

# Don't Go Unequipped: Tools to Keep You Safe During Manhole Entry

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Wearing proper gear, such as gas masks and hard hats, is vital to safety but following safety procedures every time you enter a manhole is the best form of incident prevention.

A hole where toxic gas can lurk and a misstep means a painful fall is a dangerous workplace. To prevent injuries, companies whose employees must enter sewer manholes regularly train their crews to be safe and call upon equipment manufacturers to help them in that effort.

“Every time we go in, we test the gases — opening the manhole and dropping the detector in the hole,” Horacio Franco says. “We determine if it’s clean of gases so we can safely have the guys go in. Every single guy is in a harness. They have their own gas monitors. They wear hard hats, respirators, gloves, boots ...”

The owner of H&R Underground sends rehabilitation crews into manholes all the time in and around El Sobrante, California. “Every day we have someone working in a manhole. Some days we might rehab 10 of them,” Franco says. In every case, someone is standing at ground level near the manhole opening, sometimes monitoring readouts of air quality below or standing by to help the crew member or team in the hole.

Proper equipment can mean the difference between an uneventful workday and an emergency run to the hospital.

## Gas detectors

The foremost worry is hydrogen sulfide, which can poison more than one system in a body. There are two approaches to mitigating this hazard:

Gas monitors worn by manhole workers take atmospheric readings on a bright LED screen, alerting the wearer to adverse conditions. One such unit is the Multi Gas Clip Plus by Gas Clip Technologies. This model gives readings for four gases: hydrogen sulfide, carbon monoxide, oxygen and the minimum combustible point for ignitable gases. Thus, toxic, suffocating and explosive threats are all monitored.

When a threat is detected, the device alerts the wearer three ways: an audible sound is released at a minimum of 95 dB, a light flashes and the device vibrates. The unit functions in a temperature range of 4 degrees below zero to 122 degrees F. The battery will power the monitor for three years without recharging.

Ventilation units keep air moving, thus diluting concentrations of explosive and toxic gases. This threat particularly exists at the bottom of manholes where the heavier-than-air compounds accumulate. Allegro offers a variety of types and sizes of ventilation fans powered by electricity, compressed air or gasoline engines. According to Michael Johnson of Industrial Fans Direct, the electric models are favored by contractors.

Blowers producing 2,000 cfm are frequently used, such as the Allegro 9539-12, because such models are easily moved (weighing only 31 pounds) in a constricted area. They are constructed of durable plastic. Some of the fans are explosiveproof, which is to say their motors are completely contained to avoid sparking flammable gases. The blowers cost about \$200 apiece.

## **Lighting aids**

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Working where the sun doesn't shine is a handicap and a danger. Even with the sun directly overhead, walls and deeper recesses sometimes are faintly visible. Some new products address the situation in slightly different ways.

Illuminating the space in front of an individual worker is the goal of the Illumagear Halo. A construction worker, Max Baker, invented it. It came out in 2014 and originally had a cord running to a battery pack, but the latest model is self-contained and is attached to a hard hat. Different intensities of light are available by throwing a switch. The Halo's rechargeable battery lasts up to 34 hours.

Designed to both illuminate work and give workers visibility in low-light situations, the Halo is becoming more popular in underground work, according to Matt Squires, Illumagear director of sales. He says that in confined spaces, "With the Halo, you don't have to carry a flashlight or portable light. The Halo illuminates a whole confined area, with the light in the back reflecting forward."

The patented Light Ring can light an entire manhole. The product's durable aluminum ring fits around a manhole opening and, when activated, an 18-volt battery sends LED light into the space below. The ring is bright orange to catch the eye of any worker approaching at

ground level and has a raised edge as an alert in low-light situations.

The patent-pending Light Ring mounts to a downrigger pulley on one side to facilitate running of cords and hoses. The side-mount pulley frees up the center of the hole for transfer of tools. Without a flashlight, workers can utilize their tools more effectively hands-free. The device comes in standard manhole opening sizes.

## **Cover lifters**

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Covers fitted onto manhole openings are heavy by design — their bulk helps them withstand the weight and vibration produced by pedestrians or vehicles crossing them. A cover can weigh from about 100 pounds to three times that much. Consequently, removing them can be hazardous. Two types of solutions are offered:

Manual lifts use the principle of a lever to multiply a worker's strength. The fulcrum of the lift is either on the same side as the lifting person, who pushes down to raise the lid, or on the far side, in which case the lifting person pulls up. One pull-up version is the LIFTPLAQ, a European product. It has an extendable rod handle on one end for 33 extra inches of leverage and a close-set pair of solid-rubber tires on the other end. Midway between is a dangling arm with a flat magnet at its end. The unit weighs about 40 pounds.

“One person can lift up to 300 pounds,” says Pascal Philippe, U.S. manager for the manufacturer. The ergonomic tool makes the lift a function of leg power, rather than back exertion. “For very heavy plates, we offer a two-person model with two handles and more magnets.” The LIFTPLAQ can be fitted with an extended axle so its tires straddle large rectangular covers and grates.

An automated lift that fits on the front bumper of a pickup truck is simply called The Lifter. A product of an Iowa firm, Rock Mills Enterprise, The Lifter comes in two capacities: one that lifts conventional covers weighing less than 300 pounds and a heavier version that lifts up to 600 pounds. According to company consultant Don Moos, 95% of the units are sold with an optional hinged arm so a lifted cover can be swung to one side and set down.

Also optional is a front-end camera connected to a monitor on the dash of the truck that lets an operator position the lift while seated inside the cab. A wireless remote lowers and activates the electromagnet. This hydraulically operated, higher-tech lifting device with the camera option retails for about \$4,500.

## **Fall barriers**

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When a manhole cover is removed, jeopardy mounts for anyone in its vicinity. A vitreous clay pipe representative, Jeremy Haskins, noticed that on a visit to a job site several years ago. “I saw one person after another almost fall into an open manhole. That was the genesis for designing the Holehat.”

His device fits snugly on the rim of a circular manhole with a 4-inch roller mounted on it for raising and lowering of hose or cable. On its base are affixed pivoting, high-strength, 2-inch-wide aluminum arches that can be pulled up and locked, raising into place a brightly colored, durable canvas cover. When the “hat” is raised like the top on a convertible, anyone standing next to the hole is prevented from stepping into the void, and passersby are alerted to the hazard in their path.

“Contractors will put a piece of plywood over the hole, but that doesn’t catch your eye,” Haskins says. “The Holehat is both a structural barrier and visual warning.” In 2017, the \$700 safety device was named New Product of the Year by the American Public Works Association. It currently is sold in the U.S., New Zealand and Australia.

## **Employee/tool lifts**

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Manhole work is vertical. Hoist systems keep workers safe on both the descent and ascent. While tripod cable-routing standards are popular, a more robust option is the Miller Durahoist DH-1 davit arm system (Honeywell).

The base of this welded aluminum device offers horizontal extensions that let it straddle rectangular manholes as well as circular ones. The unit is hand-assembled without tools and its main components each weigh only 31 pounds. The tower can accommodate multiple winches. Whereas tripod lifting units are available for \$1,500, the DH-1 is a \$7,500 piece of safety equipment because it is more durable and widely applicable to a broader range of manholes.

While manhole safety equipment is vital to keeping people safe, trained personnel are the real keys to safety. “One of the things we do not take for granted is safety,” Franco says. “The safety rules are there for a reason. Before anyone in our crews goes into a manhole, they have gone through eight hours of training. Then during the year, we have refreshers so they don’t forget it. There is nothing more important than their health.”