

TRACER GAS FILLING AND EVACUATION

How to properly handle tracer gas at your leak testing station

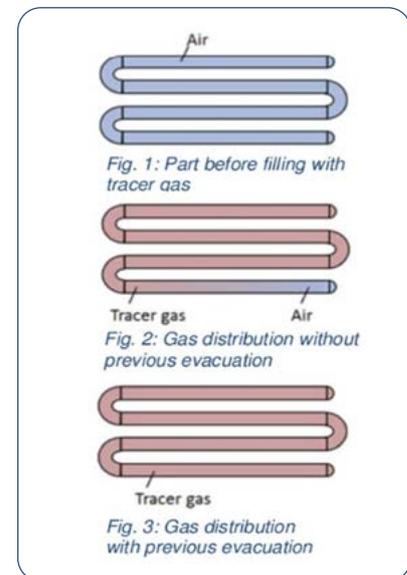
When leak testing your products with a tracer gas, helium or diluted hydrogen, it is critical that the tracer gas is distributed evenly throughout the test part, at the right time and pressure. Evacuation of the tracer gas is equally important for the reliability of the leak test results. Faulty tracer gas handling can result into missed leak indications.

Application

Handling tracer gas properly is prerequisite for a successful leak test. Some users are familiar with the process of evacuating components before filling them, typically with refrigerants. However, setting up home-made filling equipment takes time and requires expertise. Some machine builders offer integrated filling and evacuation solutions as part of a larger leak test system. A lack of knowledge about tracer gas handling can lead to unexpected faults and missed leaks. This document describes the importance of proper tracer gas filling and evacuation, highlights the risks of uncontrolled processes and explains how to accurately handle tracer gas with help of the [Tracer Gas Fillers](#) from INFICON.

Typical challenges

Correct tracer gas handling can be a challenge if not fully controlled. For proper leak testing it is absolutely mandatory to evacuate the test part before filling with tracer gas. **Pre-evacuation** is particularly important for long and narrow geometries, where the air in the test part will simply be pushed to the end of the geometry and create "air pockets". Air pockets will delay the tracer gas reaching this area. The result is that potential leaks will only release air and cannot



The table shows how variations in pressure affect the tracer gas concentration. All pressure referred to is relative.

HEAD ROW						
Evacuation (bar)	-	-0,5	-0,7	-	-0,7	-0,7
Pressure (bar)	0,5	0,5	0,5	2	2	5
He concentration (%)	33%	67%	80%	67%	90%	95%
H ₂ concentration (%)	1,67	3,33	4,0	3,33	4,5	4,75

Tracer Gas Handling

To achieve precise test results when locating leaks with tracer gas, meticulous gas handling procedures must be adhered to. These steps delineate the primary procedure.

Evacuate the air

Evacuate air from the test object to avoid dilution and air pockets

Fill with tracer gas

Fill the part with tracer gas in a controlled and repeatable way, at right time and pressure

Evacuate the tracer gas

Evacuate and vent the tracer gas to avoid background contamination of the test area

be detected by the leak detector. A correct evacuation is especially important if the test part is filled with low pressures of tracer gas, as the left-in air will dilute the tracer gas.

Filling with tracer gas should be done to a specified pressure which is maintained during the leak test. Pressure fluctuations make test conditions unstable which leads to inaccurate results. If the pressure is too low, leaks can be missed. It is good practice to perform a gross leak test before tracer gas filling, otherwise the tracer gas escaping from large leaks will contaminate the leak testing area. An easy test for large leaks is to evacuate the part and hold the evacuation pressure for a short time. If the part can hold the evacuation pressure, it will not contain any large leaks and it can be filled with tracer gas.

Evacuating the tracer gas properly after the leak test is equally important. Any tracer gas released without control in the leak testing area will contaminate the work station and steadily increase the background concentration during the working day. Thus will lead to false or missed leak indications during the leak test.

Finally, **manual tracer gas filling** is often time-consuming and does not satisfy the necessary leak test conditions.

The solution from INFICON

The tracer gas fillers from INFICON can be used as stand-alone units or as part of an automated or semi-automated leak detection system. The set-up, including filling recipes and gas connection, is completed in less than one hour. The fillers handle both helium and forming gas and, in combination with the INFICON leak detectors, provide a high-performance system for demanding leak testing.

TGF11

[Tracer Gas Filler TGF11](#) can be configured with a customized filling sequence. With the unit connected to the test object, the sequence starts with a pre-evacuation (air out of the part to test). This step avoids that the tracer gas is diluted with air, which would influence the test result. The evacuation will also impede pockets of air being trapped in complex or long geometries.

The second step in the sequence is filling the object with tracer gas to a defined pressure. The defined pressure is monitored continuously and adjusted to the specified values to ensure that test conditions are stable during the entire leak test. When the leak test is completed, last step of the sequence starts. This step consists of a proper evacuation of tracer gas. The tracer gas is evacuated via the exhaust port and the test object is refilled with air to atmospheric pressure. The TGF11 is a simple, fast and cost-efficient solution to fill and evacuate tracer gas in objects in a wide pressure range (0.05 - 10 bar). Thanks to the "flush and pressure" function, even parts that normally do not allow for evacuation can be filled with tracer gas.

ILS500 F

[Tracer Gas Filler ILS500 F](#) is a more advanced unit with



The TGF11 is an accessory to INFICON hydrogen and helium leak detectors. It is a stand-alone unit which allows for easy and reliable tracer gas filling and evacuating.

the basic functionality of the TGF11, but with additional functions such as tooling port control for automated functionality to prevent test area contamination and minimize gas consumption in the event of a gross leak. The unit offers the advantage of a more automated process at a low price. It is robust, versatile and efficiently handles tracer gas filling in a wider pressure range (0.05 - 30 bar). Gas supply warnings help operators avoid mistakes when gas supply is low.

Advantages of tracer gas fillers from INFICON

- Proven solution
- Easy set-up and installation
- High-performance, for demanding leak testing
- Significantly improved leak test quality
- Shortened test cycles due to the high filling speed
- No tracer gas contamination at the workplace
- Controlled test pressure during the entire test

Tips! Check connectors for leaks

Loose connectors are sometimes indicated as the cause of tracer gas contamination of the test area. Even if your connectors are perfectly tight when connected, almost any connector releases some amount of tracer gas during connecting and disconnecting. By regularly checking the connectors for leaks, you can avoid tracer gas backgrounds.