0110021 R-22MEDV
# Long Term Performance Testing

Samples of production oxygen sensors are routinely retained for on-going long-term performance testing against the published specifications. To accelerate the testing, sensors are maintained in an environment of 100% oxygen, at room temperature. Sensors are routinely reprocessed through production final stage testing to ascertain when a sensor is exhausted or has failed. The following graph illustrates the lifetime results in terms of oxygen percent hours for recent sample sensors that have completed the testing process.
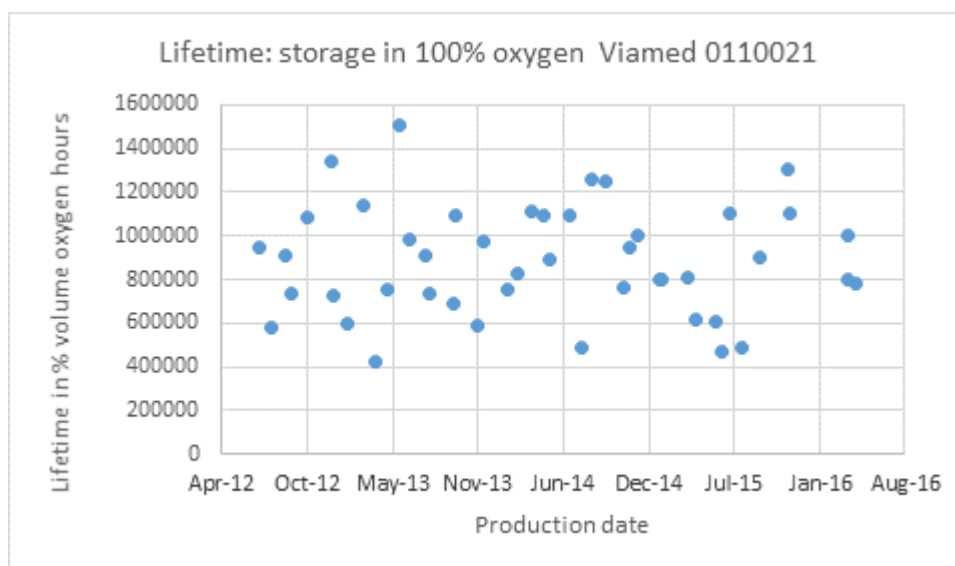
Oxygen sensors undergo the following final stage testing to verify that each sensor meets the published specifications in terms of: output in ambient air, output in oxygen, zero offset voltage, linearity error and response time.

Each sensor is exposed to a flow of dry ambient air for 10 seconds, followed by a flow of dry oxygen for 60 seconds and then to flow of dry nitrogen for a further 60 seconds. The flow rate is 3 L/min.

A typical output measurement is as follows:
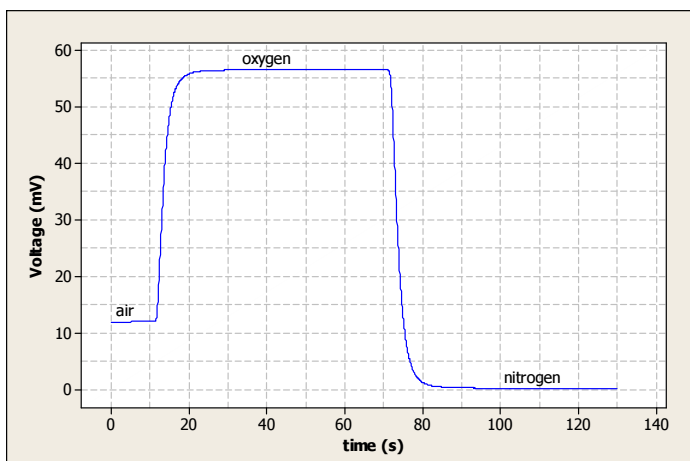
Sensor parameters are derived as follows:

- **Output in ambient air.**

  During the last few seconds of the test, the sensor response is averaged and taken as the sensor output (mV). Actual real time barometric pressure is monitored and used to calculate the pressure compensated sensor output (mV) in ambient air at the standard pressure of 1013 hPa.

- **Output in oxygen.**

  Again, during the last few seconds of the test, the sensor response is averaged and pressure compensated as described above, so as to provide the sensor output (mV) in 100% oxygen.

- **Zero offset voltage.**

  The sensor response between 59.8 and 60 seconds in dry nitrogen is averaged and taken as the zero offset voltage.

- **Linearity error.**

  The linearity error is calculated according to the following equation:

$$\text{linearity error} = \left| \frac{\text{sensor response in 100\% oxygen} \cdot 0.2095}{\text{output in ambient air}} \cdot 100 - 100 \right|$$

- **T90 response time.**

  From the output in ambient air and the sensor response in 100% oxygen the response change is calculated. The time required to reach 10% and 91% of the response change respectively is taken to calculate the T90 time according to the following equation:

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