Ladder Fatality from Fall

INCIDENT

On Friday, Aug. 25, 2017, four gutter installation specialists arrived on the construction site of a new private residence for the purpose of installing gutters. This was their first day on the site. At approximately 11:00 a.m., the victim and a co-worker gathered two, 16 ft. aluminum extension ladders and approached the front porch.

The workers set up the first ladder on the side of the house in order to access the porch roof. The two then worked together to carry the second ladder up to the porch roof, where they positioned it in order to take measurements of the house roof. The victim ascended the second ladder while his coworker held the base of it in order to keep it in place.

The victim took measurements and verbally communicated the results to the owner of the company who was located on the ground below.

In an interview with the coworker who was holding the ladder, he stated that as the victim completed his measurements and began descending the ladder that was placed on the porch roof, the steep angle of the porch roof caused the base of the ladder to ‘kick out’ and strike the employee who was holding the ladder. This resulted in the victim, the coworker and ladder all falling 10 ft. 9 in. from the porch roof to the ground below.

As the incident occurred, the owner of the company stated that he had his back turned away from the house and was walking away in order to cut the guttering material when he heard the noise behind him. As he turned, he observed the two employees and the ladder on the ground.

The coworker was uninjured, but the victim had landed on his head and neck area, and was unresponsive. The owner of the company rushed to the victim and called 911. Emergency services arrived within five minutes of the call and transported the victim to a local hospital where he was pronounced dead at 3:13 p.m. the same

day.

Cause of Death

The cause of death was blunt force head and torso injuries due to a fall from height.

NEED TO KNOW

Falls are the leading cause of deaths and injuries in the construction industry.

Make sure your ladder is positioned at least to deal with the following:

1. **Repeated Handling of Heavy Climbing Equipment**

Strains and sprains caused by moving and setting the ladder are usually less serious, but because they are by far the most common kind of injury, they account for the greatest expense to the employer. By using modern advances in fiberglass-resin composites and engineering design, the weight of an extension ladder can be reduced by up to 25 percent without reducing its strength. Reducing the weight of the ladder, along with proper training, will greatly reduce this type of injury.

2. **Using the Wrong Ladder for the Job**

Using a ladder that is too short for the job, climbing on the top rung, or using a stepladder and leaning it against the wall like an extension ladder are prime examples of this mistake. This type of accident is usually more serious because it involves a fall that might result in broken bones or a permanent disability. Proper training is important to educate the user about proper ladder selection. Multipurpose ladders, which adjust to multiple sizes and configurations can also be used if needed.

3. **Falls Due to Over-Reaching**

Over-reaching leads to the most serious type of ladder-related injuries, often disability or death. Instead of climbing down and moving the ladder over a few feet, some users try to reach beyond

the recommended distance and cause the ladder to tip. Uneven ground is also a factor in this type of accident. Just one inch out of level at the bottom of a 28-foot ladder will cause the top of the ladder to be more than 19 inches off center, vastly increasing the likelihood of a side-tip fall. Adding levelers to the ladder can help alleviate this concern, but levelers do not prevent the user from over-reaching. In addition, they add extra weight to the ladder and increase the possibility of a strain or sprain. Training everyone to keep their belt buckle between the side rails while working on a ladder will help. The best solution to the over-reaching problem is adding retractable wide-base levelers to greatly increase side-to-side stability. Since no jobsite is perfectly level, these outriggers also adjust to uneven ground to ensure a perfectly level base.

BUSINESS/REGULATIONS

Contributing Factors

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. Investigation identified the following unrecognized hazards as key contributing factors in this incident:

- Lack of hazard recognition and safety training
- Performing work at heights without adequate fall protection
- Ladder not used on stable and level surface

STATISTICS

Each year, more than 4,000 construction workers are injured so seriously by ladder falls that they miss work. Each year, about 70 construction workers DIE in falls from ladders.

Every year more than 300 people die in ladder-related accidents, and thousands suffer disabling injuries.

The study, published in the most recent Morbidity and Mortality Weekly Report (MMWR), found that falls remain a leading cause of unintentional injury mortality nationwide, and 43 percent of fatal

falls in the last decade have involved a ladder.

Percentage of ladder fall fatalities and nonfatal ladder fall injuries treated in emergency departments, by fall height. In 2011, work-related ladder fall injuries (LFIs) resulted in 113 fatalities (0.09 per 100,000 full-time equivalent [FTE] workers), an estimated 15,460 nonfatal injuries reported by employers that involved more than 1 day away from work (DAFW) and an estimated 34,000 nonfatal injuries treated in emergency rooms. Rates for nonfatal, work-related, emergency room-treated LFIs were higher (2.6 per 10,000 FTE) than those for such injuries reported by employers (1.2 per 10,000 FTE).

“LFIs represent a substantial public health burden of preventable injuries for workers,” noted the researchers.

According to the study:

1. Men and Hispanics had higher rates of fatal and nonfatal LFIs compared with women and non-Hispanic whites and workers of other races/ethnicities.
2. LFI rates increased with age, except for injuries treated in emergency rooms.
3. Fatality rates were substantially higher for self-employed workers (0.30 per 100,000 FTE workers) than salary/wage workers (0.06 per 100,000 FTE workers).
4. Companies with the fewest employees had the highest fatality rates.
5. The construction industry had the highest LFI rates compared with all other industries.
6. Across all industries, the highest fatal and nonfatal LFI rates were in the following two occupation groups: construction and extraction (e.g., mining) occupations, followed by installation, maintenance and repair occupations.
7. Head injuries were implicated in about half of fatal injuries (49 percent), whereas most nonfatal injuries involved the upper and lower extremities for employer-reported and emergency room-treated nonfatal injuries.

RECOMMENDATIONS

Perform a job hazard analysis of the worksite.

A job hazard analysis (JHA) is a technique employed by site supervisors, experienced employees, and safety personnel that focuses on job tasks as a way of identifying potential hazards that workers may encounter when performing each task. Had a job hazard analysis been performed, it is likely the employer would have recognized potential hazards on the site, which included working at heights above six feet and using a ladder on an uneven surface.

Train employees on and enforce the use of fall protection when working at heights above 6 ft.

The victim and a coworker were on the roof of the porch, 10 ft. 9 in. above the ground. In interviews with other employees, they acknowledged that the owner of the company had never directed them to wear fall protection nor were they ever trained on how to inspect or adjust a personal fall arrest system (PFAS). Failure to protect employees while working at heights and failure to properly train and document completion of fall protection training directly violates two separate OSHA standards.

Ensure ladders are placed on sturdy, level ground or secured before use.

At the time of the incident, the victim was descending a ladder whose base was being held in place by a coworker. The base of the ladder was positioned on the roof of the porch that had a measured pitch of 6:12. A roof’s pitch is measured by how many inches the roof rises for every 12 in. it moves inwards toward the peak (or ridge). A roof with a pitch of 6:12 would convert to an angle of 26.5o. If there was no feasible way to secure the top of the ladder to the house roof, efforts should have been made to secure the base of the ladder to the porch roof.

Ladder Regulation

1. On a construction project, where an employer intends to have

work performed at heights, the employer shall use a scaffold or other equipment as outlined by sections 125 to 149 of the Regulation. Where the hazard assessment for the use of a ladder to perform the work in question determines that there are no hazards posed by the use of a ladder or that any identified hazards have been mitigated, an employer may consider the use of a ladder to perform that work. Where a ladder is used, the employer shall ensure that the ladder and its use comply with regulatory requirements and that all reasonable precautions for the protection of the worker when using the ladder are taken.

2. Portable, manufactured ladders must be designed, constructed, and maintained so as to not endanger a worker and must be capable of withstanding all loads to which they may be subjected.
3. Ladders must be used in accordance with manufacturers' instructions. It is a requirement of the regulation that "a portable ladder at a project shall be manufactured and shall meet the design, performance, test and marking requirements of a Grade 1, Grade 1A or Grade 1AA ladder in the CSA Standard Z11-12, Portable Ladders"(O. Reg. 213/91, ss. 80(1))
4. Workers must be adequately trained on the selection, setup, use, and maintenance of a ladder.
5. An employer's site-specific health and safety program must address the hazards and risks associated with the use of ladders to ensure that a worker's health and safety are protected. 6. The work to be performed from a ladder must also not adversely affect the stability of the ladder (e.g., overreaching to where the worker's "belt buckle" or mid chest is beyond the side rails of the ladder, and reaching to extreme overhead would not be allowed).
6. A worker must not carry any materials, tools or equipment in his/her hands while climbing/descending the ladder or supporting heavy objects that will overload the weight capacity of the ladder.
7. When a ladder is used as a means of access, the ladder must be erected in accordance with the manufacturer's

instructions, and a worker must maintain three-limbed contact so that both hands are used when climbing up or down.

8. When ladders are used as a means of work positioning, the Ministry of Labour expects that a worker will be protected from falling, while in the work position and exposed to fall hazards described under section 26 of Ontario regulation 213/91. The worker's fall protection must be secured to an adequate anchor point independent of the ladder.
9. Any equipment including ladders which are damaged must be immediately taken out of service and repaired in accordance with manufacturers' instructions or be replaced.
10. Ladders that are used as access between levels of a structure must be secured at the top and bottom to prevent movement.
11. Where possible, it is recommended that ladder stabilizers be used with portable, manufactured ladders.
12. A ladder is not designed or intended to be used as a "work platform". Work platforms must meet the requirements of sections 134 and 135 of the Regulation respecting loading, dimensions, configuration, etc. It should be noted by employers considering ladder use that the narrower width of ladders does provide additional ergonomic stresses to workers using ladders, and results in less stability necessitating strict work practices to avoid overreaching while on a ladder.
13. The use of ladders with built-in work platforms that are designed and manufactured in accordance with CSA Standard Z11-12 Portable Ladders are a preferable choice over standard step ladders.
14. MOL inspectors will review situations where a ladder is being used for work based on a ladder risk assessment for the tasks being performed and may issue orders or requirements, as appropriate, where they determine that the use of the ladder contravenes or may contravene the OHSA and the regulation.

PREVENTION

1. **Inspect the ladder before every use**
    - Inspect the rails, rungs, feet, and spreaders or rung locks of your ladder for defects or damage every time you use it. If you see any damage, tag it “do not use” and request another ladder in proper working order. And check your ladder’s duty rating – certain ladders may not support you and your toolbelt!
2. **Position your ladder properly**
    - **For all ladders:**
    - Make sure you have level, solid footing for your ladder.
    - Position the ladder near your work to avoid overreaching.
    - **For extension ladders:**
    - Set the base one foot away from the building for every four feet of height.
    - Tie off the ladder at the top – and bottom where possible!
3. **Use the ladder safely**
    - Maintain three-point contact with the ladder at all times.
    - Do not stand on the top two rungs of a stepladder, or the top four rungs of an extension ladder.
    - Have your partner hold the ladder to steady it as you ascend.
    - Don’t carry tools and materials while climbing. Use a rope to haul or hoist materials to the upper level!
4. **Falls from portable ladders (step, straight, combination and extension) are one of the leading causes of occupational fatalities and injuries.**
    - Read and follow all labels/markings on the ladder.
    - Avoid electrical hazards! – Look for overhead power lines before handling a ladder. Avoid using a metal ladder near power lines or exposed energized electrical equipment.
    - Always inspect the ladder prior to using it. If the ladder is damaged, it must be removed from service and tagged until repaired or discarded.

- Always maintain a 3-point (two hands and a foot, or two feet and a hand) contact on the ladder when climbing. Keep your body near the middle of the step and always face the ladder while climbing (see diagram).
- Only use ladders and appropriate accessories (ladder levelers, jacks or hooks) for their designed purposes.
- Ladders must be free of any slippery material on the rungs, steps or feet.
- Do not use a self-supporting ladder (e.g., step ladder) as a single ladder or in a partially closed position.
- Do not use the top step/rung of a ladder as a step/rung unless it was designed for that purpose.
- Use a ladder only on a stable and level surface, unless it has been secured (top or bottom) to prevent displacement.
- Do not place a ladder on boxes, barrels or other unstable bases to obtain additional height.
- Do not move or shift a ladder while a person or equipment is on the ladder.
- An extension or straight ladder used to access an elevated surface must extend at least 3 feet above the point of support (see diagram). Do not stand on the three top rungs of a straight, single or extension ladder.
- The proper angle for setting up a ladder is to place its base a quarter of the working length of the ladder from the wall or other vertical surface (see diagram).
- A ladder placed in any location where it can be displaced by other work activities must be secured to prevent displacement or a barricade must be erected to keep traffic away from the ladder.
- Be sure that all locks on an extension ladder are properly engaged.
- Do not exceed the maximum load rating of a ladder. Be aware of the ladder’s load rating and of the weight it is supporting, including the weight of any tools or equipment.

Safety tips:

- Eliminate the risk by doing all or some of the work on the ground or from a solid construction.

- Reduce risk by using fall prevention devices like scaffolds, perimeter screens, guardrails, elevated work platforms or safety mesh.
- Travel-restraint systems, industrial rope-access systems, catch platforms and fall arrest harness systems can also be used to reduce the risk of falls.

Construction work involving a risk of a fall from more than two metres is considered high-risk work and a Safe Work Method Statement (SWMS) is required.