

Leak location on gearboxes



Application

Leak location on assembled gearboxes showing leakage after i.e. a pressure or flow test.

Some customers

Getrag
ZF Steyr
Volkswagen
Volvo Trucks

Specification

Gearboxes are generally required to be oil tight. Below you will find the typical leak specifications expressed in different units. Test pressure is set usually between 0,1 and 0,5 bar.

Leak Specifications (typical)	
mbarl/sec	0,07-0,17
cc/sec	0,07-0,17
cm ³ /min	4-10
Pa m ³ /min	0,007-0,017
mm ³ /min	70-170

Current method and reason for change

The leak location test frequently follows an air pressure or flow test, when the overall leak rate is found to exceed the tightness specification. The current method used for leak location is typically visual using a water bath or a soap spray. The problems encountered with this test are:

- 1) Not all areas are readily accessible for viewing i.e. the back of a fitting or a hard to access angle can be easily missed.
- 2) In presence of large leaks the soap spray is often blown away from the leak site, and in case of small leaks the soap spray is too slow to react. Therefore both types of leak are missed.
- 3) A liquid test is not recommended for gearboxes that house electronic components as corrosion may occur. Additionally the gearbox will have to be dried and cleaned after a wet test.
- 4) Often the leaking gearbox has to be passed to an offline rework station due the long time required to locate the leak.



Fig. Leak Detection with Hydrogen Trace Gas

The Sensistor solution

Connections and seals to the gearboxes are made in the same manner as for a pressure or flow test. The test using the Sensistor equipment is sequenced as follows:

In instances where the gearbox allows for vacuum, a brief evacuation phase will purge air from the relevant compartment to be tested. After that a gas mixture consisting of 5% Hydrogen and 95% Nitrogen is used to pressurise the system. A hand probe connected to the Sensistor H2000 PLUS Hydrogen Leak Detector is then used to inspect all areas by scanning it along and around all suspect joints and assembled components. Audio and visual alarms are activated indicating the precise location of the leak that is above the preset reject level. Leak size measurements can be taken at any time.

Benefits of Sensistor Hydrogen Leak Testing

- Fast pin-pointing of the leak position
- No operator interpretation of the leak size, precise measurement obtained
- Repair only the sites that are leaking above the reject level
- No time wasted in cleaning up or drying after testing
- All leaks detected even in hard to access areas
- Reduces or eliminates rejects at the hot test stage due to fluid leaks
- Improves quality and saves time

Equipment used

Hydrogen Leak Detector H2000 PLUS

The H2000 PLUS is virtually maintenance free (no moving parts) making it the ideal detector for the production floor. A microelectronic sensor that responds only to the Hydrogen gas ensures that true readings for the leak are obtained each and every time.



Leak Detection System ILS500 (optional)

The Leak Detection System ILS500 is a complete equipment for leak detection based on the Hydrogen Gas Method. It includes three main modules: the Controller Unit, the Detector Unit and the Operator Unit which allow exact tooling control, trace gas handling, test sequencing and leak testing. The pre-evacuation phase (optional) and the pressurization phase with the trace gas to the gearbox are completely controlled by the touch of a button. Complete confidence that the trace gas has reached all suspect leak areas is assured. ILS500 also controls the exhaust phase of the gas after the test and the disconnection of the gas connectors.



Trace Gas Filler TGF10 (optional)

The Trace Gas Filler TGF10 is an accessory to the H2000 PLUS Hydrogen Leak Detector, designed to evacuate the gearbox and fill it with trace gas prior to leak location. The TGF10 is also adapted for simple integration with existing pressure decay equipment.



Facts about Hydrogen as a trace gas

The gas used for testing is a mix of 5% hydrogen and 95% nitrogen which is inexpensive, non flammable (see ISO 10156), non toxic and with no environmental issues is the ideal trace gas for leak testing. With the hydrogen's unique dispersion characteristics it will not only quickly and evenly fill the gearbox but will also quickly clear the test area allowing gearboxes to be continuously tested with no wasted time.

Some gas suppliers have their own trade name for this gas mixture.



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