

## Are You Properly Leak Testing Your Flexible Endoscope?



**F**luid invasion is a flexible endoscope's worst enemy because it can damage the instruments' delicate internal components. In fact, approximately 80% of all image problems are caused by fluid invasion. Fluid can enter a scope wherever the integrity of the scope is broken. The most important preventative measure in avoiding fluid invasion is leak testing the scope after every procedure. For leak testing to be effective, it is helpful to understand the mechanics and how to perform it properly.

The leak tester attaches to the ETO venting connector of the fiberoptic scope or to the leak tester connector of the water-resistant cap on video endoscopes. This connector can be considered the "door" to the inside of the scope. If this door is open, air, or fluid can flow in the scope and around the internal components such as the channels, wires, fiber bundles and the CCD chip. Likewise, if the water-resistant cap is off the electrical connector, the "door" is open. Moisture can also invade the interior of the scope through a hole anywhere on the exterior of the scope or in the inner channels.

The two types of leak testers available are electric powered and manual/hand operated. Electric powered leak testers are preferable because they provide a continuous flow of air; this will prevent fluid from invading the scope during inspection and reprocessing procedures. If using the hand operated type, extra caution is necessary during leak testing. When you note a drop in the pressure gauge, you should continuously repressurize the scope during inspection and cleaning of the instrument.

Leak testing flexible endoscopes is a good way to reduce repair costs for you equipment, but is not 100% accurate. Even with the most skilled personnel, limited pressure introduced into the endoscope and the self sealing nature of the polymers, which are used in scope manufacture, a significant percentage of leaks could be missed.

### **The Steps for Leak Testing a Scope are:**

1. Visually inspect the scope for tears, holes, and joints that may leak. Pay close attention to the seams and body joints. If any tears or holes are found, the scope cannot be submerged.
2. Remove all valves and attachments from the endoscope.

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3. Attach the leak tester to the ETO venting connector of the fiberoptic scope or to the leak tester connector of the water-resistant cap on video endoscopes and pressurize the scope before placing the scope in water. Never place the scope under water before pressurizing; water can invade the interior of the scope in just a few seconds. When the interior of the scope is pressurized with air, you will be able to see or feel the bending rubber expand. A continuous stream of bubbles coming from the interior of the scope will indicate a leak.
4. Check the bending rubber at the distal tip of the insertion tube. The most common area for leaks is the bending rubber, always check this area first. With only the distal end of the insertion tube submerged in water, angulate the distal tip in all directions to make sure you “open” any small holes that may be sealed by the bending rubber. The control knobs must be out of the water when angulating the distal tip because the rubber o-rings between the control knobs are not designed to operate under water with excessive pressure. When manipulated to the maximum position, these o-rings may leak and allow fluid past them and into the scope’s interior. Next, completely submerge the scope under water.
5. Observe the control knobs. Bubbles will appear if one of the o-rings is damaged.
6. Observe for holes in the scope’s internal channels. If this happens, you will see air bubble coming out of a channel opening at the valve ports, the air and water inlets, the suction port of the light guide connector, the biopsy port, or the channel opening(s) at the distal tip of the insertion tube. Air trapped in the channels may take a few minutes to clear and may falsely appear to be a leak. You can clear this air by flushing the channels with water. However, a continuous stream of bubbles indicates a leak.
7. Observe the insertion tube and light guide tube. Examine the entire length of both tubes for bubbles when leak testing. If either tube is buckled anywhere the chance of holes forming is increased.
8. Remove the scope from the water and drain.
9. Release pressure by:
  - Video scope – by taking off water-resistance cap.
  - Leak tester – leak tester still hooked to scope, but disconnect from light source or pump.
  - Hand tester – turn air release knob to allow pressure to release.Verify deflation of the scope by observing the bending rubber or the air release sound.
10. Disconnect the leak tester from the scope. Never disconnect the leak tester under water; water could enter the leak tester connector and invade the scope’s interior.

**If you always leak test your endoscopes properly after every procedure, you can prevent fluid invasion and many costly endoscope repairs.**