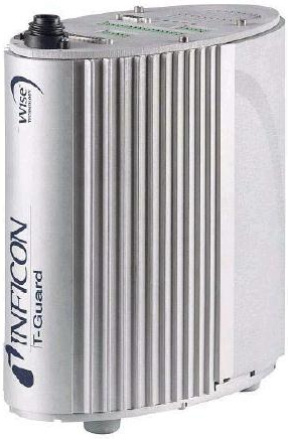
WHAT IS THE ACCUMULATION TESTING MACHINE AND HOW DOES IT WORK?

The Accumulation Testing Machine (AT Machine) is based on the use of a specific sensor developed and commercialised by Inficon, called Inficon Wise Technology™. The sensor uses a quartz (SiO_2) membrane to separate helium from all other gases at atmospheric pressure. It is maintenance-free and it has no wearing parts or failing ion source filaments.

The Inficon Wise Technology™ sensor is a proven technology, as it has been already used for many years in the Inficon Protec P3000 sniffer, a helium leak detection tool widely used in different in a broad range of different industries.



Based on the use of the Wise Technology™ sensor, Inficon created a new product called T-Guard. The T-Guard incorporates the Wise Technology™ sensor in a stand-alone unit complete with communication ports and pneumatic fittings which can be easily controlled via PC, PLC or optional display unit and that can be integrated in a Helium Leak Detection System.

Vacuum Engineering Services created the Accumulation Testing Machine by integrating the T-Guard in a machine equipped with valves, pumps, HMI, control system, framework and with an enclosure for the location of the part to test.

The beauty of this machine is that it does not require a vacuum chamber, as it is not based on the use of mass spectrometer technology. In this case in fact a simple and cheaper hermetic enclosure is sufficient to isolate the component to test in a sealed environment. The T-Guard is connected to the internal part of the enclosure, so that it can detect the quantity of helium in standard atmospheric conditions and can therefore identify any increase in it during the test cycle.

Description of the test cycle

The component to test is first positioned within the enclosure and connected to the couplings; then the enclosure door is closed and the component evacuated.

The evacuation of the component is necessary as a preliminary step prior to the component being charged with helium, in order to avoid any mixes between the existing atmospheric gases and the helium the part is pressurised with. This operation is also useful for the completion of a first leak test; if a gross leak is present in the part under test, its internal pressure will rise and at this point the test will be terminated and the part classified as a “fail”.

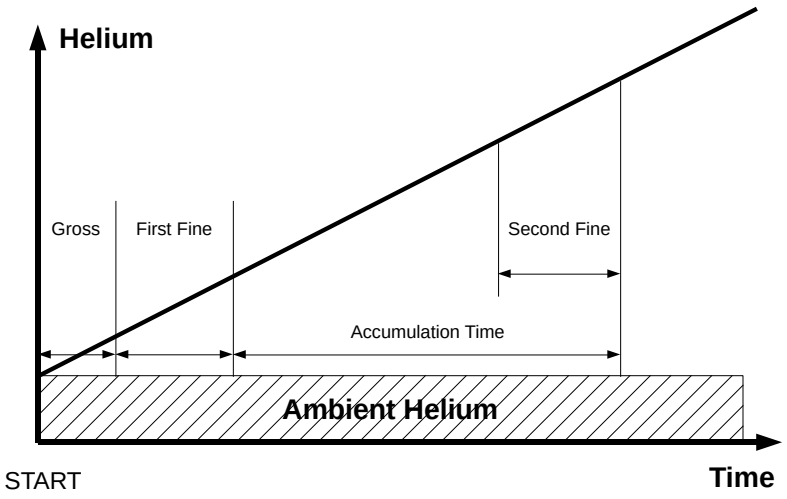
Should the pre-set level of vacuum be maintained for the whole duration of the vacuum test (a few seconds), the part is charged with helium at the test pressure.

At the same time the air in the free volume of the enclosure (at atmospheric conditions) is continuously mixed through the use of fans, necessary to guarantee a uniform concentration of the atmospheric gas blend within the enclosure itself.

At this point a first gross leak measurement is taken: this is done using only part of the Wise Technology™ sensor , so that if a gross leak is actually present, the sensor does not get badly contaminated with helium.

If the gross leak test is passed successfully, a first fine leak rate measurement is taken, using the full surface of the sensor.

The T-Guard is then isolated for a set amount of time, the “accumulation period”: this time depends on the volume of the enclosure, on the volume of the component to test and on the pass/fail leak rate.



A second fine leak rate measurement is taken once that the accumulation period has elapsed: the component leak rate can then be established by knowing the helium partial pressure increase.
Depending on the calculated leak rate, the test will return a pass or a fail result.

Benefits and advantages of the Accumulation Testing Machine

This helium leak detection method has a good level of sensitivity (down to 10-3 mbar·litre/sec subject to component and enclosure size) coupled with reliable and repeatable results. The high quality level of the results is demonstrated in the video visible at: http://www.youtube.com/watch?v=bw7AR3JSplM
The system does not require any vacuum chamber as the T-Guard can work perfectly at atmospheric pressure. For this reason, all the costs related to a vacuum chamber and to the corresponding pumping group are saved, as only a simple hermetic enclosure is required, equipped with a series of fans and the necessary safety measures (the system has to be safe in case of a sudden release of pressure from the component during the test).
As a consequence the cost of such a system is significantly lower than the cost of a conventional hard vacuum system. This also means lower maintenance costs and fewer spare parts.
Another very important point is that, as the system performances are not dependant on the temperature, this solution is highly indicated when brazed products need to be tested, as they can be subject to the test when still cooling right after the furnace.
The machine can be supplied with a data-system for the storage of all the test results. A bar code reader can be integrated with the machine, so that each component is identified before or after the test, and the results can be associated to the product ID. The machine can also be equipped with a helium sniffer allowing the operator to locate the position of the leak when a part has not passed the test.
Finally the machine can be integrated in the manufacturing line and, if loaded and unloaded automatically, can work completely autonomously.