

# APPLICATION NOTE

## Leak locating on aircraft fuel system with Extrima Hydrogen Leak Detector

### APPLICATION

Maintenance: Back-tracing of leaks from the outside to the inside of fuel tanks to locate the exact entry point before repair. Confirmation of leak repairs before re-fuelling.

### BENEFITS OF INFICON HYDROGEN LEAK TESTING

- Fast pin-pointing of leak entry point to enable repair
- Less repeat write ups due to easy control of repair
- Low disturbance by elevated tracer gas background concentrations
- Easy to use detector with intuitive functions
- Complete injection system for tracer gas - from gas bottle to leak exit position
- EX-certified detector option to avoid time consuming venting

### SOME USERS

- Lufthansa Technik
- Eurocopter
- Lear
- Bombardier

### SPECIFICATION

Leaks from aircraft fuel systems are usually spotted on the skin of the aircraft or in dry bays or other sometimes hard to reach places. Some aircraft manufacturers specify corrective actions according to size of wet spot and position. Studies show average acceptable leak to be around

- 10E-4 mbarl/s (cc/s) in assembly situations

- 10E-3 mbarl/s (cc/s) in maintenance situations

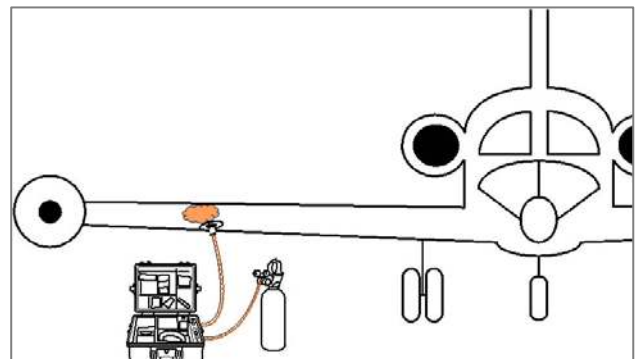
In reality most leaks visible to the eye are repaired sooner or later as most agree that all leaks tend to grow bigger with time.

### CURRENT METHOD AND REASON FOR CHANGE

Current methods including guesswork, soap water and helium leak detection are to various degrees:

- difficult to apply with no guarantee of success
- time consuming due to need for venting of the tank to non-Ex level prior to leak detection
- difficult to forecast in terms of time needed for leak locating
- dependent on having two operators

The main problem with leaks on integral tanks is that the leak entry, where you want to repair, is rarely on the opposite side of the leak exit. In many cases the point of repair is far away from the leak exit. Insufficient or non-adhering sealant between panels can form leak paths (capillaries) of up to several meters on large aircraft. Age and mechanical stress



both accelerate the formation of leak capillaries. A common method to identify the leak entry point is - guesswork. Based on experience the maintenance staff scrapes off old sealant and repairs the area they deem most probable. As this method is not based on facts it often leads to repeat repairs when the tank is refuelled and is still showing leaks. Another method is to have one operator apply pressurized air to the exit point of the leak. A second operator uses soap water on the inside of the tank to get bubbles where there is a leak. Besides the obvious drawback of having to tie up two operators, it is also extremely difficult to apply soap in a recently emptied tank. Add to this the fact that you need visual access to the leak to make this method work. Visual access can be extremely limited in particular on small aircraft.

## CHANGING TO THE INFICON HYDROGEN LEAK TESTING

INFICON hydrogen leak testing of fuel tanks:

- is easy to apply and finds leaks with a minimum of training
- offers EX Zone 0-rated (DIV I) detectors allowing for immediate entry into de-fuelled tank without prior time consuming venting and de-classification of hazardous areas
- shortens time needed for leak locating and enables better forecasting of time to finish only needs one operator
- will help you precisely pin-point leaks without visual access

## PROCEDURE

Leak locating procedure on visible leak:

- de-fuel the leaking tank
- inject hydrogen tracer gas into the leak exit point using the INFICON tracer gas injection system
- locate the entry point inside the tank using the INFICON hydrogen leak detector
- repair the leak
- verify the repair with tracer gas
- re-fuel...and take off

## EQUIPMENT USED

EX Zone 0 (equivalent to DIV I)

### Sensistor Extrima Hydrogen Leak Detector

Extrima Leak Detector is the world's first intrinsically safe leak detector using hydrogen tracer gas, designed for leak detection in the toughest of environments, including explosion hazardous areas. It is virtually maintenance free (no moving parts).

Sensistor Extrima fulfills the ATEX directive for use in Zone 0 – ATEX Classification Ex ia, IIC T3. Additional Ex-certificates are IECEx, CSA and NEPSI. It is portable (4,5 kg), water protected (IP67) and with 12 hours battery capacity.



Non EX environment

### Sensistor ISH2000 C Hydrogen Leak Detector

Sensistor ISH2000 C is a portable (4 kgs / 8.8 lbs), battery operated version of the Hydrogen Leak Detector Sensistor ISH2000. It is virtually maintenance free (no moving parts). The Sensistor ISH2000 C can also be run continuously from the battery charger.



### Complete Gas Injection Kit

A complete set of accessories for easy tracer gas filling when leak detecting on aircraft fuel tanks. The equipment includes Injection Pads in two sizes, Injection Fix Kit and Injection Panel with transport case. The Complete Gas Injection Kit is an accessory to the Ex-approved Hydrogen Leak Detector Extrima.

## FACTS ABOUT HYDROGEN AS A TRACER GAS

The gas used for testing is a readily available standard mix of 5% Hydrogen and 95% Nitrogen. Inexpensive, non flammable (see ISO 10156 or EN 720-2), non toxic and with no environmental issues, this gas does not affect the test object, for example aerospace grade steel, aluminium, titanium or composites. Some gas suppliers have their own trade name for this gas mixture.





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