APPLICATION NOTE

How to capture gas images with your Ti450 SF6 Gas Detector

Even with the right tools, SF_6 gas or sulfur hexafluoride, can be difficult to spot in a switchyard. Inspections require a fair amount of patience. It's important to know the optimal environmental conditions for SF_6 gas inspections. For best results in detecting gas leaks, select a time and day when the sky is even, a cold clear sky is best, there is no wind or the wind is light, and there is no precipitation. If you must inspect on a day with cloud cover, aim for total overcast, as it can provide a uniform background for temperature comparison. Keep in mind that while clouds can look visually uniform, the bottom can potentially have a different temperature contrast from the rest of the clouds. Follow these seven steps for capturing the best gas images.

1. Inspect the right equipment.

The Fluke Ti450 SF6 Gas Detector is an infrared camera designed for localizing SF_6 leaks on equipment where you have confirmed a leak through substantiated evidence, such as a history of adding gas periodically. The first thing you should do when you get onsite is verify that you are investigating the right equipment and components. Many times, utilities workers will maintain a written log on the inside of the control cabinet door indicating its service history, the dates on which SF_6 gas was added, and how much gas was added. However, the log will not always tell you where leaks are present. The pre-inspection phase is a visual survey of the equipment susceptible to leaks, and an opportunity to devise an inspection plan.

2. Inspect common leak points.

Randomly searching equipment that does not have a known gas leak is not effective. Doing a visual inspection of your equipment first and knowing where common leaks have been in the past is useful. Inspecting those common leak points using a systematic approach as described below will give the best results. Prior to pulling out your Ti450 SF6 camera, do a visual inspection of the equipment and components including the tops and bottoms of bushings, flanges, bolted connections, welds, seals and pressure monitoring tubes. During this visual inspection, look for signs of environmental wear, such as rust or pitting and other forms of corrosion. Welds can deteriorate over time or have workmanship defects. When this equipment is out in the field it's going to deal with rain and weather conditions. Sometimes water will pool and drip from the equipment from different weld points. Rust generally indicates that moisture is getting into the equipment. Any area of corrosion is a potential breach and subsequent leak. In some rainy climates, organic matter (like mold or mildew) can grow on the outside of the flanges.

3. Mind your background.

Every time you encounter a potential leak point, inspect from multiple angles with uniform backgrounds that are different in temperature than the gas. The gas inside the equipment will be at, more or less, the same temperature as the equipment. So, you want to get a good contrast where you will be able to see a small plume or wisp against a uniform background. The key is to find an angle with a background that is as uniform as possible and has a high temperature differential from the gas. You need good contrast in order to see small plumes or wisps of gas. This is why you don't want objects such as trees or clouds in your background, as their movement and varying temperatures make it harder to spot the presence of SF_6 gas. A clear cold sky is almost always going to give you the best background for locating a gas leak. If a clear sky is not available, other uniform backgrounds such as an electrical cabinet wall will work.

4. Trust your tripod and eye piece.

A tripod is recommended for a detailed inspection of entire equipment sets. Using a tripod and the camera in tripod mode gives you the most effective setup for detecting small gas leaks. To inspect equipment located up high or down low you will need your Ti450 SF6 camera, along with its included tripod holder and HDMI eye piece, two essential accessories for gas detection. Using a tripod can help to stabilize the camera as well as establish a good viewing angle near the ground below the equipment or at other odd angles. In dangerous energized environments it is necessary to be aware of where you are and where your equipment is located—don't fixate solely on the camera display. The high-definition connected eye piece is a useful tool for leak detection as you can place the camera at an awkward angles and still view potential gas leaks while maintaining awareness of your surroundings. Additionally, the eye piece allows you to view the leak image in bright sunlight when glare on an LCD screen can be a problem. It also creates the opportunity for team members to view the live camera screen with ease. Make sure you maintain all safety standards and recommended protocols from the utility where you work.

5. Be patient and methodical.

Position the camera so that you have a good uniform background that has a high temperature difference from the gas. This often can be achieved by pointing the camera lower than the leak and pointing toward a cold sky. At all times, be aware of wind direction and look for gas downwind. If the wind speed is low, the gas will swirl in different directions. Some additional tips for performing more efficient inspections that are more likely to find gas leaks:

- Position the camera and tripod to view each possible leak point with a good background
- Check every bushing, flange and tubing fitting, look at them from multiple angles
- Watch and wait for at least 5–10 seconds before repositioning the camera
- Don't stop inspecting when a leak is identified; sometimes there is more than one leak in a piece of equipment

6. Steady your camera.

The camera has two primary modes for viewing gas. The less sensitive is handheld mode, while tripod mode is more sensitive and optimal for capturing wisps of gas. Even slight camera movement can create clutter on images. A good technique is to stop, stare, look for a leak and reposition the camera. Note that you can change your IR-Fusion level, and while on site, it is a good practice to capture IS3 video images. While still capture is a functional option, gas leaks are much easier to see in video. You may be surprised to find that a leak that seems pretty obvious in video is difficult to capture in a still image. The IS3 fully radiometric video taken by the Ti450 SF6 camera along with desktop software allows for extensive editing and the ability to isolate and save still images for reporting purposes. With this flexibility, you can fine tune images out of the danger zone or in your office. From this point, you can enhance hand-picked image for presentation.

- Use two of the tripod legs for stability on the ground and tilt the camera for a wider viewing angle. Use this method to slowly inspect equipment from the top of the bushing down to the flange at the bottom.

7. Stay focused.

As you are viewing the scene, it can be difficult to verify that the image is still in focus. Use the LaserSharp auto focus, making sure that the laser is pointed at the equipment rather than the sky. Occasionally switch to normal infrared mode and confirm focus on the correct spot and then switch back to gas detection mode. Finally, you may want to slightly move the tripod mounted camera to momentarily show equipment edges and confirm that the focus is sharp. Remember to refocus the camera as you change your position relative to the component or equipment being inspected. If something looks suspicious, try to look at it from a different angle to confirm or disconfirm, and try to inspect from a closer position.

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