Fall Protection for Roof Work

by Andrew Wormer

Dave Molloy

You'll need a written plan, proper training, and the right equipment to comply with OSHA safety rules

Once every few issues, a *JLC* reader takes exception to the misused ladders, unsafe scaffolding, and sketchy fall protection sometimes depicted in our photos. "You are doing contractors and tradesmen a disservice and making yourselves look foolish when you let this stuff through," wrote one reader recently, a union roofer from the Chicago area.

So I contacted this reader — who asked to remain anonymous — to find out how his company tackles fall protection. To get some other perspectives on the subject, I also talked to several contractors about how they keep their roofing employees safe and productive while complying with OSHA fall protection guidelines. In addition, I've attended safety seminars, navigated through OSHA's extensive online resources, and contacted OSHA for guidance on specific issues — all in an attempt to gain a better understanding of the rules. What I've discovered is that while OSHA compliance can be tricky, working safely high above the ground isn't that difficult if you have the right attitude and the right equipment.

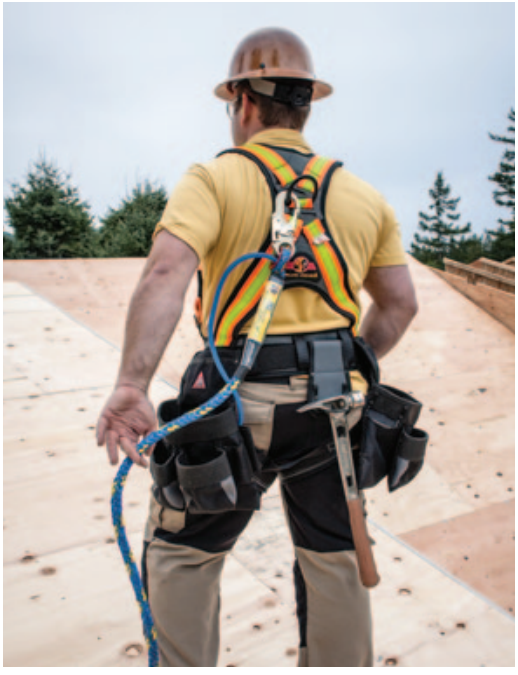

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Figure 1. The full body harness at left (superanchor.com) has multiple D-rings, integral tool bags, and a hammer holder, and comes in different sizes. Here it's connected to Super Anchor's X-Line, which combines a 50-foot safety line with a pneumatic air hose. The harness included with the Compliance-in-a-Can kit (right) offers fewer features but is also OSHA-compliant.

Ladder Safety

- Using an aluminum ladder in close proximity to power lines is an OSHA violation. Try to replace old metal ladders with fiberglass models, and maintain OSHA clearances — 10 feet away for up to a 50 kV line — between any type of ladder and energized power lines.
- Using a folding A-frame type stepladder in the folded position is an OSHA violation.
- When an extension ladder is being used to provide access to a landing, it must extend at least 3 feet above the landing.
- When using a ladder to get from one level to another, make sure the ladder is tied off with a wire or rope or some other kind of attachment.
- A step or ladder is needed to change levels that are as low as 2 feet high. If you need a bucket to step up, then you need a ladder.
- Follow the 4:1 rule: For every 4 feet between the ground and the top of the ladder, offset the base of the ladder by one foot. The base of a 12-foot-high ladder should be placed 3 feet away from the wall.
- Don't use a ladder in place of any type of plank.

The Basics

By now, most builders know that OSHA's interim fall-protection guidelines have been replaced with stricter safety rules (see "OSHA Moves to Limit Alternative Fall Protection," *JLC Report,* 3/11). Any employee working more than 6 feet above ground — or above a lower level — needs to be protected from falls by one of several OSHA-approved methods (see "OSHA Fall Protection Requirements," facing page). This article focuses on roof work, but fall protection is also usually needed when installing floor joists, framing walls and roofs, and installing millwork and siding, and in all cases it involves similar techniques and equipment.

For contractors like Dave Molloy, who owns a roofing company that does both commercial and residential work in the Cincinnati area, the phase-out of the interim guidelines has meant changes in the ways his residential crews operate. "Under the old rules, we could simply

set up our roof jacks and still be OSHA-compliant," he says. "Now we also have to install anchors and use safety lines and harnesses, even though we still need the roof jacks to work safely." Molloy estimates that the new measures increase the labor costs of his average residential job by 5 percent to 10 percent.

Harness. Often, the most simple and cost-effective way to work safely high above the ground is to wear a harness that is securely attached to a safety line (**see Figure 1**). Even if you're a sole proprietor and are not subject to OSHA rules, a harness is a good insurance policy that you can carry around in your truck. Molloy supplies his workers with DBI/Sala's Compliance-in-a-Can (dbi-sala-safety.com), a $120 kit that includes 50 feet of $^{5}/_{8}$-inch lifeline with a snap hook and a reusable roof anchor bracket along with the full-body harness.

Most basic harnesses have a single back-mounted D-ring, but the union roofer I spoke with prefers a harness equipped with multiple D-rings. For certain tasks, he says, he uses the rope to hold himself in place on the roof as he works, and it's hard to do that with a back-mounted D-ring.

Sometimes a worker wants a harness that has different features or a better fit than the model offered by his company. In such cases, many employers — including Molloy — will pay part of the cost of the upgrade. According to the union roofer, you'll quickly appreciate the difference between a $75 harness and a $300 harness if you ever do fall off a roof. But if you need only occasional fall protection, you may prefer a basic harness, which will weigh less and fit better under a toolbelt.

Anchors. OSHA rules require that a single-attachment-point anchor be strong enough to support a 5,000-pound load in any direction (**Figure 2**). On a reroofing job, that means that temporary anchors can't be attached to just the sheathing, but need to be nailed through the sheathing into framing.

Permanent anchors — some of which

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Figure 2. Anchors need to be strong enough to support 5,000-pound loads, so they must be securely fastened to framing.

OSHA Fall-Protection Requirements

All residential builders and subcontractors subject to OSHA rules now have to comply with 29 CFR 1926.501(b)(13), which requires conventional fall-protection systems like guardrails, safety nets, or personal fall-arrest systems whenever an employee is working 6 feet or more above the ground or a lower level.

Written safety manual. Companies must also have a written safety plan that identifies the person responsible for implementing the company's safety policies. The plan should explain procedures for training, enforcement, and accident investigation, and company expectations on how those procedures are to be implemented. The plan should also contain site-specific information on the types of work done by the company (such as roof truss installation or roofing).

Training. Employers are required to train their workers on how to use the company's fall-protection equipment, which would be in addition to any OSHA general 10-hour or 30-hour safety courses.

Equipment. Companies must supply and maintain certain types of personal protective equipment (PPE), such as harnesses, ropes, and scaffolding.

Documentation. Employers have to maintain training records and monitor compliance, as well as document retraining efforts when there are changes in the fall-protection system or in the type of work performed by the company.

To learn more about fall protection and find sample fall-protection plans, go to osha.gov and nahb.org.

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can support multiple workers — are also available and would appear to be a sensible safety upgrade, especially in new construction where the framing is exposed and the strength of the connection can be verified. But installing permanent anchors raises questions of liability. For instance, who's responsible for maintaining and inspecting the anchors — the building owner, the GC, or the sub who installed them?

Finding a good anchoring point can be tricky. When installing roof trusses, for example, you can't just attach an anchor to the first truss and then use a rope-and-harness system to install the remaining trusses. A single truss isn't designed to handle out-of-plane loads — the kind of

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Figure 3. A rope grab is needed to match the length of the safety line to job-site conditions. The mechanical rope grab in the top photo (A) must be manually operated. A nonmechanical Prusik knot rope grab (B), an attachment familiar to climbers, tightens its grip only when the line is tensioned. A self-retracting lifeline (C) eliminates the need for a rope grab but tends to tug on the harness, making it most suitable for work done very near the anchor point.

load that might occur when a worker who is wearing a harness that is attached to the truss falls — without bracing and sheathing. Studies have shown that lateral loads created by the falling worker can either fracture the bottom truss chord or cause the metal truss-wall connectors to fail. In either case, the truss could collapse or break away from the structure.

There are ways to avoid this problem. For example, anchors can be attached to truss sections (typically four trusses) that have been assembled and sheathed on the ground, then lifted into place with a crane. Another option is to attach the safety line to an engineered spreader that distributes the force of the fall-arrest system across several braced (but still unsheathed) trusses. Of course, many builders choose to install trusses while working from scaffolding or ladders, limiting the need for harnesses altogether.

Safety line. The weak point in most fall-arrest systems is the connection between the harness and the anchor point — not because the connection isn't strong enough, but because many workers "forget" to tie off or clip in. According to Molloy, this is the most common safety violation and the one most likely to trigger an inspection during an OSHA drive-by. Like anchors, safety lines must have a breaking strength of 5,000 pounds; many are also equipped with some sort of shock absorber or deceleration device and quick-release harness safety clips.

Another common violation in roofing work is using a safety line that is too long. It doesn't do much good to be tied off to a rope that won't stop you before you hit the ground.

To avoid this problem, safety lines are typically attached to harnesses with a lanyard equipped with a rope grab, which allows workers to easily adjust the attachment point. Most rope grabs are mechanical devices; some are operated manually and some work automatically, like a clutch. They allow free movement as long as the worker is moving slowly, but grab automatically during a fall or sudden movement (**Figure 3**).

When OSHA Shows Up

Any number of situations can trigger an OSHA inspection, including an accident, a tip from a competitor, an employee complaint, or a special emphasis program. OSHA inspectors may drive by a job site if they see a crane boom in the air, and stop work if they see an example of imminent danger — a worker who isn't tied off, for example. To help with OSHA compliance and prepare for a possible inspection, many companies hire private safety trainers that perform regular training sessions and "inspections" that mimic OSHA procedures.

Control the site visit. During an actual inspection, the job foreman should confirm the inspector's credentials, then notify the company office (if necessary) of the visit. To make sure additional violations don't occur directly in front of the inspector while everybody is waiting for the company's safety rep to arrive, employees should stop working immediately and leave the working area (but not the job site).

Cooperate — and take notes. During employee interviews, the inspector will try to find out if suspected violations are one-time occurrences or standard operating procedure (which would constitute a willful and ongoing violation). Employees have the right to decline to be interviewed, but company policy can't prohibit an employee from talking to OSHA during an inspection. As the inspector walks around the job site asking questions and taking photos, the company rep should accompany him with his or her own camera, taking notes and photos to prepare for later meetings with OSHA.

Fix violations immediately. Some problems are easily fixed, such as a ladder that isn't tied off or that doesn't extend far enough above the roof edge. These can — and should — be addressed during the inspection to demonstrate the company's willingness to comply with regulations.

Keep job sites neat and clean. First impressions set the tone for any inspection. Part of the daily routine should be to make sure materials are neatly stacked and organized, warning flags and guardrails are in place, and safety equipment is in working order and set up properly.

Passive Fall Protection

Harnesses aren't always necessary up on the roof. On low-slope (less than 4:12 pitch) roofs, for example, OSHA allows the use of warning lines set 6 feet from the rakes and eaves. Because this approach also requires a safety monitor — a worker whose only task is to keep an eye on the warning line — it's not really a workable option for most small residential crews.

Guardrails. Roof jacks can be used on roof pitches between 4:12 and 8:12, but harnesses are also needed unless the roof jacks have integral guardrails (**Figure 4, next page**). Safety harnesses are required on roof pitches steeper than 8:12. Remember too that workers within 6 feet of a rake edge need fall protection. Rake edge guards are available to meet this requirement, but technically you'll still need to be roped off to install them.

Guardrail systems are a reasonable option for flashing repairs and similar work where movement is limited. But roofers work fast, installing 10 or more squares of shingles per man per day on some roofs. As the union roofer I spoke with noted, a contractor couldn't afford to buy all of the guard-equipped roof jacks that a commercial crew would need — much less

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Figure 4. Roof jacks fitted with integral guardrails can be used instead of safety harnesses in certain situations, such as for flashing and repair work.

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Figure 5. Harnesses may not be needed when there is fully planked staging up to the eaves of a house with guardrails installed as shown. But workers on the cross-gable still need fall protection, because they would be within 6 feet of an unguarded roof edge.

spare the time to install them and move them around.

Scaffolding. On one job site I visited recently, the GC (who was also the roofing contractor) used pipe staging to build a continuous work platform underneath the eaves (**Figure 5**). The top sections of the scaffolding were fully planked, and his crew installed guardrails around the perimeter of the work platform. A similar OSHA-compliant work area could also be assembled with exterior bracket scaffolds, which bolt through the wall framing.

This approach brings the roof eaves down to ground level in OSHA's eyes and — except for work along the rake — eliminates the need for safety lines and harnesses. The investment in staging sections and planks is significant, of course, but for a builder who is also trimming windows and eaves and installing siding, the increase in productivity may be worth the cost.

Behavior Modification

Dave Molloy says that the most challenging part of his safety program is getting workers to buy into it. To help with OSHA compliance, he shares a safety person with five other Cincinnati roofing companies. This person conducts weekly safety meetings with his crews and trains key employees so that they have the authority to write warnings when a worker forgets a harness or fails to wear a hard hat. Workers are suspended after two written warnings and terminated after three warnings during any 60-day period.

In the end, the goal is job-site safety and not OSHA compliance. "It's tough to modify behavior," says Molloy. "If one of my roofers forgets his tools, he can just borrow what he needs from someone else. But what I have to keep reminding them is that when someone forgets a harness, it shuts down the job site."

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