can be responsible for verifying that it has been done by the supplier.

A preventive maintenance program includes maintenance schedules and records of maintenance work. It also includes procedures to ensure that spare parts are available.

Warning Systems

Highlighting and signalling hazards that cannot be immediately eliminated can be an effective control along the path from the hazard to the worker. Hazards are made visible so that they can be anticipated or avoided. For example, the hazard of a one-step riser can be reduced with the use of visual cues. The cues might be direct lighting, handrails, warning signs or a colour contrast with the surrounding area. Other trip hazards, like speed bumps, can be highlighted in the same way to attract the walker's attention. Examples of highlights and signaling include:

- marking floor receptacles with cones until they can be capped;
- outlining the borders of aisles with strong, contrasting colours so that there can be no mistake about their purpose - which is traffic not storage;
- signaling locations where a conveyor system can be safely crossed; and
- warning workers about temporary slip hazards by means of signs and barriers.

References

- ASTM-F462-American Standards Specification for Static Coefficient of Friction
- Cameron Taylor and Lee-Ann Jack, Slips, Trips and Falls, Occupational Health and Safety Canada, September-October, 1991
- Canadian Centre for Occupational Health and Safety-PPE Infogram K04 Safety Footwear
- Canadian Standards Association, B651-95 (R2001), Barrier Free Design
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- Closing the Gait on Slips, Trips and Falls, Safety and Health Magazine, National Safety Council, June, 1990
- Health and Safety Executive, Watch Your Step, Prevention of Slipping, Tripping and Falling Accidents at Work. ISBN #0 11 883782 6
- Jeffrey Elie, Anti-slip Products: Getting a Foothold on Safety, Occupational Health and Safety Canada, March-April, 1997
- The Work Environment, Volume 1, Chapter 12, Trip, Slip and Fall Prevention, William Marietta, 1991
- National Safety Council, Data Sheet 1-495-Reaf.86

Industrial Accident Prevention Association

- Housekeeping At Work*
- Walking and Working Surfaces*
- Inspecting Physical Conditions, Guidelines for Setting Standards LPBA0140410
- Workplace Inspection Recording Form*

* Download from www.iapa.ca

Template for Fall Analysis

Template for Fall Analysis

Purpose

The purpose of fall assessments is to identify and reduce loss through a systematic evaluation of the physical conditions of workplace, property and work activities.

Scope

The fall assessment should assess all aspects of the workplace associated with the potential for slips and falls by workplace parties.

Responsibilities

Senior management should be responsible for the development, selection of a team for the assessment and implementation of the fall assessment and control program.

The fall assessment team shall:

a) conduct assessments according to the team objectives

b) review accident and inspection reports to identify fall occurrences and locations

c) provide copies of completed assessments to senior management for further action.

Frequency

The fall assessment should be conducted on an as needed basis, with the results of the assessments reviewed annually to ensure relevance and that slips and falls are being managed according to the program.

Procedure

The attached assessment checklist will be used to conduct the assessments of the workplace for hazards associated with slips, falls and loss of balance.

SOP #14 and 15 will be utilized upon completion of the assessment in order to implement the appropriate controls for those identified risk areas.

Communications

The fall assessment and control program will be communicated to all employees through the general notice system. This will be followed up by departmental notification prior to the team assessments in each department. The health and safety manual will contain the current fall assessment standard and will be available for distribution to employees as needed.

Training

All fall assessment team members will be trained in the respective procedures prior to commencing the assessment activities. Team members will also be trained in:

- causal analysis
- statistical analysis
- computer software data entry and usage
- report writing
- IAPA Hazard Identification Course (Energy Barrier Analysis)
- technical training to understand slips, trips and falls, including dynamics of a fall and understanding the principles of co-efficient of friction

A needs analysis will be conducted by the safety coordinator of all assessment team members to identify gaps in knowledge or skills in order to determine specific training requirements.

An analysis will be conducted of the firm's resources available to provide internal training and will be supplemented by external training as needed.

Evaluation

The safety coordinator will review the fall assessment worksheets to ensure all areas of the workplace have been analyzed according to the procedures. The safety coordinator will report to the fall assessment team any noncompliance areas identified to ensure the team covers all aspects of the workplace.

Senior management will evaluate the ability of the fall assessment team to identify trends with respect to slips and falls. The results will be reviewed with the safety coordinator, JHSC and the fall assessment team in order to develop recommendations for controlling slips, trips and falls.

The safety coordinator and the fall assessment team will monitor the workplace for continued experiences associated with slips, trips and falls to ensure the fall assessment and control is working.

This assessment tool will be used to review the physical conditions and practices of each department. The assessment team will conduct a review annually, following an accident involving slips or falls or when changes to the physical conditions or practices within the department have been modified.

Upon completion of an assessment the team will determine the risk potentials for slips/falls or loss balance to the department. Slips/falls or loss of balance associated with same elevation will proceed to SOP #14 for further direction. Slips/falls or loss of balance associated with working at heights will proceed to SOP # 15 for further direction.

The checklist is to be used to inventory if any of the following conditions exist; if so are adequate controls in place to eliminate or minimize the risk.

Fall Assessment Tool/Checklist

Conditions		Present	Controls
Work Areas Associated with:	Loading docks		
	Balconies		
	Galleries		
	Landings		
	Platforms		
	Stairs		
	Walkways		
	Mezzanines		
	Parking areas		
	Sidewalks		
Openings In:	Floors		
	Roof		
Housekeeping:	Cluttered floors		
	Tripping hazards		
	Slipping hazards		
	Poor drainage		
	Material storage		
	Aisles		
	Waste areas identified		
Surface Types:	Carpet		
	Concrete		
	Ceramic tiles		
	Wood		
	Vinyl tiles		
Lighting:	Floor level		
	At heights		
Working Surface Conditions:	Oil, grease, wax		
	Fluids		
	Ice		

Conditions		Present	Controls
	Irregular surfaces		
Uneven or Broken	Truck beds		
	Rail car floors		
	Walking surfaces		
	Platforms		
	Stairways		
	Scaffolds		
	Outdoor yards		
	Any other working surfaces		

Comments:

Have any Special Needs Been Identified for the Use of an Area?

	Handicapped use		
	Elderly/children		
	Traffic		
	Visitors		
	Construction		
	Heavy machinery		

Working At Heights With:	Portable ladders		
	Fixed ladders		
	Elevated Platforms		
	Scaffolds		
	Cherry pickers		
	Catwalks		
	Other elevating devices		

Resource Information

Guide for Ladders

Guide for Walking and Working Surfaces

Guide for Ladders

Controls

- Develop a policy on ladders that covers use, inspection, storage and disposal.
- Establish safe use and storage practices for the ladders.
- Make sure they are followed.

Straight Ladders

- Use the right ladder for the job.
- Inspect the ladder before and after use.
- Tag and remove defective ladders for repair.
- Get help when moving heavy or long ladders.
- Make sure that your shoes are safe; not wet or muddy.
- Put the ladder up correctly - one foot back for each four feet up.
- Secure the top of the ladder as needed.
- Where there is the danger of traffic, have someone hold the ladder. Post a warning sign, if necessary.
- Secure the top and bottom of the ladder if using it to access a platform or scaffold.
- Face the ladder when ascending or descending.
- Hoist materials or attach them to a belt.
- Do not carry materials in your hands.
- Make sure that only one person at a time is on the ladder.
- Don't stretch beyond the side rails of the ladder.
- Never stand any higher than the third rung from the top of a ladder.
- Keep metal and wet wooden ladders away from live electrical circuits.

Stepladders

- Never use a stepladder as a straight ladder.
- Never stand on the top shelf or pail shelf.
- Lock the stepladder; spread the legs to their limit and ensure the braces are locked.

Maintenance

Establish a program for regular maintenance of ladders which includes:

- inspection of ladders for common defects such as broken rungs, split side rails, worn or broken safety feet, oil or grease which can make climbing surfaces slippery;
- destruction of ladders that cannot be safely repaired;
- prohibiting repairs which include tying or binding with wire;
- prohibiting the painting of ladders – this can hide cracks or weak points;
- regular inspection of the safety feet for damage if stored and used outdoors/extreme weather conditions.

Inspection Checklist for Ladders

	Rungs (loose, movable by hand)
	Nails, screws, bolts or other metal parts loose
	Uprights, braces and rungs in good condition
	Wooden parts (smooth, no splinters)
	Non-slip safety feet (in proper condition)
	Ladder stable
	Hinge spreaders (tight, straight)
	Hinges (tight)
	Extension locks (in place, in good condition)
	Rope (undamaged)
	Identification marks (legible)
	Ladder stored properly when not in use

Ladders Can Kill You

Ladders are among the more common pieces of equipment used in the workplace. Step, extension and fixed ladders, as well as portable staircases, are provided for the use of workers. Unfortunately, every year many workers are seriously injured and some fatally injured.

Since July, 1991, in the Industrial Sector, the death of 11 workers can be attributed to ladders. Including all sectors, there were a total of 23 deaths. WSIB statistics indicate the number of lost time injuries involving ladders has not declined significantly since 1992 and, in fact, in relation to all lost time injuries, the percentage of injuries associated with ladders increased in 1996.

Ladders Safety /Awareness Program

These injuries can be prevented. A ladder safety/awareness program is a good place to start. Basic elements of such a program should address the following **Elements**: Application, Selection, Procedures, and Training.

Components of the Elements should include the following:

1. Application

What is the job for which you will be using a ladder:

- Where will you be using the ladder?
- Will you be working near live electricity, above ground or underground, in high or low traffic areas?
- What will be the frequency of use?
- How long will you be using the ladder?
- What is the type of work you will be doing?
- What will be the potential uses of the ladder?

- Will the ladder be used for tasks other than those for which you purchase the ladder?
- Is a ladder required for the job? Are there alternative means of elevation, e.g., a scaffold?

2. Selection

What type and class of ladder do you require:

- It is important to use ladders only as recommended by ladder manufacturers. If in doubt, always use a Grade 1 Heavy Duty Industrial ladder with a load rating of 250 Ibs.
- Ensure you have the appropriately configured ladder. You may require a fixed ladder, an extension ladder, a step ladder, or another access fixture such as a portable staircase.
- Select a wooden (without wire reinforcement) or fibre glass ladder where there is any possibility of electrical contact (see section 43 of the Industrial Regulations).
- Select a ladder to suit the job; one size and material does not fit all jobs.
- Consider what accessories or additions may be required. Contact ladder manufacturers to determine what is available to suit your needs. In all cases, make sure you do not tamper with the structure of the ladder.

3. Procedures

What are the conditions under which you will be working, and what safety measures should you take:

- Appropriate instruction regarding any workplace related safety hazards must be provided to workers as required by clauses 25(2)(a) and 25(2)(d) of the Occupational Health and Safety Act. [All employers "shall provide information, instruction and supervision to a worker to protect the health and safety of the worker" and "shall acquaint a worker or a person in authority over a worker with any hazard in the work and in the handling, storage, use, disposal and transport of any article, device, equipment or a biological, chemical or physical agent."]
- In addition, workers must be informed of procedures required under appropriate regulations. See the Regulations for Industrial Establishments (0. Reg. 851/90), sections 18, 19, 45, 46, 73, 74 and 85. Also see the Regulations for Construction Projects (0. Reg. 213/91), sections 78 and 84.
- Read and follow instructions on manufacturer's labels affixed to the ladder.
- Where practical, ensure that two workers are present when a ladder is being secured or released.
- Always ensure that your ladders are properly stored and maintained.
- Always ensure that ladders are properly secured, providing for proper footing, stability, tie offs, etc.
- Always ensure the ladder is properly set up for the position of the work you will be doing.
- Keep areas at the base and the top of the ladder free from obstructions.

DO NOT
carry objects in your hands when ascending or descending a ladder. Hoist materials or attach tools to a belt.

DO NOT
stand higher than the third rung from the top.

DO NOT
use makeshift items such as a chair, barrel or box as a substitute for a ladder.

DO NOT
make temporary or makeshift repairs.

DO NOT
try to straighten or attempt to use bent or bowed ladders.

DO NOT
lean to either side rail beyond your belt buckle.

- Always ensure that ladders are inspected on a regular basis, using checklists if possible. Such inspections should be signed off.
- Always ensure that inspections and repairs are conducted by qualified workers. Tag and remove a defective ladder.
- Always ensure that rescue procedures are in place in the event of an emergency. This especially applies to falls of the ladder or falls from the ladder.
- Ensure you have a hazard reporting procedure, so that the best preventive measures can be taken.

Training

What kind of training is required for the safe use of ladders:

- Ensure that training in the use of ladders is "hands-on" training.
- Ensure that training is specific to the employer's equipment and work to be done.
- Ensure that training in proper climbing techniques is conducted, emphasizing the requirement for maintaining three point contact when climbing up or down.
- Ensure that proper training is provided to those who will be inspecting the ladders.
- When conducting training, always compare best practices to unsafe practices.

For all of the above elements, ensure you have established standards.

These are only some elements of a ladder safety program. To provide for the safe use of ladders, develop, maintain and update a program specific to the needs of your workplace.

Use ladders properly and climb safely!

This material was prepared by representatives of the Ontario Safe Workplace Associations and representatives of Ontario ladder manufacturers. For more information, contact your Safe Workplace Association, your Industry Association, or a ladder manufacturer.

Walking and Working Surfaces

Slips, trips and falls are a major source of injury and death in industry. About 60% of all falls take place on the same level.

Controls

In-plant

- Install **non-slip surfaces** especially around machinery and equipment where spills may occur, on stairs and ramps and in canteens and aisles.
- Provide **duckboards** or other non-slip footing in frequently wet areas.
- Provide **proper lighting**, particularly on stairs.
- Repair or replace worn or damaged **stair treads**. Install **drip pans**.
- Provide proper **storage facilities**.
- Ensure that **workers** at your workplace:
  - wear **clothing** that fit properly and are in good repair;
  - wear suitable **footwear**;
  - store heavy objects in low places;
  - do not carry **loads that obstruct** their **view**; and
  - refrain from **horseplay**

Outside Areas

- **Loading dock**: mark the edges with yellow warning lines. Caution everyone to watch for the edge.
- Never jump from a loading dock – use the stairs.
- Keep **stairs, ramps and walkways** clear and in good condition.
- Maintain **parking lots** – use sand or salt on icy patches in the winter.

Offices

- Make sure that there are **no turned up or worn patches in carpets.**
- Place telephone **cords, cables, etc. out of the way** of traffic.
- Arrange furniture so that it does not create an **obstacle**.
- Apply **non-slip coatings** to uncarpeted floor areas (e.g., in washrooms).
- Ensure everyone keeps **desk and file drawers closed** when not in use.

Personal Factors

Everyone should take the following precautions:

- **walk at a safe speed**, watch where you are going, change direction carefully, do not run;
- **use flashlight** or extension light in dim or unlit areas; and
- **be alert** at all times.

Administration

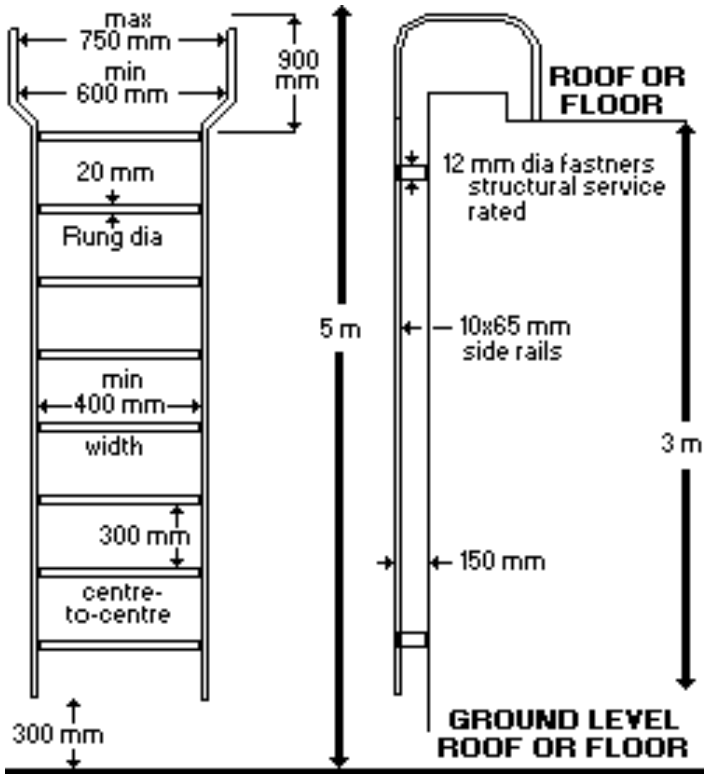
- **Establish and enforce procedures** for immediate clean up of spills, waste disposal, parts and equipment storage, ladder and scaffold safety and the reporting and correction of slip and trip hazards.

- **Post warning signs** in slippery areas.
- **Review accident records** periodically. (Where and how have slips and falls occurred? Have conditions and contributing causes been addressed?)
- Provide **permanent access to high places** which must be reached regularly.

Fixed Access Ladders

Reference: Ministry of Labour Engineering Data Sheet No. 2-04.

Drawing Not to Scale



Checklist for Walking and Working Surfaces

	Ladders (secure, condition)
	Scaffolds (secure, condition)
	Ropes/cables (condition)
	Stairs (lighting, clear, condition)
	Floors (holes, spills, clutter)
	Projecting machine parts
	Loading dock (surface condition, work practices)
	Parking lot (condition)
	Office (carpet, telephone cords, equipment, power cords)
	Reporting procedures posted/enforced
	Warning signs posted/barriers erected
	Written procedures for safe walking/working surfaces

Hazard Information

Fixed Access Ladders

Window Cleaning Anchor Systems

Snap Hooks in Fall Arrest Equipment

MOL Engineering Data Sheet 2-04: Fixed Access Ladders

MOL Engineering Data Sheet 2-05: Railings and Toeboards

Who Can Help? & Resources

Source: Ontario MOL Bulletins

Fixed Access Ladders

Fixed access ladders that are poorly secured to the structure they serve may pull away from the structure and cause death or serious injury to workers using them.

A contractor's employee needed to service a rooftop heating/air conditioning unit by using an access ladder that was attached to the outside of the building. Several years earlier the ladder had been cut off at the bottom, so that it ended eleven feet above the ground.

The worker used a portable ladder to reach the fixed access ladder. As he neared the top of the fixed access ladder, it pulled out of the wall. The worker fell and sustained fatal head injuries.

An accident investigation revealed that the ladder had been inadequately secured to the wall using anchor bolt shields, which were not suitable for this purpose.

This shortcoming was compounded by other factors:

- cutting off the lower portion of the ladder had reduced the number of anchor points from six to four;
- the upper anchor bolts had become loose.

In order to avoid accidents of this nature:

- fasteners used in fixed access ladder installations shall be rated for intended structural service and for the type of wall construction;
- through-bolted connections should be used; and
- fixed access ladder installations shall be periodically inspected and maintained in good condition.

Window Cleaning Anchor Systems: Non-Galvanized Anchors

Hazard Summary

After an investigation prompted by complaints from the window cleaning industry, Ministry of Labour personnel found that some anchors installed on buildings for window cleaning and maintenance of facades exhibited excessive rusting and deformation. This reduced the overall strength of the anchors, creating a definite hazard to workers using them.

Use of these anchors as a fixed support for the attachment of workers' fall arrest systems contravenes the **Window Cleaning Regulations**, which state:

"(1) If a worker who is not working from a ladder is exposed to the hazard of falling more than three metres, the worker shall use a fall arrest system that is adequately secured to a fixed support and arranged so that the worker cannot fall freely for a vertical distance of more than 1.5 metres.

(2) The fixed support mentioned in subsection (1) shall be able to resist all arrest forces when a worker falls" (Ont. Reg. 859/90, section 10)."

The anchors that were investigated were designed and supplied by G.A. Pearsons and Associates and Atlas Anchor Systems Ltd. They consist of a main body, fabricated of non-galvanized mild steel and coated with grey paint, and a rotating hook assembly of stainless steel.

Anchors that are fabricated of mild steel and are not hot-dip galvanized do not meet the requirements of the National Standard of Canada, CAN/CSA Standard Z91-02, "Safety Code For Window Cleaning Operations". They also do not meet the Ministry of Labour guidelines "Roof Anchorage For Fall Arrest Systems and Tiebacks For Suspended Equipment and Primary Support", issued in September 1991.

Besides having a main body of non-galvanized mild steel, the anchors had an inadequate seal between the hook assembly and the body, allowing water to accumulate inside the body. When water trapped there freezes it exerts excessive pressure on the retaining plate of the hook assembly, causing the plate to buckle. This in turn leads to the failure of the welds attaching the plate to the main body.

It was also found that, in some instances, the inadequate roofing seal between the aluminium flashing placed over the main body of the anchor and the roof membrane allowed water to penetrate to the body, accelerating the rate at which its mild steel components corrode.

These anchors are usually connected to concrete floors, walls or roof slabs by adhesive inserts that secure the base plate of the main body to the concrete. The Ministry of Labour guideline requires that these inserts must be made from stainless steel or some other corrosion-resistant base material.

Locations and Sectors

All buildings with roof, floor or wall anchorage systems to support workers and their equipment for window cleaning or maintenance of facades.

Required Action

All **owners of buildings that have roof, floor or wall anchoring systems** that:

- are designed, manufactured or installed by G.A. Pearsons and Associates or Atlas Anchor Systems Ltd.; or
- have anchors or components of the anchors fabricated from mild steel that is not hot-dip galvanized; or
- have adhesive inserts that are not made from stainless corrosion-resistant base material,

must take the following **steps BEFORE any of these systems are used**.

(1) The building owner must have each installed system inspected by a professional engineer or his or her designee to determine whether it complies with:
   - the Regulation for Window Cleaning (Ont. Reg. 859/90),
   - CAN/CSA Standard Z91-02, "Safety Code For Window Cleaning Operations",
   - the Ministry of Labour guidelines, "Roof Anchorage For Fall Arrest Systems and Tiebacks For Suspended Equipment and Primary Support", September 1991, and
   - good engineering practice.

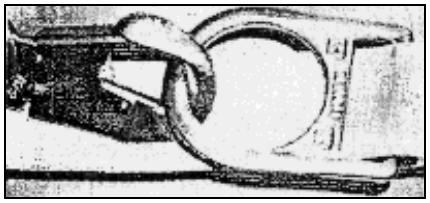
(2) Based on the **inspection report** of the professional engineer, the building owner must:
   - immediately remove and replace all corroded anchors and adhesive inserts as indicated by the professional engineer;
   - carry out any corrective actions or any tests on the remaining anchors and adhesive inserts that the professional engineer deems necessary; and
   - remove and replace all remaining anchors that are fabricated from mild steel that is not hot-dip galvanized within a period to be prescribed by the professional engineer, which must not exceed three years.

Produced by Professional and Specialized Services, Ministry of Labour.
Alert #C15/0696 ISSN 1196.6228

Cette publication est également disponible en français sous le titre <<Dispositifs d'ancrage pour le nettoyage des vitres: dispositifs non galvanisés>>.

Snap Hooks in Fall Arrest Equipment

A worker experienced difficulties in removing his lanyard locking snap hook from the D-ring of his safety belt. Although he had believed the snap hook was properly engaged, he found that it had passed through the D-ring and jammed there instead of hooking on and locking properly. In a case like this, should an accidental fall occur, the snap hook could slip back through the D-ring opening.



Correct

Hazard!

This hazard is possible with combinations of D-rings and snap hooks which are close in size. For example, the snap hook in this incident passed through a D-ring with an ID (interior diameter) of 2 3/8 inches but was restricted from outward movement by a 2 1/8 inch ID-ring in a way that could lead a worker to believe that he was secured. Lanyards with snap hooks small enough to slide through the D-ring freely do not present this hazard.

Location(s) and sector(s) where this hazard may be encountered are **mining, construction and industrial** and wherever fall arrest equipment is used.

Suggested Precautions

All users of fall arrest equipment should be informed of this incident and advised to inspect their equipment.

All workers using fall arrest equipment should be informed of this hazard and instructed that they should:

(A) **never rely on the sound or feel** of a snaphook engaging, and

(B) **before each use**, always **visually check** that:

1) the snap hook freely engages the D-ring or the anchor point; and

2) the keeper (the moving part of the hook) is completely closed and locked in position.

MOL Engineering Data Sheet 2-04: Fixed Access Ladders

Ontario Ministry of Labour – Occupational Health and Safety Division – Industrial Health and Safety Branch

1. Legislative Requirements

1.1 **Section 19** of the Regulations for Industrial Establishments states:
Where frequent access is required to equipment elevated above or located below floor level, permanent platforms shall be provided with access by a fixed stair or access ladder.

1.2 **Section 18 (1)** of the regulation states:
An Access ladder fixed in position shall,

(a) be vertical;
(b) have rest platforms at not more than nine metre (30 ft) intervals;
(c) be offset at each rest platform;
(d) where the ladder extends over five metres (16 ft) above grade, floor or landing, have a safety cage commencing not more than 2.2 metres (7 ft) above grade and continuing at least ninety centimetres (36 inches) above the top landing with openings to permit access by a worker to rest platforms or to the top landing;
(e) have side rails that extend ninety centimetres (36 inches) above the landing; and
(f) have rungs which are at least fifteen centimetres (6 inches) from the wall and spaced at regular intervals.

1.3 **Section 18 (2)** of the regulation also states that:
Subsection (1) does not apply to an access ladder on a tower, water tank, chimney or similar structure which has a safety device which will provide protection should a worker using the ladder fall.

2. General

2.1 Fixed access ladders shall be designed, constructed, installed and maintained so as not to endanger a worker and shall be capable of withstanding all loads to which they may be subjected.

2.1.1 Structural design, including attachment methods, should be performed by a Professional Engineer.

2.1.2 The minimum design live load imposed by persons shall be two loads of 1.1 KN (250 lb) each concentrated between any two consecutive attachments. Each rung in the ladder shall be designed for a single concentrated live load of 1.1 KN (250 lb) minimum.

2.1.3 Other loads, such as concentrated loads, loads due to ice, wind, rigging or impact, and dead loads, shall be considered in the design.

2.1.4 A safety factor of at least 4:1 shall be applied in designing components for normal usage and at least 10:1 for components supporting fall-arrest systems.

2.2 All parts and surfaces of fixed ladder installations shall be free of sharp edges, burrs or other details that may be hazardous to the person using the ladder.

2.3 Prevention of unauthorized access may be achieved only by methods that do not compromise the safety or structural integrity of the ladder.

2.3.1 For example, a smooth panel may be locked over the lower rungs.

2.3.2 The bottom portion of an existing ladder shall not be cut off for security purposes.

2.4 Design, condition and surface finish of rungs and side rails must permit secure foothold and handhold. Avoid highly polished surfaces which may become slippery, especially when wet. Avoid designs having rungs with sloping upper surfaces (a condition which may occur when a step-ladder is converted into a fixed ladder).

2.5 Where access is required to Heating, Ventilating and Air Conditioning (HVAC) equipment or other equipment mounted on a roof or slung under a ceiling, the building design should ensure safe means of access for service personnel.

2.6 Roof access hatches served by fixed ladders must be at least 550 mm (21 5/8 in.) by 900 mm (2ft 11 in.) on buildings more than 3 stories in building height, where the slope of the roof is less than 1 in 4.

2.7 When oversized clothing or equipment is anticipated (for example, self-contained breathing apparatus), the ladder design should take such needs into consideration. However, dimensional extremes should be avoided to ensure that the ladder remains suitable for normal use.

2.8 Materials of construction shall be compatible with intended conditions of use. For example:

- aluminium ladders must not be used in a caustic environments
- ladders made of dissimilar metals should be protected against deterioration due to galvanic electrolytic corrosion
- wooden ladders should not be used in humid environments, or should be protected against deterioration from exposure to moisture

2.9 If the distance from the top of a parapet to the roof-top exceeds one rung-space (i.e. max. 300 mm or 12 inches) a means of climbing to and from the top of the parapet should be provided.

2.10 Fixed ladders should not be located in areas where the atmosphere creates or contributes to unsafe conditions. For example:

- where ice may build up or steam may condense on a ladder
- where oil or grease-laden air is present, such as cooking areas in commercial kitchens

3. Rungs

3.1 The top of the uppermost rung of a ladder should be level with the top of the access/egress level or landing platform served by the ladder. Where there is a parapet, if the parapet is cut to permit passage through it, the access/egress level will be the roof. If the parapet is continuous, the access/egress level will be the top of the parapet.

3.2 Rungs shall have a non-slip surface.

3.3 To accommodate functional requirements or additional safety requirements, dimensions which exceed the minimum specified dimensions in Figures 1, 2 and 3 may be used, provided sizes are increased from the minimum specified sizes to maintain the same factor of safety. In the design example following (Fig. 1, "Typical Steel Access Ladder"), increasing the inside clear width of rungs from 400 mm (16") to 600 mm (24") would require an increase in the rung diameter from 20 mm (3/4") to 25 mm (1").

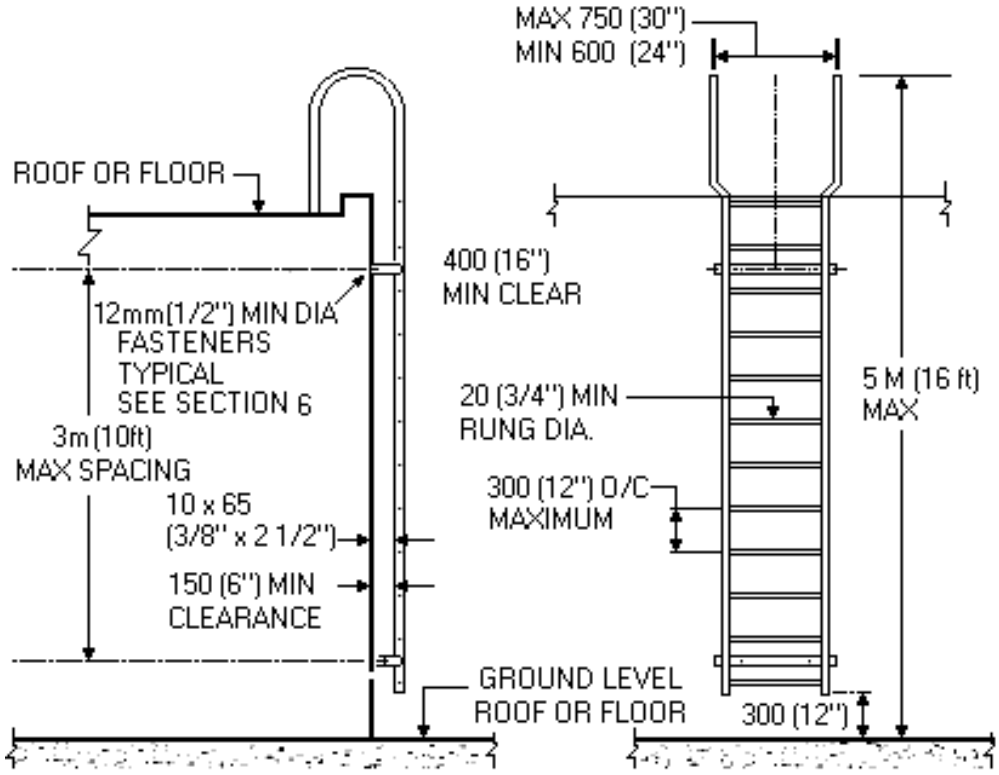


FIG. 1: Typical Steel Access Ladder
General Arrangement – Cage not Required

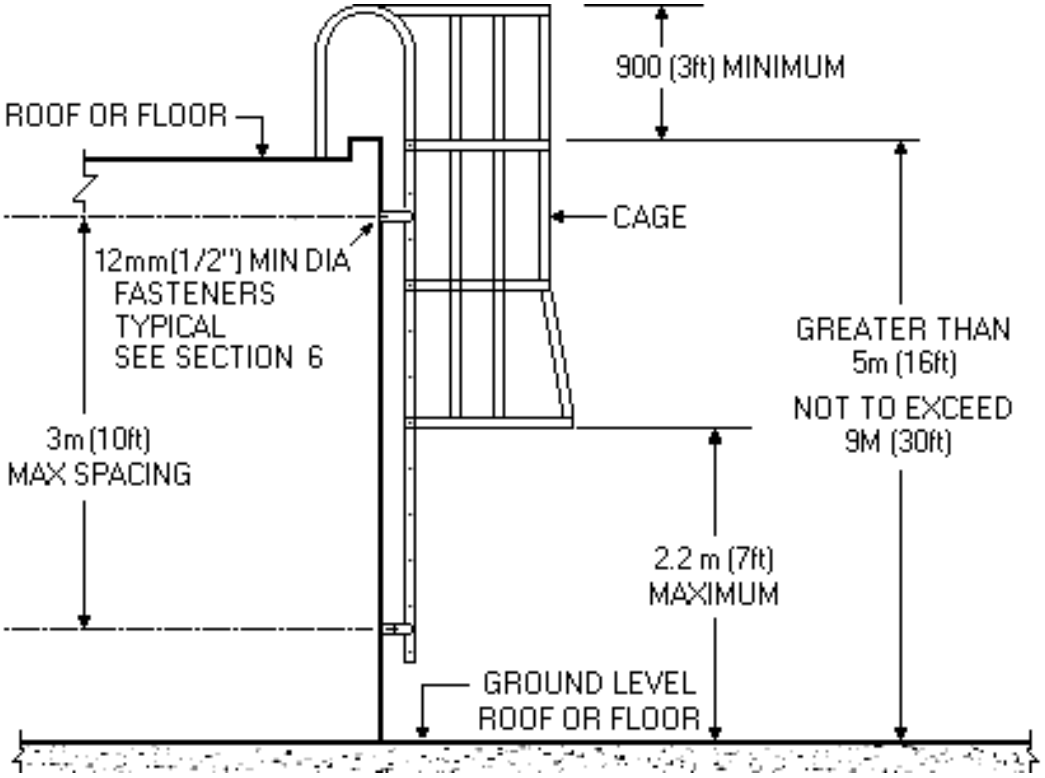


FIG. 2: Typical Steel Access Ladder
General Arrangement – Cage Required

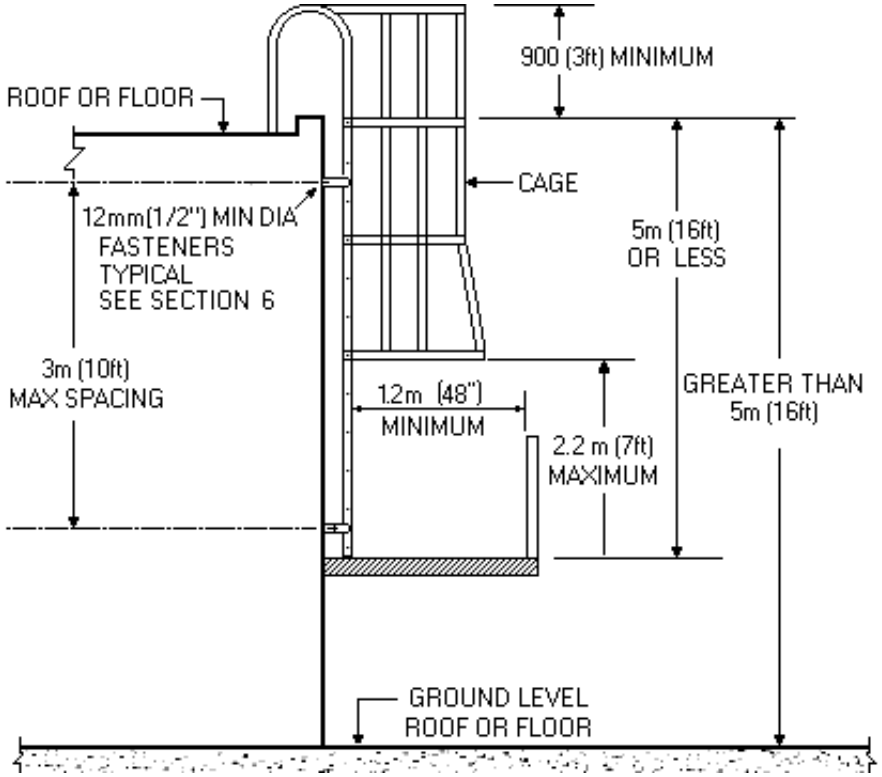


FIG. 3: Typical Steel Access Ladder – Elevated Access
General Arrangement – Cage Required for Wide Landings
[Ref. Section 5.1.2]

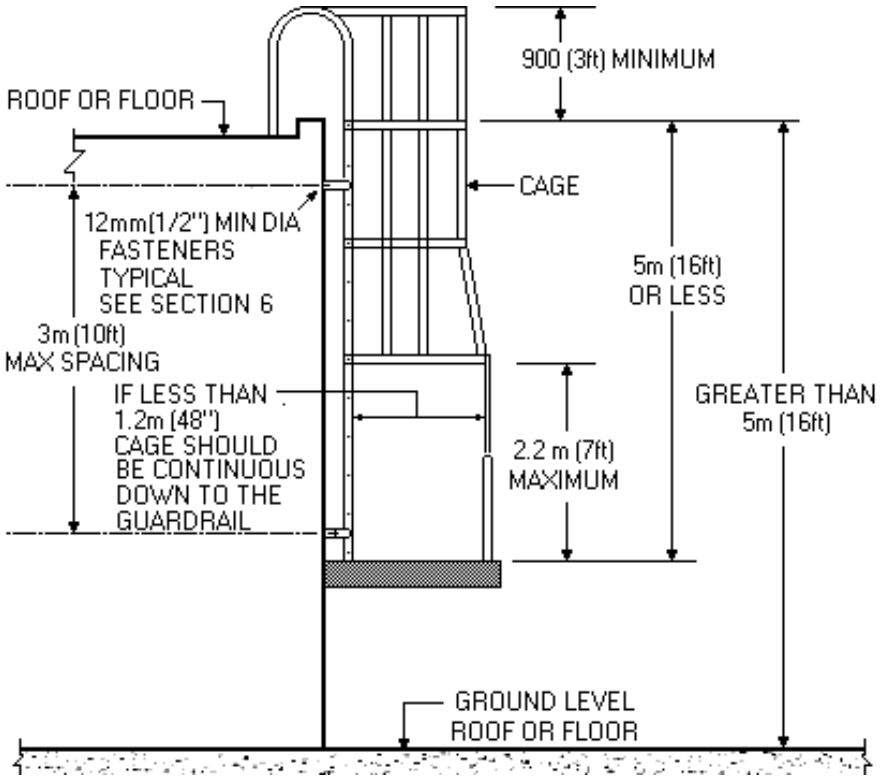


FIG. 4: Typical Steel Access Ladder – Elevated Access
General Arrangement – Cage Required for Narrow Landings
[Ref. Section 5.1.2]

4. Side Rails

4.1 Any shape of side rails may be used that provides a uniform gripping surface for the hands of workers using the ladders, as long as the shape permits a power grip.

4.1.1 Side rail shapes that do not permit a power grip shall not be used.

4.1.2 The same shape of side rails shall be maintained for all ladders in the same length of climb.

4.2 The minimum sizes (cross-section) of side rails recommended in this section (4.2) are based on satisfying the design criteria of section 2.1, assuming the maximum spacing of supports specified in section 6.2.4 below.

4.2.1 For different design loads or support spacing, the minimum size of side rails shall be adjusted in accordance with recognized design practice.

4.2.2 The same size (cross-section) of side rails shall be maintained for all ladders in the same length of climb.

4.2.3 The minimum size (cross-section) recommended for a steel ladder (subject to normal atmospheric exposures) is 10 mm x 65 mm (3/8" x 2½") solid flat-bar stock.

4.2.4 For different materials, the minimum recommended size shall be adjusted in accordance with recommended design practice.

4.3 Where it is not practicable to have fixed extensions of side rails above a landing, equivalent provisions shall be arranged. Extensions integrated into guardrails, telescoping side rails, extensions incorporated into roof hatches, etc., may be accepted by the Ministry of Labour. CENTRE-POST EXTENSIONS ARE NOT CONSIDERED ACCEPTABLE.

5. Safety Cages

5.1 With an elevated access, a cage shall be provided where the top of the ladder is higher than five metres (16 feet) above ground level, floor or roof, even if the length of the climb is less than five metres (Fig. 3).

5.1.1 An elevated access from a platform having 1.2 metres (48 inches) (or more) clearance between the ladder and any adjacent guard rail, may utilize a standard cage (as per Fig. 3).

5.1.2 An elevated access from a platform having less than 1.2 metres (48 inches) clearance between the ladder and any adjacent guard rail should have a cage continuous with the guardrail on the sides(s) with clearance less than 1.2 metres (48 inches) (Fig. 4).

5.2 Cages should be provided with horizontal hoops or bands to help prevent or arrest the fall of a worker.

5.3 Cages should not be less than 680 mm (27") in width and should extend not less than 680 mm (27") and not more than 760 mm (30") from the centre-line of the rung (measured on the climbed side of the ladder, horizontally and perpendicular to the rung).

These restrictions do not apply to the bottom flare of cages.

5.4 The insides of cages should be free of obstructions.

5.5 Cages must be designed to withstand all loads to which they may be subjected.

6. Attachment and Anchoring

6.1 Structural soundness of the wall, member or piece of equipment to which the ladder is to be attached shall be confirmed by a competent person, prior to installation of the ladder.

6.2 Attachment method (e.g., through-bolting, anchoring, welding, etc.) must be rated for the intended structural service and for the type of wall, member or piece of equipment.

6.2.1 Expansion anchors of all descriptions should be avoided with masonry walls. (Anchor manufacturers' pull-out ratings are invariably given for poured concrete walls; these ratings cannot be reliably attained in masonry.)

6.2.2 Through-bolted connections (or an equivalent) shall be used for masonry walls and other walls for which there is no anchor manufacturer's pull-out rating. Generally, through-bolted connections should be used wherever practicable.

6.2.3 Attachment and anchor bolts shall have a minimum diameter of 12 mm (½ inch).

6.2.4 The maximum spacing of attachment points for a steel ladder with side rails shall be three metres (10 feet). For different materials or extra loads, this maximum spacing shall be adjusted in accordance with recognized design practice.

6.3 To provide an improved margin of safety, there should be two means of anchoring the top of the ladder. This may be accomplished by fastening the side rail extension above the top of the access/egress level to the structure, building or equipment.

6.4 Modifications to the attachment of the ladder to the structure, building or equipment must be approved by a professional engineer.

7. Safety Platforms

7.1 Suitable safety platforms should be provided along a ladder where worker activity is anticipated and where lack of such a platform would cause a significant additional hazard for workers. For example:

- at the top of a ladder on a tower or similar structure where work of significant duration can be anticipated (such as gathering information on emissions)
- on a roof access ladder, just under the roof hatch, where it can be anticipated that workers encumbered with tools and/or supplies will need to put them down before unlocking the work hatch

7.2 Rest platforms (per section 1.2 b), above may be used for this purpose, where practicable.

7.3 Minimum total depth of the platform (from climbed side of ladder to guardrail) should be 760 mm (30 inches) and the minimum width of the platform should be 760 mm (30 inches).

7.4 Self-closing safety gates should be provided on platforms next to a ladder, whenever worker activity near the ladder can be foreseen.

8. Inspection

8.1 Fixed access ladder installations shall be periodically inspected for rust, corrosion and structural integrity and be maintained in a good condition that is not likely to endanger any worker. These inspections should be conducted at least once a year.

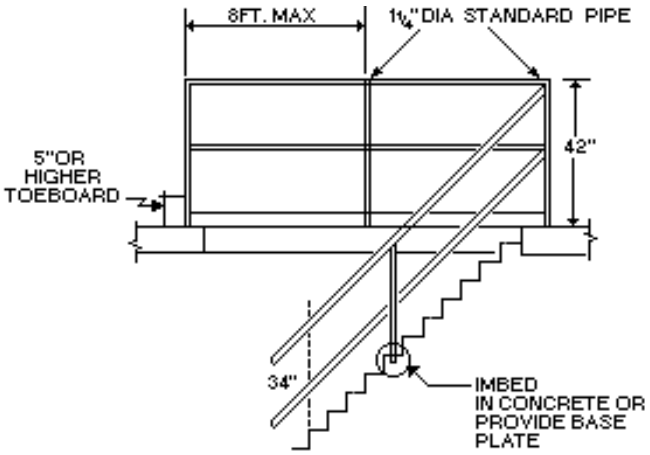
8.2 Records of inspections and maintenance of fixed access ladder systems should be maintained.

9. References

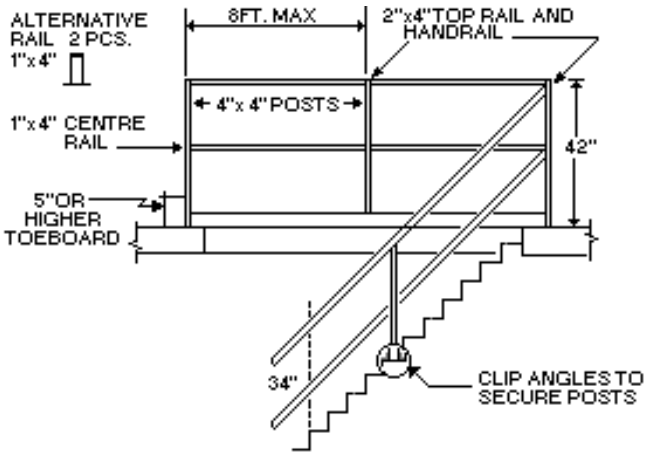
ANSI A14.3 - 2002	American National Standard, "Ladders, Fixed Safety Requirements"
USDOL-OSHA	1910.27 Fixed Ladders
O.B.C. - 1990	Ontario Building Code

MOL Engineering Data Sheet 2-05: Railings and Toeboards

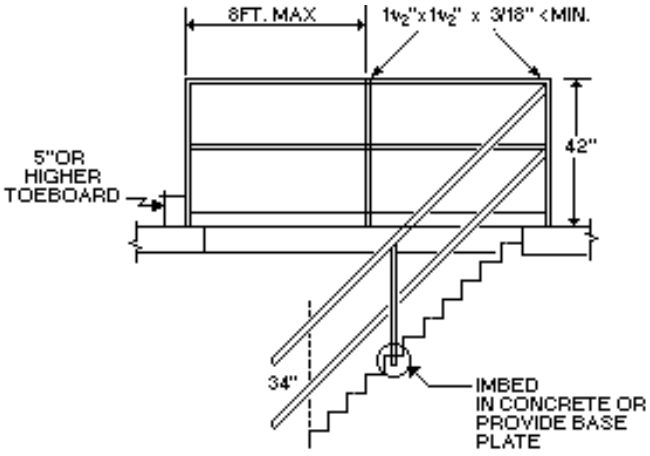
Ontario Ministry of Labour – Occupational Health and Safety Division – Industrial Health and Safety Branch



TYPICAL PIPE RAILING



TYPICAL WOODEN RAILING



TYPICAL STRUCTURAL STEEL RAILING

NOTES:

1. GUARDRAILS TO BE SECURELY ANCHORED TO FLOOR. WHEN USED AROUND HATCHWAYS, ONE OR MORE SIDES MAY BE HINGED ORIN SOCKETS.

2. CENTRE RAIL TO BE MIDWAY BETWEEN FLOOR AND TOP RAIL. IF SPACE BETWEEN FLOOR AND TOE RAIL IS FILLED IN (SOLID OR WIRE SCREEN), TOEBOARD AND CENTRE RAIL MAY BE OMITTED.

3. IF WIRE SCREEN IS USED BETWEEN FLOOR AND TOP RAIL, NO. 12 G.A. OR HEAVIER WIRE, AND NOT OVER 2" MESH IS TO BE USED.

Who Can Help?

Who Can Help?

The Industrial Accident Prevention Association has:

- Fall Prevention programs
- Fall Prevention training
- Information Centre
- Best Practices in Fall Prevention
- Phone 1-800-406-IAPA (4272) - www.iapa.ca

The Workplace Safety and Insurance Board

- Help you analyze your injury record to determine claim costs and develop a prevention strategy based on your past experience.
- Phone: 1-800-663-6639 - www.wsib.on.ca

The Ministry of Labour

- Help you understand the legislation and reinforce the requirements.
- Phone: See blue pages of phone book for local MOL office - www.gov.on.ca/lab/main.htm .

You may contact any of these organizations and will be linked to the others as needed. We are partnering to co-ordinate and plan programs, activities and services that will meet your injury prevention needs.

Resources

The following resources are available upon request.

Standard Operating Procedures (SOPs)

- Slips/Falls - Loss of Balance
- Slips/Falls From Height
- Template for Fall Analysis

Guides

- Guide for Ladders
- Ladders Can Kill You

Hazard Information

- Fixed Access Ladders
- Window Cleaning Anchor Systems: Non-Galvanized Anchors
- Snap Hooks in Fall Arrest Equipment

Ministry of Labour Engineering Data Sheets

- 2-04 Fixed Access ladders
- 2-05 Railings and Toeboards

IAPA Products

- Inspecting Physical Conditions, Guidelines for Setting Standards - LPBA0140410
- Housekeeping At Work*
- Walking and Working Surfaces*
- Ladders*
- Rolling Scaffolds*
- Workplace Inspection Recording Form*
- Injury Analysis Report*

* Download from www.iapa.ca